Software requirement Specification

New bus management system

Version 1.0

12 \ 13 \ 2025

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1. introduction

- This document specifies the production and design of the new bus management system web application
- The NBMS aims to digitize and optimize bus operations, including route management, scheduling, tracking, and reporting. It serves both passengers and administrators to ensure efficient, transparent, and reliable transport services.

1.1 Goals and objectives

- Provide a user-friendly interface for passengers to view routes, and track buses in real time.
- Enable drivers to share live location for buses
- Enable administrators to manage buses, routes, drivers, schedules, and reports.
- Improve transparency and trust through live tracking.

1.2 Scope

- The scope of this system includes developing a web-based Bus Management System that provides real-time bus tracking, route management, driver management, and passenger access to bus information.
- The scope covers all stages from requirements gathering, system design, database modeling, backend/frontend development, testing, deployment, and delivering a functional web application.
- The system will not include mobile app development, payment processing, or advanced analytics in this version.

1.3 Intended Audience and Reading Suggestion

- This document is intended for instructor, developers, and stakeholders involved in the development of the system.

- Instructor are advised to read the document to understand the system scope, overall description, requirements.

- Developers should focus on the functional and non-functional requirements, and interface descriptions to guide the implementation process.

- Stakeholders may review the introduction and user requirements sections to gain a general understanding of the system's objectives and functionality.

1.5 Glossary

Term	Definition
NBMS	New Bus Management System, the web application for managing buses, routes, and passengers
OTP	One-Time Password sent to users via email for password reset or verification.
Real-time GPS Tracking	Functionality that allows the system to track the location of buses and passengers continuously

1.6 Overview of document

This document specifies the requirements for the New Bus Management System (NBMS). It provides a detailed description of the system's objectives, features, user classes, interfaces, and functional and non-functional requirements.

This document is intended to guide developers, instructors, and stakeholders in understanding the NBMS system, its components, and expected behavior, ensuring proper implementation and evaluation

2. overall description

2.1 Product Perspective

The NBMS is a standalone system developed by our team members to address the problem of passengers missing buses and the lack of proper schedule organization. The system provides a digital solution that replaces traditional and manual coordination methods.

The development of NBMS follows an Incremental development model

The system enables users to track buses in real time and receive accurate information about arrival times, allowing them to plan their attendance more efficiently. It also supports better coordination between passengers and drivers through organized routes and schedules.

The NBMS is designed to be user-friendly and operates as an independent application while relying on GPS and internet connectivity to deliver real-time updates.

2.2 Product Functions

- User Registration
- User Login
- Driver Login
- Reset Password
- Store User and Driver Details
- View Bus Trips
- View Passenger Locations for Pickup
- Track Buses in Real Time
- Manage Schedules
- Receive Bus Notifications and Alerts

2.3 Constraints

- Time Constraint: The project must be completed and submitted before the deadline set by the instructor2025\ 1\ 15 .

- User Device Constraint: The user must have a stable internet connection and an active GPS for the application to function properly.

- Technical Constraints: No specific technical restrictions have been imposed; the development team can choose suitable technologies and tools.

2.3 User Classes and Characteristics

The system will have three main user classes: Administrator, Passenger, and Driver, each with specific roles and responsibilities.

The Administrator

is responsible for managing the overall system. This includes adding, editing, or removing drivers and routes, as well as generating reports and monitoring system usage to ensure smooth operations.

The Passenger

interacts with the system by registering and logging in to access its features. Passengers can view bus routes, track buses in real time, plan their attendance, and receive notifications regarding bus schedules, which helps them manage their travel more efficiently.

The Driver

accesses the system to manage their assigned routes. Drivers can view passenger locations for pickups, update the status of their routes, and report any issues encountered during operations, ensuring accurate and timely service for passengers.

2.4 Operating environment

The NBMS will operate in a web-based environment with the following components:

Application Server

Runs the backend using ASP.NET Core.

Database Server

A relational database such as SQL Server.

Client Environment

Any modern web browser (Chrome, Edge, Firefox) can be used to access the web application.

