Software Engineering
Software Requirements Specification (SRS) Document

GoChariot

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Version 2

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Table of Contents

1. Introduction

1.1. Purpose

The purpose of the GoChariot project is to develop a comprehensive web application to enhance the existing Spartan Chariot tracking system at UNCG. By incorporating features like ride requests, driver reviews, route planning, and real-time location tracking, the project aims to improve safety, convenience, and community engagement for students and drivers.

1.2. Document Conventions

This SRD outlines the requirements and specifications for GoChariot, focusing on user-centric design and developer requirements. It ensures alignment with the functional and non-functional requirements detailed in subsequent sections.

1.3. Definitions, Acronyms, and Abbreviations

Web Application	A software application that runs on a web server, accessible via a web browser.
UNCG	University Of North Carolina At Greensboro
GC	GoChariot, the project name.
API	Application Programming Interface, used for communication between different software components.
MVC	Model-View-Controller, an architectural pattern used for developing user interfaces.
HTML/CSS/JS:	Standard technologies for creating web pages and applications. Backend Framework: The server-side framework used to implement the application logic and database management.
Backend Framework	The server-side framework used to implement the application logic and database management.

1.4. Intended Audience

This document is intended for multiple audiences, including the group, stakeholders at UNCG, and potential end-users such as students and drivers. Each section of the document targets the needs and understanding of these varied groups.

1.5. Project Scope

GoChariot aims to align closely with UNCG's goals of enhancing campus safety and improving student services. The software will provide a comprehensive solution for managing the Spartan Chariot system, offering benefits like:

- Improved safety through real-time tracking and safety alerts.
- Enhanced user experience for students and drivers.
- Efficient management of ride requests and route planning*.
- Building a community through driver reviews and interactions*.

1.6. Technology Challenges

Real-time Data Processing: Implementing efficient real-time updates for Spartan Chariot locations.
Cross-Platform Compatibility: Ensuring functionality across diverse devices and browsers.
Scalability: Adapting to growing user numbers and data.
Data Security: Protecting sensitive user data.
User Interface Design: Creating an intuitive, responsive interface.
System Integration: Integrating with existing UNCG systems.
New Technologies: Incorporating advanced mapping and geolocation services.

1.7. References

Alred, G. J., Brusaw, C. T., & Oliu, W. E. (2003). Handbook of Technical Writing (7th ed.). Boston: Bedford/St. Martin’s.
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UNCG website and current Spartan Chariot system users’ feedback.

2. General Description

2.1. Product Features

- **Account Management**: Registration and login for users, drivers, and admins.
- **Bus Route Visualization**: Real-time tracking and display of bus routes.
- **Ride Request System**: For students to request rides.
- **Driver Review Mechanism**: To share and view feedback.
- **Safety Alerts**: Critical updates and notifications.
- **Admin Controls**: Manage users, routes, and system alerts.

2.2. User Class and Characteristics

The application caters to students, drivers, and admins at UNCG, designed for ease of use without requiring advanced technical skills.

2.3. Operating Environment

GoChariot is a web-based application accessible via various internet-connected devices, including smartphones, tablets, and computers.

2.4. Constraints

Key constraints include internet connectivity, cross-platform compatibility, and integration with existing UNCG systems.

2.5. Assumptions and Dependencies

The project assumes the availability of essential software components like Bootstrap, React*, Spring Boot, and relies on external APIs for location tracking.

This refined approach ensures that the introduction and general description sections are in harmony with the detailed functional and non-functional requirements you've outlined, providing a cohesive and comprehensive overview of the GoChariot project.

3. Functional Requirements

(* = tbd)

The system first has a sign up and login feature for each respective user. The system will respond to bus routes the driver inputs and user requests. The admin will also have the ability to manage all users and bus routes.

3.1. Primary

The system doesn't consist of design, graphics, or operating system requirements or constraints?

