**SIMATS SCHOOL OF ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**CHENNAI-602105**

**Smart Bus Pass System**

**A CAPSTONE PROJECT REPORT**

***Submitted in the partial fulfillment for the award of the degree of***

**BACHELOR OF ENGINEERING**

**IN**

**COMPUTER SCIENCE AND ENGINEERING**

**Submitted by**

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**September 2024**

**DECLARATION**

We,P.Srividya,Y.Sravani, students of **Bachelor of Engineering in Information Technology**, Department of Computer Science and Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, hereby declare that the work presented in this Capstone Project Work entitled **Smart Bus Pass System** is the outcome of our own bonafide work and is correct to the best of our knowledge and this work has been undertaken taking care of Engineering Ethics.

(P.Srividya 192210463)

(Y.Sravani 192210028)

Date:

Place:

**CERTIFICATE**

This is to certify that the project entitled **“Online Bus Pass System”** submitted by P.Srividya,Y.sravani has been carried out under my supervision. The project has been submitted as per the requirements in the current semester of B. Tech Information Technology.

Teacher-in-charge

**Mr.Yuvaraj**

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**Abstract:**

The bus pass system is designed to cater to various user groups, including students and working professionals. Each pass contains essential details such as the user’s name, address, date of birth, email ID, and a photograph. For students, the pass also includes information about their school, such as the name and validity period. Government school students benefit from free bus passes, while other students will have to pay a fee. This ensures equitable access to transportation services for students of different backgrounds.

For working professionals, the system replaces school-related details with information about the user’s organization. The structure of the pass remains consistent, but the customization ensures relevance for different user types. By offering flexibility, the system streamlines the process for individuals needing public transportation for commuting, whether to schools or workplaces. All necessary details are displayed clearly on the bus pass to make verification easier.

Renewal options are designed to be user-friendly, allowing individuals to renew their passes on a monthly basis according to their preferences. The system automatically calculates and deducts the renewal fee based on the selected renewal period, making the process efficient and hassle-free. This approach enhances convenience for both students and professionals, providing a streamlined, adaptable bus pass system that meets varying user needs.

**Introduction:**

Public transportation plays a crucial role in daily commuting for a wide range of users, from students to working professionals. To ensure efficient and seamless access to these services, a bus pass system is implemented, tailored to meet the specific needs of different users. The bus pass serves as an essential identification and payment tool, containing personal details such as the user’s name, address, date of birth, email ID, and a photograph. By incorporating such key information, the system helps streamline the process of verification and access to public transportation.

For students, the bus pass is further customized to include additional details like the name of their school, the validity period, and the fee paid for the pass. Special provisions are made for government school students, who receive the pass for free, promoting equitable access to transportation. This feature ensures that students from all backgrounds can benefit from the public bus system, making commuting to school more accessible and affordable.

Working professionals, on the other hand, will have a modified version of the bus pass that includes their organizational details instead of school information. This allows the bus pass system to be relevant and efficient for those who commute daily to their workplaces. By tailoring the pass to different user categories, the system ensures that it remains versatile and user-centric, catering to both educational and professional needs.

The bus pass system also offers flexibility in its renewal process. Users can opt for a monthly renewal based on their individual needs, with the amount for renewal deducted automatically depending on the selected period. This feature provides users with the ability to manage their transportation needs more effectively, without the hassle of long-term commitments. The combination of customizable details and a user-friendly renewal process makes this bus pass system an efficient solution for a diverse set of commuters.

**Project Description:**

The bus pass system is designed to cater to different user groups, such as students and working professionals, by providing personalized passes with essential details. For students, the pass includes the user's name, address, date of birth, email ID, photograph, school name, validity period, and the amount paid (free for government school students). In contrast, for working professionals, the pass contains organization details instead of school information. This distinction ensures that the bus pass remains relevant and practical for each type of user, whether for commuting to school or work.

A key feature of the system is its flexible renewal process, allowing users to renew their bus passes on a monthly basis based on their needs. The system automatically calculates and deducts the appropriate fee for the chosen renewal period, making it a convenient and efficient option for users. This combination of personalized information and flexible renewals enhances the overall experience, offering a simple and accessible solution for managing public transportation services.