Hosting Environment

The system will be hosted on ASP.Monster that supports ASP.NET Core applications, database connectivity, and multiple concurrent users.

3. External Interface Requirements

3.1 User Interfaces

All user interactions with the system shall be performed through a web-based graphical user interface.

- The system shall provide authentication interfaces, including Login and Registration screens, allowing users to create accounts and securely access the system.
- The system shall provide a Passenger interface that allows users to view available trips, request participation, share their location, and track buses in real time through a map view.
- The system shall provide a Driver interface that allows drivers to start and end trips, view live bus location, and see passenger pickup locations on a map.
- The system shall provide an Administrator interface that enables system administrators to manage users, drivers, routes, trips, and view system reports through a dashboard-style interface

3.2 Hardware Interfaces

The system does not require any dedicated or specialized hardware devices.

The system requires:

- A stable **internet connection** to enable communication with the server and real-time data exchange.

- An active **GPS capability** on user and driver devices to support location tracking functionality.

3.3 Software Interfaces

The NBMS will interact with several software components and frameworks to support its core functionality:

- The system will utilize SignalR to enable real-time communication between the server and connected clients, ensuring live updates for bus tracking and notifications.
- The backend application will be developed using the **.**NET platform, providing a robust and scalable environment for server-side processing.
- The system will interface with SQL Server as the database management system for storing and retrieving user data, trip information, routes, and system records.

3.4 Communication Interfaces

The system communicates with users and system components through standard network communication protocols.

- The system shall use the Internet as the primary communication medium between clients and the application server.
- HTTP/HTTPS protocols shall be used for secure data exchange between the client interface and backend services.
- Real-time communication shall be supported to enable live bus location updates and notifications.
- The system shall support email communication for account verification and password reset services.

4. System features

Feature 1: Real-time GPS Tracking

The system provides real-time GPS tracking for all buses. Passengers can view the current location of buses on a map interface, which helps them plan their attendance and avoid missing buses. Drivers' locations are also tracked to ensure accurate and timely updates for route management.

Feature 2: Route Management

The system allows administrators and drivers to manage trips efficiently. trips can be created, edited, or deleted as needed. The system supports assigning drivers to specific routes, and updating route status in real time, ensuring smooth coordination between passengers and drivers.

Feature 3: Driver Management

The system maintains detailed records of pessengers , including personal information, contact details . Administrators can add, edit, or remove drivers, monitor performance, and manage driver schedules. This feature ensures that all drivers are organized and responsibilities are clearly defined, contributing to the overall efficiency of the system.

5. Specific Requirements

5.1 Functional Requirements

User Requirements:

- The user shall be able to register using email and password.

- After registration, the system shall send an email verification to the provided email.

- The system provides a password reset feature for users who forget their login credentials. When a user requests a password reset, OTP is sent to the registered email address. The user can then enter the OTP to verify their identity and set a new password, ensuring secure access to their account.

- The user shall be required to click a verification button to complete registration.

- The user shall be able to log in using email/username and password after successful verification.

- Upon login, the user shall be able to view available bus trips

- The user shall be able to request to join a trip.

- The user shall be able to share their current location to be shown to the driver.

- The system shall send a notification to the user when the bus is approaching specific stations .

1. Abu Ashra Company
2. Karnak Fuel Station
3. College of Education
4. Mobile Gas Station
5. French International School

Driver Requirements:

- The driver shall be provided with a predefined account (email/username and password) by the system admin.
- The driver shall be able to log in to their account
- The driver shall have access to a simple interface with the following controls
- Start Trip
- End Trip
- When the driver clicks “Start Trip”, the system shall:
- Mark the trip as active.
- Start sharing the live location of the bus
- The driver shall be able to see users’ shared locations to know where to stop for pickups.
- When the driver clicks “End Trip”, the system shall:
- Stop the live location sharing.
- Mark the trip as finished in the system.

Admin requirements

- The administrator shall be able to create, update, and delete trips.
- The administrator shall be able to add, edit, and remove driver accounts.
- The administrator shall be able to view all registered passengers in the system.
- The administrator shall be able to activate or deactivate trips as needed.
- The administrator shall be able to receive and review system reports related to trips, drivers, and system usage.
- The administrator shall be able to manage user access and permissions within the system.