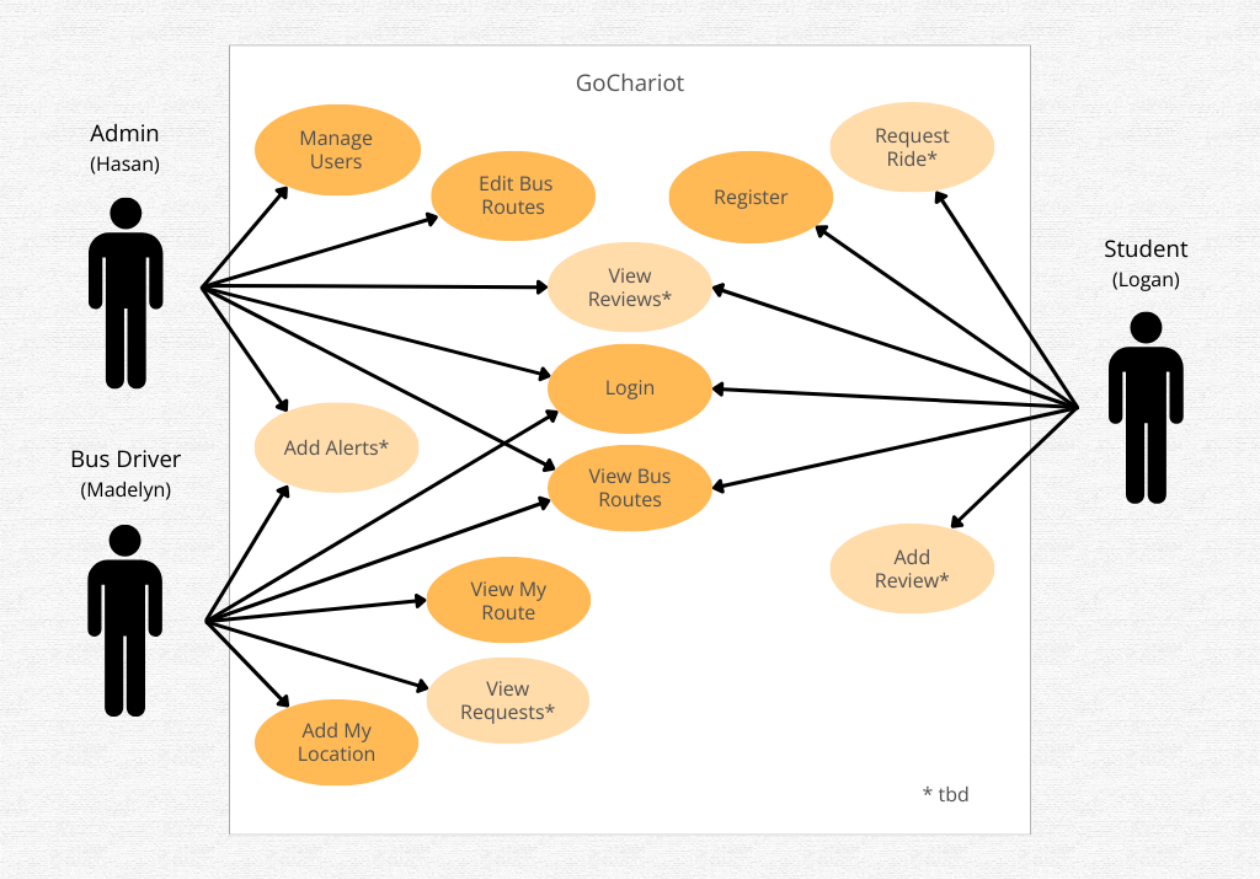
- FR0: The system will allow the user, driver, and admin to view all UNCG bus routes
- FR1: The system will allow the user to register an account
- FR2: The system will allow the user to request a ride*
- FR3: The system will allow the user to add and view reviews*
- FR4: The system will allow the driver to view assigned bus route and add location
- FR5: The system will allow the driver to view ride requests*
- FR6: The system will allow the driver and admin to add alerts*
- FR7: The system will allow the admin to manage users
- FR8: The system will allow the admin to view reviews*

3.2. Secondary

- Location services for all users
- TransitStat/Passiogo API for chariot tracking

3.3. Use-Case Model

3.3.1. Use-Case Model Diagram



3.3.2. Use-Case Model Descriptions

3.3.2.1. Actor: Student (Logan)

- Register: make an account using UNCG credentials
- View Bus Routes: view live map of all available and running bus routes
- Request Ride*: submit ride request from point A to point B
- Add Review*: submit evaluation of bus ride experience

3.3.2.2. Actor: Driver (Madelyn)

- View Bus Routes: view live map of all available and running bus routes
- View Assigned Route: view map and schedule of assigned bus route
- Add Location: add tracking location (to show on map)
- View Requests*: view ride requests, ride queues
- Add Alert*: create and post announcement/notification