**Problem Description:**

Develop a simple software application for managing bus passes for different user types, such as students and working professionals. The software should generate a bus pass containing essential information, including the user's name, address, date of birth, email ID, and a photograph. For students, the bus pass must also include the school name, validity period, and the amount paid (with government school students receiving free passes). For working professionals, the pass should replace school-related details with information about their organization.

The system should allow users to renew their passes on a monthly basis, as per their preference. The renewal fee must be automatically calculated and deducted based on the selected renewal period. The software should provide a streamlined experience for both students and working professionals, offering flexible renewal options and accurate handling of personal information.

### **Tool Description:**

**User interface:**

1.**Register Page:**

* + **Fields:** Name, Address, Date of Birth, Mail ID, Password, School/Organization, Upload Photo
  + **Buttons:** Register, Cancel

**Login Page:**

* + **Fields:** Username, Password
  + **Buttons:** Login

**Dashboard:**

* + Quick view of current bus pass, balance in eWallet, bus timings, renewal status.

**Add Money – eWallet:**

* + **Fields:** Amount to Add
  + **Payment Method:** Choose (Card, UPI, etc.)
  + **Buttons:** Add Money

**Buy Bus eTicket:**

* + **Fields:** Destination, Number of tickets, Date/Time
  + **Buttons:** Buy Ticket
  + **Display:** Ticket details with QR code

**Apply New Bus Pass:**

* + **Form:** Enter required details (Name, Address, DOB, Mail ID, School/Organization, Validity Period, etc.)
  + **Buttons:** Submit, Cancel

**Renewal Bus Pass:**

* + **Fields:** Choose Renewal Period (1 month, 3 months, etc.)
  + **Buttons:** Renew Pass

**Apply Student & Route Pass:**

* + **Form:** Similar to new bus pass with different options for student vs. route users.
  + **Buttons:** Apply, Cancel

**Get QR Code for Bus Pass:**

* + **Display:** QR Code for the bus pass
  + **Button:** Download QR Code

**Calculate Expected Time to Reach:**

* + **Fields:** Enter starting point, destination
  + **Display:** Expected arrival time of the bus based on current bus location

### **Conductor Interface:**

1. **Login Page:**

**Fields:** Username, Password

**Buttons:** Login

1. **Scan QR Code:**

**Action:** Access camera or upload QR code for scanning

**Display:** Verification details for the bus pass/ticket

1. **Verify Bus Pass ID:**

**Field:** Enter or scan pass ID

**Display:** User details, pass validity, route details

1. **Verify Bus Ticket:**

**Field:** Enter or scan ticket ID

**Display:** Ticket details, trip details

1. **Update Bus Location:**

**Action:** Manually update bus location or use GPS tracking

### **UI Design Notes:**

* **Navigation:** Each user will have a sidebar or top navigation menu to easily access different functionalities (e.g., "Manage Passes", "Renew Pass", "Scan QR").
* **Forms:** Use simple, user-friendly forms with clear labels for data entry.
* **QR Code Integration:** Each pass and ticket will have a corresponding QR code, ensuring quick scanning and validation.
* **Notifications:** Users and admins can be notified about expiring passes, successful renewals, and account updates via a notification system.
* **Responsive Design:** The interface should be mobile-friendly, ensuring easy access for conductors and users on the go.

**Features:**

### **Admin Features:**

1. **Login**: Secure access to the admin portal.
2. **Manage Student & Route Pass**: Admins can view, edit, approve, or reject applications for both student and route bus passes.
3. **Manage Conductor Login**: Admins can create and manage accounts for conductors.
4. **Approve Bus Pass**: Admins review applications and approve or deny bus passes.
5. **Generate QR Code**: Admins can generate unique QR codes for approved bus passes.
6. **Create Bus Details**: Admins can enter and update information about buses (Bus number, seating capacity, etc.).
7. **Create Route Information**:
   * **From**: Starting point.
   * **To**: Destination.
   * **Time**: Schedule or timetable.
   * **Route Stopping**: List of stops along the route.