5.2 Non-Functional Requirements

- **Performance and Response Time**

The system shall provide response time not exceed 2 seconds to ensure smooth interaction for users.

The system shall update the live bus location at a maximum interval of 3 seconds, ensuring near real-time tracking for passengers and administrators.

- **Availability**

The system shall be available every day, ensuring continuous access for passengers, drivers, and administrators without unexpected downtime.

- **Security**

The system shall ensure secure handling of user data. User authentication shall be required for access, and all users must have proper authorization to access specific components. Passwords and sensitive tokens shall be securely stored to prevent unauthorized access.

- **Scalability**

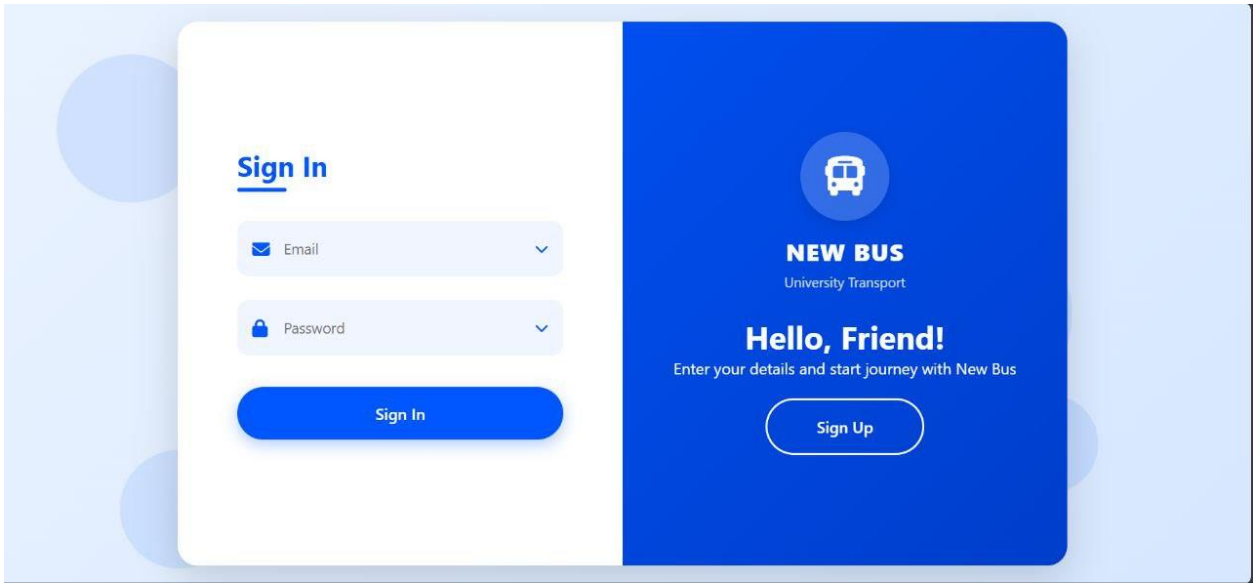
The system shall be designed to handle an increasing number of users and data without degradation of performance. It should support multiple concurrent users efficiently.