3.3.2.3. Actor: Admin (Hasan)

- View Bus Routes: view map of all available and running UNCG bus routes
- Manage Users: ability to view, add, and remove users
- Edit Bus Routes: add bus routes, add bus stops
- Add Alert*: create and post announcement/notification
- View Reviews*: view evaluations of bus ride experiences

3.3.3. Use-Case Model Scenarios

3.3.3.1. Actor: Student, Driver, Admin (Logan, Madelyn, Hasan)

- **Use-Case Name**: View Bus Routes
  - **Initial Assumption**: The user is logged in
  - **Normal**: The user will see a live map of all available and running UNCG bus routes
  - **What Can Go Wrong:** The map is not visible
  - **Other Activities**: Logout, request ride*, add review*
  - **System State on Completion**: View bus routes live map
- **Use-Case Name**: Register/Login
  - **Initial Assumption**: The user has access to the web app
  - **Normal**: The user will have successfully logged in and will see a live map of all available and running UNCG bus routes
  - **What Can Go Wrong**: Invalid credentials
  - **Other Activities**: n/a
  - **System State on Completion**: Full access to web app

3.3.3.2. Actor: Driver (Madelyn)

- **Use-Case Name**: View My Route
  - **Initial Assumption**: The driver is logged in
  - **Normal**: The driver will see assigned schedule and bus route
  - **What Can Go Wrong**: The map/assigned route is not visible
  - **Other Activities**: Logout, add location, view requests*, add alerts*
  - **System State on Completion**: View map and assigned bus route
- **Use-Case Name**: Add Location
  - **Initial Assumption**: The driver is logged in and in route
  - **Normal**: The driver will turn on tracking in assigned chariot
  - **What Can Go Wrong**: Tracking error
  - **Other Activities**: Logout, view requests*, add alerts*
  - **System State on Completion**: Live location is visible

3.3.3.3. Actor: Admin (Hasan)

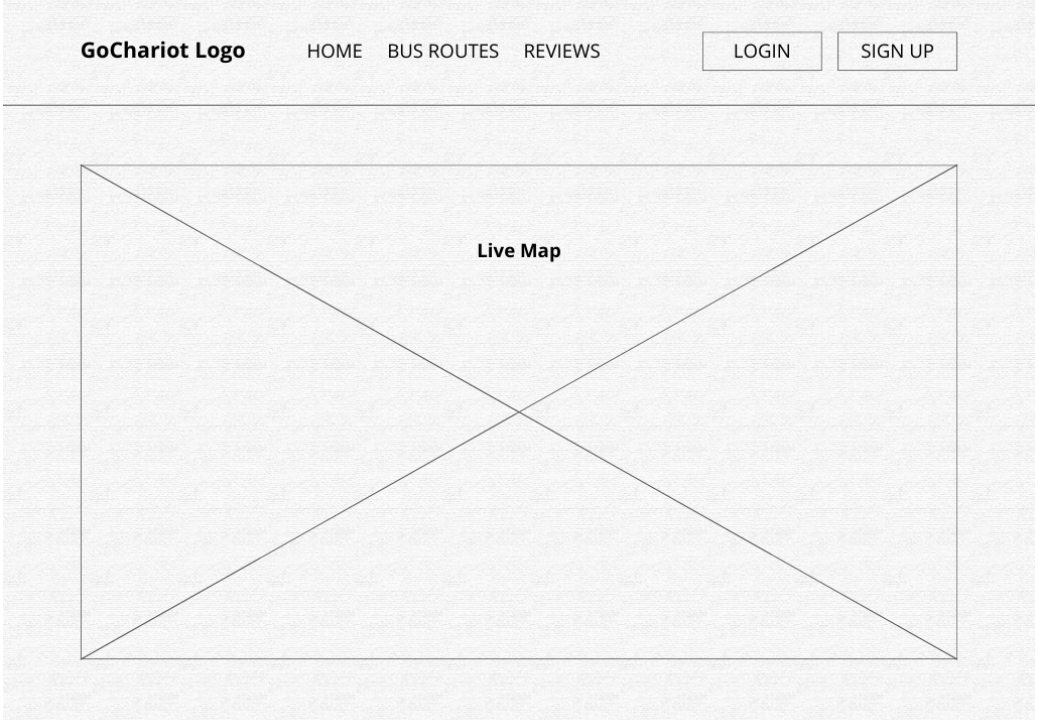
- **Use-Case Name**: Edit Bus Routes
  - **Initial Assumption**: The admin is logged in
  - **Normal**: The admin can add/remove/hide bus stops
  - **What Can Go Wrong**: Invalid route information
  - **Other Activities**: Logout, manage users, view bus routes
  - **System State on Completion**: Updated bus route
- **Use-Case Name**: Manage Users
  - **Initial Assumption**: The admin is logged in
  - **Normal**: The admin can edit/add/remove users
  - **What Can Go Wrong**: Invalid account info
  - **Other Activities**: Logout, edit bus routes, view bus routes
  - **System State on Completion**: Updated user accounts