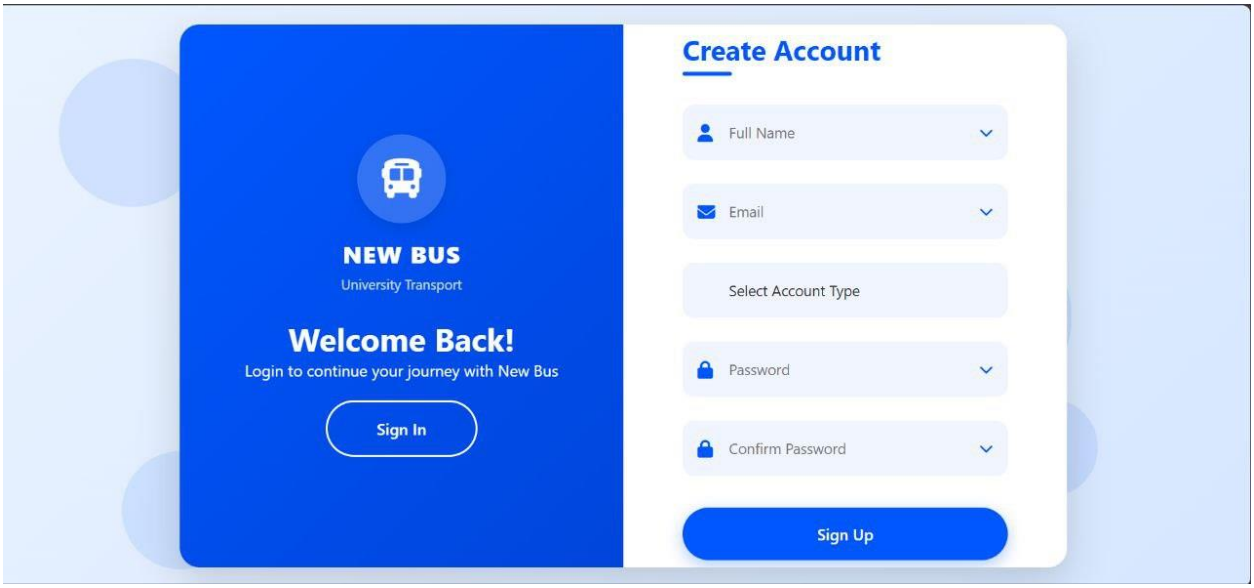
- **Usability**

The system shall provide a user-friendly and intuitive interface, allowing users to easily navigate the application, access features, and complete tasks with minimal training.