4. Technical Requirements

4.1. Interface Requirements

4.1.1. User Interfaces

Every page will feature a header, navigation bar, login, and a body that will display a live map and respective information.



4.1.2. Hardware Interfaces

The web application will run on any hardware device that has access to the internet, the ability to display webpages, and the ability to interact with web pages. This includes, but is not limited to, smartphones, tablets, desktop computers, and laptops.

4.1.3. Communications Interfaces

(* = tbd)

It must be able to connect to the Internet as well as the local database running on PostgreSQL. The communication protocols, HTTP and WebSocket*, must be able to connect to the Transitstatus API and the Passio Go! WebSocket* and return bus coordinates and destinations.

4.1.4. Software Interfaces

We will use Bootstrap, React*, and Spring Boot ThymeLeaf to help build the front-end. We will also use JPA for the backend database functionality, as well as using Spring Boot with Java to connect the front-end to the back-end.

5. Non-Functional Requirements

5.1. Performance Requirements

- NFR0(R): The local copy of the Go Chariot database will consume less than 50 MB of memory
- NFR1(R): The system (including the local copy of the Go Chariot database) will consume less than 150MB of memory
- NFR2(R): The novice user will be able to intuitively navigate the map for viewing bus routes.
- NFR3(R): The expert user will be able to view bus driver reviews/routes and use it to make an informed decision for requesting/deciding on rides.

5.2. Safety Requirements

False safety alerts could be reported that would lead to unnecessary panic for users. With this in mind, administrators will be able to remove/resolve safety alerts.

5.3. Security Requirements

- NFR4(R): The system will only be usable by authorized users.
- NFR5(R): Passwords for accounts will be stored securely (hashed and salted).
- NFR6(R): Users will be able to decide what is publicly available about them on their profile.

5.4. Software Quality Attributes

5.4.1. Availability

Go Chariot will be available to users at all times.

5.4.2. Correctness

All displayed information on Go Chariot will be correct and not outdated.

5.4.3. Maintainability

Go Chariot does not have a set lifespan. Go Chariot's code will be sufficiently documented, use modular programming, and be cost effective for great maintainability. If the software faces system failure, administrators will be alerted so that it can be resolved as quickly as possible.

5.4.4. Reusability

Go Chariot's code will be modular and use consistent and well-established libraries/software, which means that the components will have good reusability.

5.4.5. Portability

All components behind Go Chariot are cross-platform, meaning the software will be able to be deployed on any modern system. The front-end will also be able to be accessed by any device that can connect to the Internet and access a website.

5.5. Process Requirements

5.5.1. Development Process Used

Agile

5.5.2. Time Constraints

TBD* (Due dates for presentations throughout the semester)

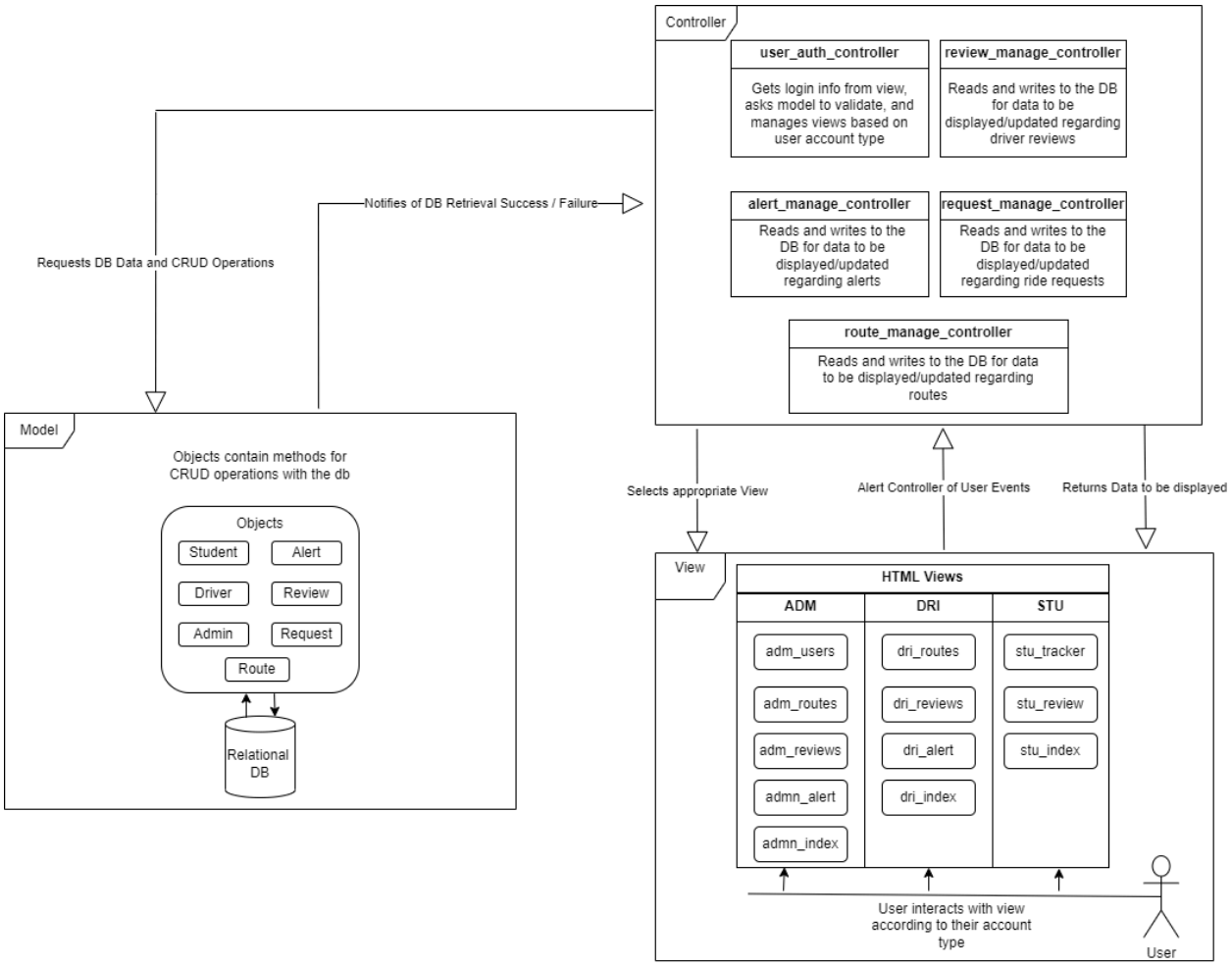
5.5.3. Cost and Delivery Date

$0 and end of the semester (May 1st, 2024).