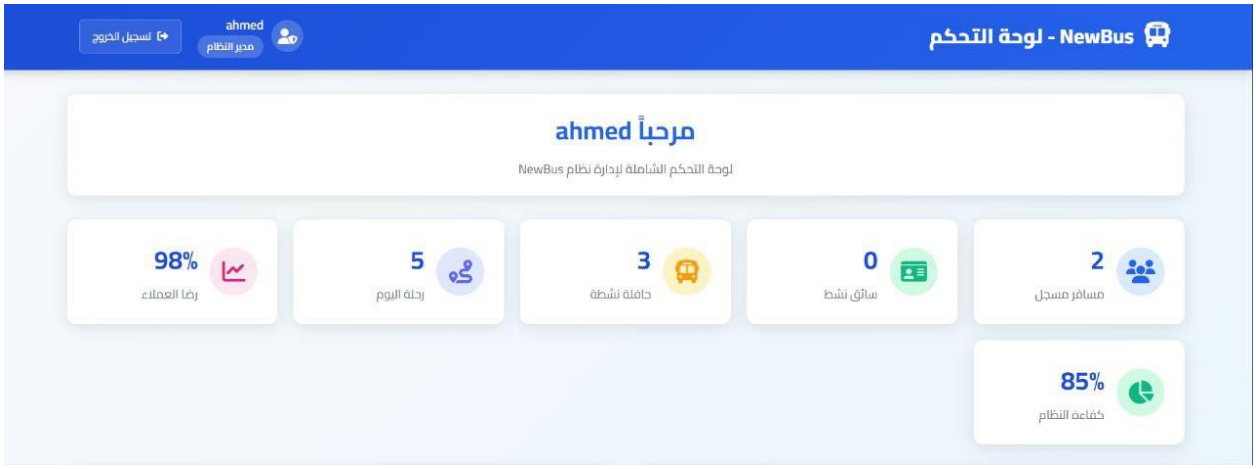
6. User Interface design

6.1 Create account & Sign in Interface

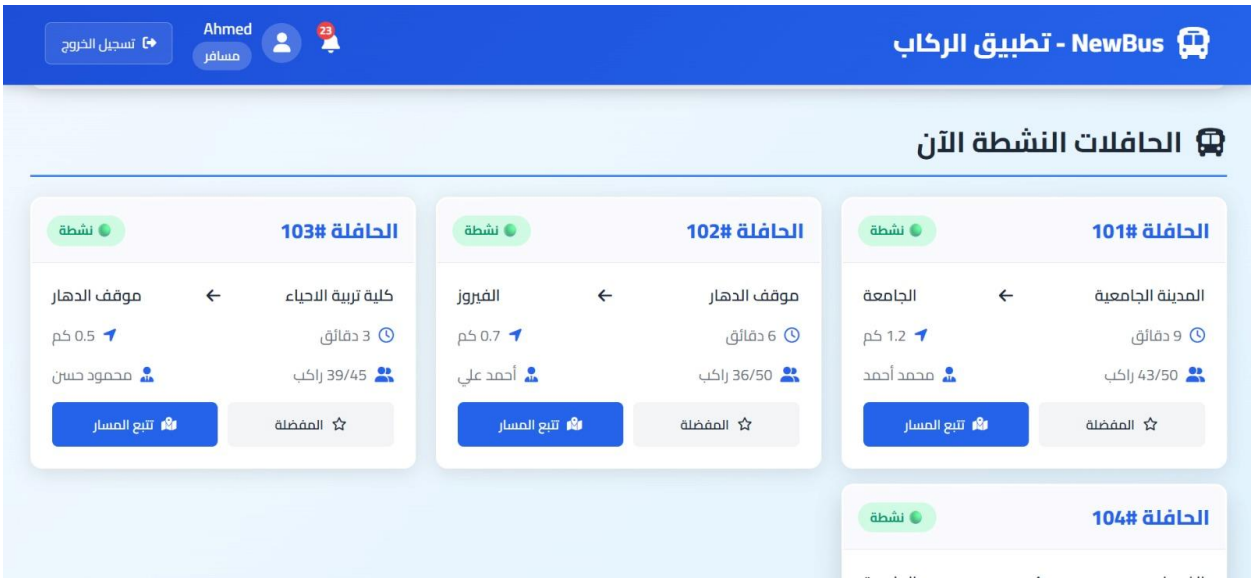




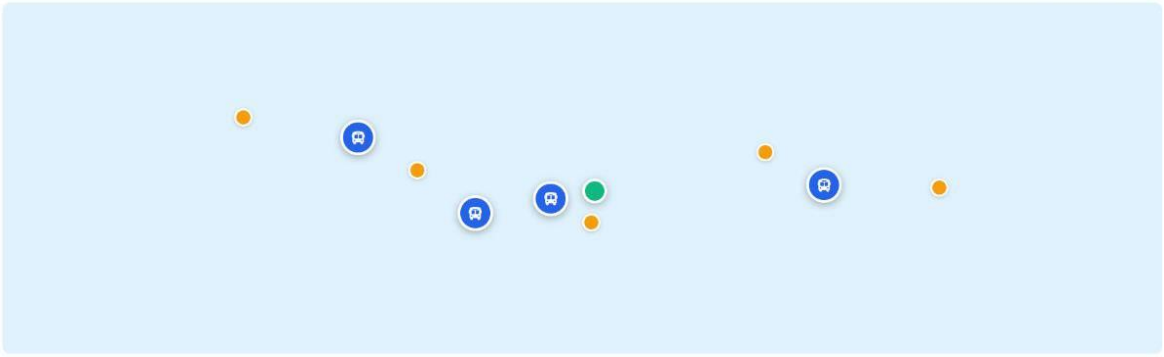
6.2 Admin interface



6.3 Passenger Interface



خريطة حافلات الجامعة



الرحلات الحديثة

تصدير البيانات | بحث في الرحلات...