5.6. Other Requirements

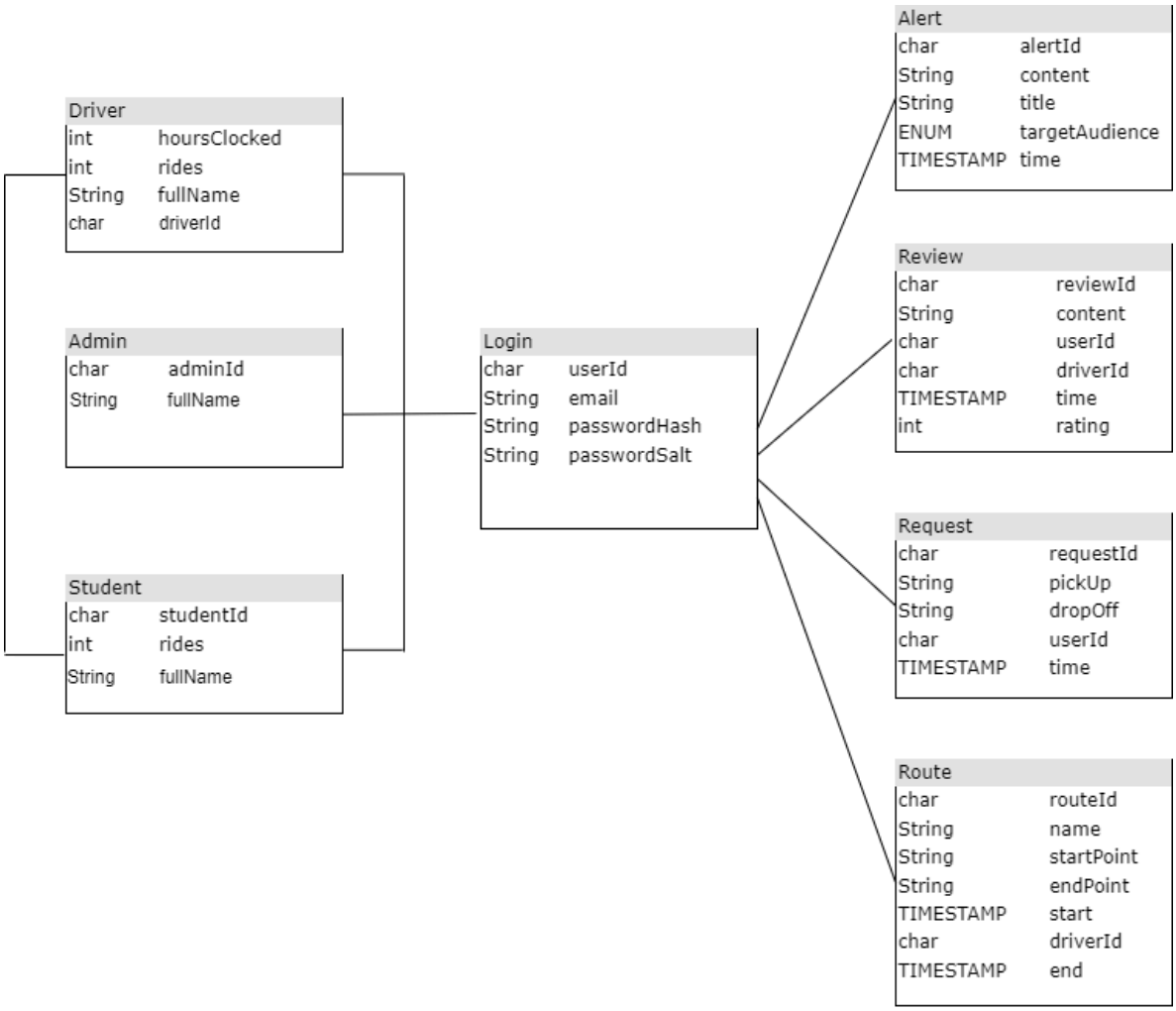
6. Design Documents

6.1 Software Architecture



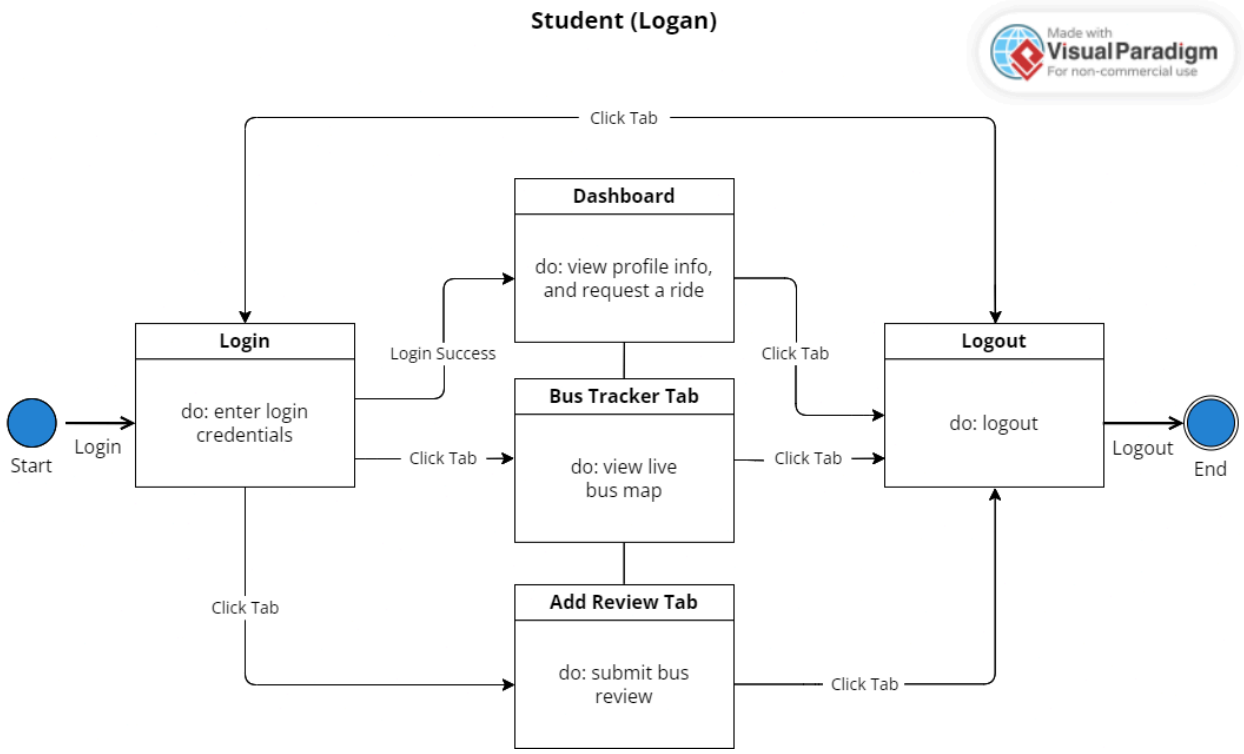
6.2 High-Level Database Schema

The data being stored on the system will be stored using a relational database. It will use a local PostgreSQL server. The data will be created and updated via interacting with endpoints in the Controller that query the local PostgreSQL server. The data being stored will be information about admins, students, drivers, login information, alerts, reviews, routes, and requests – more can be seen on this in the diagram below.

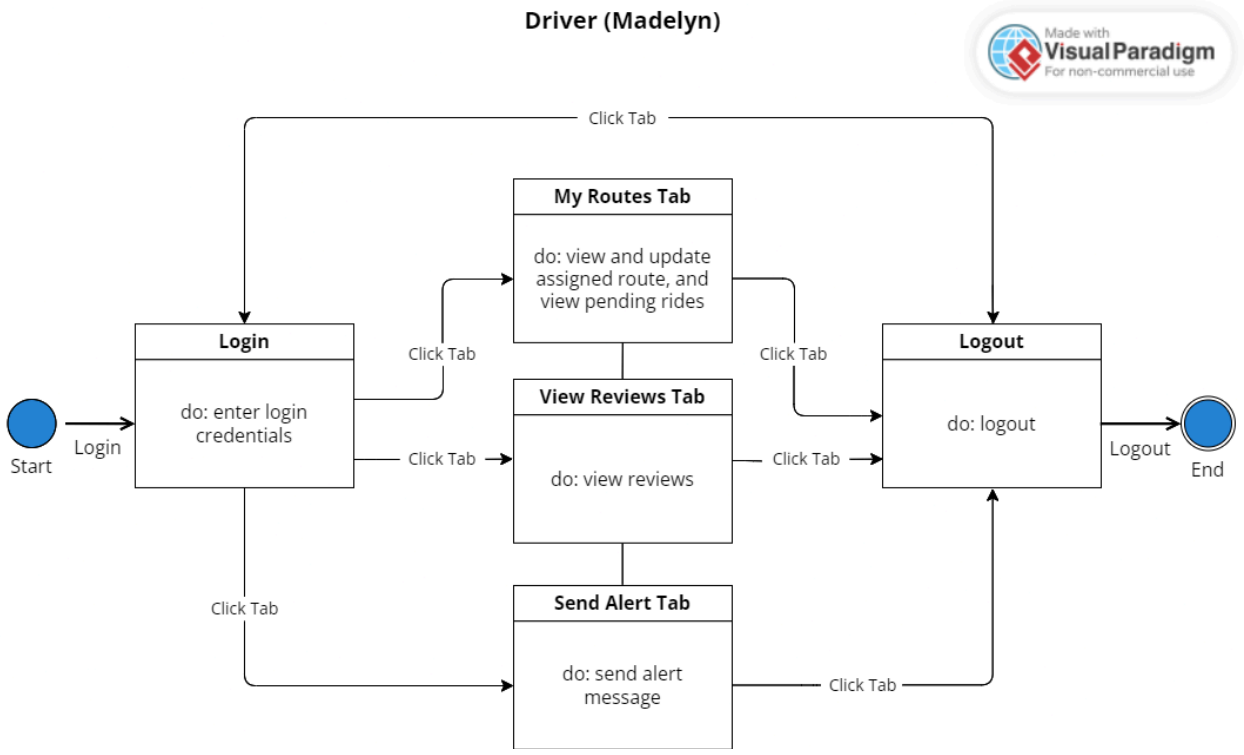

Alert
char alertId
String content
String title
ENUM targetAudience
TIMESTAMP time
Driver
int hoursClocked
int rides
String fullName
char driverId
Review
char reviewId
String content
char userId
char driverId
TIMESTAMP time
int rating
Admin
char adminId
String fullName
Login
char userId
String email
String passwordHash
String passwordSalt
Request
char requestId
String pickUp
String dropOff
char userId
TIMESTAMP time
Student
char studentId
int rides
String fullName
Route
char routeId
String name
String startPoint
String endPoint
TIMESTAMP start
char driverId
TIMESTAMP end