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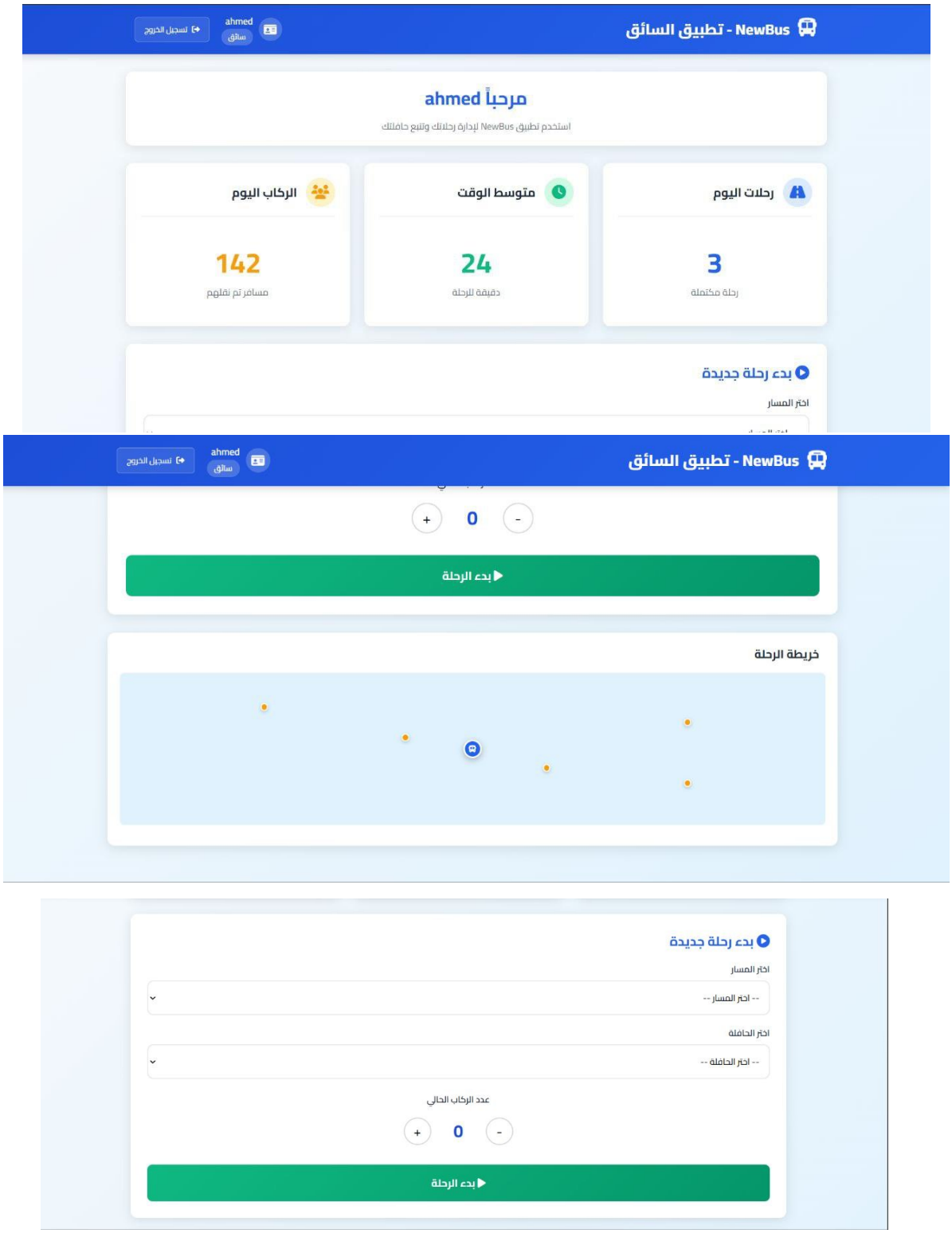
T-1001	محمد أحمد	#101	المدينة الجامعية ← الجامعة	1:00 م - 1:25 م	مكتملة	عرض
T-1002	أحمد علي	#102	موقف الدهار ← الفيروز	1:10 م - 1:22 م	مكتملة	عرض
T-1003	محمود حسن	#103	كلية تربية الاحياء ← موقف الدهار	1:15 م - 1:23 م	مكتملة	عرض
T-1004	خالد محمد	#104	الفيروز ← الجامعة	1:20 م - 1:31 م	مكتملة	عرض
T-1005	عمر سعيد	#105	المدينة الجامعية ← الجامعة	1:30 م - 1:55 م	جارية	عرض

6.4 Driver Interface