6.3 Software Design

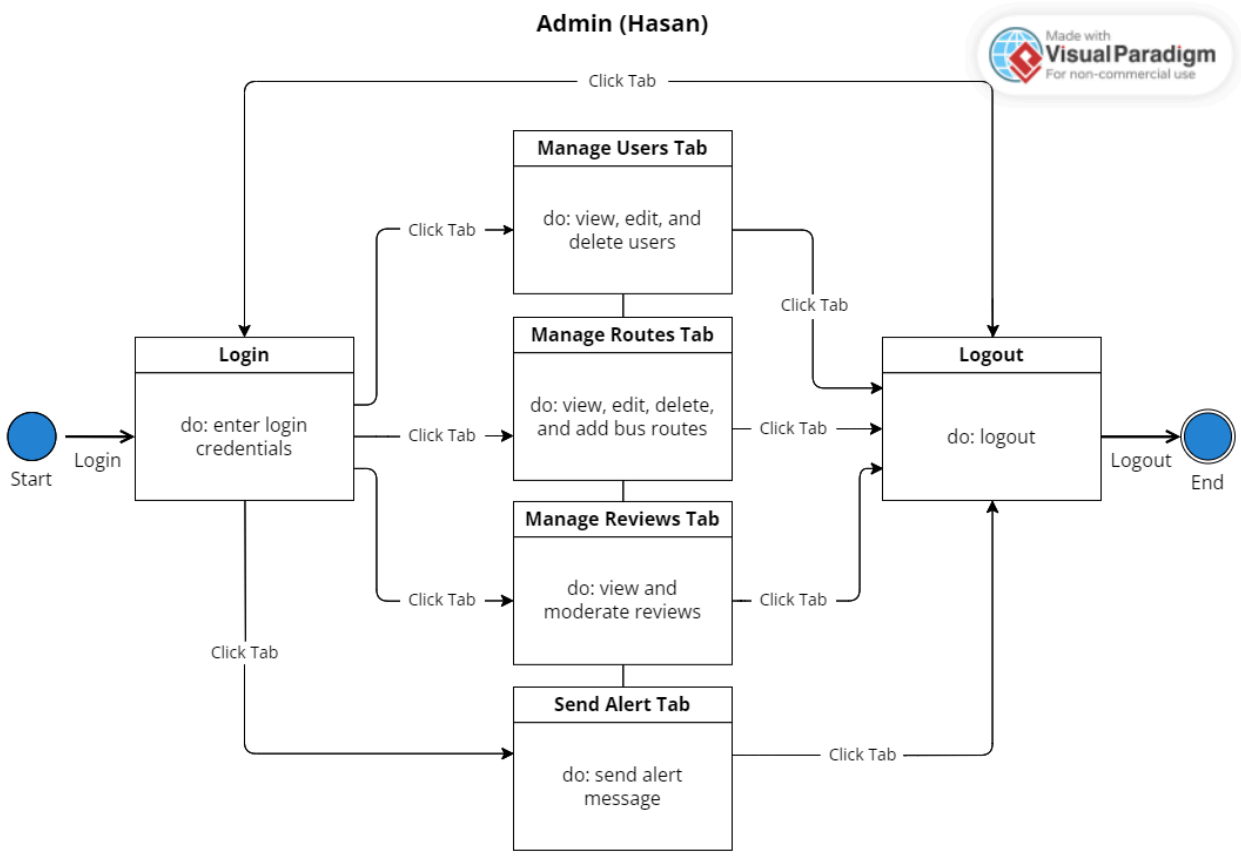
6.3.1 State Machine Diagram: Student (Logan Phillips)



6.3.2 State Machine Diagram: Driver (Madelyn Good)



6.3.3 State Machine Diagram: Admin (Hasan Hashim)



6.4 UML Class Diagram

(tentative)