### **User Features:**

1. **Register**: Users sign up by entering personal details.
2. **Login**: Secure access to their account.
3. **Add Money – eWallet**: Users can load money into an eWallet for easy payment.
4. **Buy Bus eTicket**: Users can purchase digital tickets for bus rides.
5. **Apply New Bus Pass**: Users can apply for new bus passes (student or route).
6. **Renewal Bus Pass**: Option for renewing the bus pass on a monthly basis with automatic payment deductions.
7. **Apply Student & Route Pass**: Application options for both student-specific and route bus passes (with relevant details for each type).
8. **Get QR Code for Bus Pass**: Users receive a QR code after applying/renewing their bus pass.
9. **Calculate Expected Time to Reach**: Track the bus and estimate the time of arrival at their stop.

### **Conductor Features:**

1. **Login**: Secure access to the conductor’s account.
2. **Scan QR**: Verify the bus pass by scanning the user’s QR code.
3. **Verify Bus Pass ID**: Check the bus pass ID for validation.
4. **Verify Bus Ticket**: Verify if the user has purchased a valid bus ticket.
5. **Update Bus Location**: Update the bus's real-time location for user tracking.

**Operations:**

### **Admin Operations:**

1. **Login**: Admins log in to access the management dashboard.
2. **Manage Student & Route Pass**: Admins can create, update, and manage both student and route passes, including details of candidates and routes.
3. **Manage Conductor Login**: Admins handle the creation and management of conductor accounts.
4. **Approve Bus Pass**: Admins review and approve bus pass applications for students and route users.
5. **Generate QR Code**: Admins generate a unique QR code for each approved bus pass, allowing for quick verification by conductors.
6. **Create Bus Details**: Admins input and update bus details such as bus numbers, bus types, and other specifics.
7. **Create Route Information**:
   * Admins define routes by entering the starting point, destination, time, and all route stops.

### **User Operations:**

1. **Register**: Users can sign up by providing their personal information (name, address, email, etc.).
2. **Login**: Registered users can log in to access their account and services.
3. **Add Money – eWallet**: Users can add money to their eWallet to pay for bus tickets, passes, or renewals.
4. **Buy Bus eTicket**: Users can purchase digital bus tickets using their eWallet balance.
5. **Apply for New Bus Pass**: Users can apply for a new student or route pass by submitting their details.
6. **Renewal of Bus Pass**: Users can renew their bus pass on a monthly basis, with the renewal amount automatically deducted.
7. **Apply for Student & Route Pass**: Users choose between applying for a student pass or a route pass depending on their needs.
8. **Get QR Code for Bus Pass**: After applying, users receive a QR code that serves as their digital pass.
9. **Calculate Expected Time to Reach**: Users can calculate the expected time of arrival for a bus based on real-time data.

### **Conductor Operations:**

1. **Login**: Conductors log in to access the system and perform their duties.
2. **Scan QR Code**: Conductors scan the QR code from a passenger’s bus pass for verification.
3. **Verify Bus Pass ID**: Conductors verify the authenticity of the bus pass by checking the ID.
4. **Verify Bus Ticket**: Conductors ensure the bus ticket is valid before allowing a passenger to board.
5. **Update Bus Location**: Conductors can update the real-time location of the bus for tracking purposes.

**Approach / Module Description / Functionalities:**

### **1. User Role-based System Design**

The system will differentiate user functionalities based on three primary roles: **Admin**, **User**, and **Conductor**. Each role has a specific set of tasks and permissions, allowing for better management and security.

### **2. Modules and Functionalities:**

### **A. Admin Module:**Admins manage the overall system and approve pass applications, manage user accounts, and set up the bus and route details.

* **Login Module**:
  + Admin login with secure credentials.
  + Role-based access control ensures that only admins can access management features.
* **Manage Student & Route Pass Module**:
  + Create, update, and delete bus pass records for both students and route passengers.
  + Handle candidate details like name, school/organization, validity, and payment status.
* **Manage Conductor Login Module**:
  + Admins can create and manage conductor accounts.
  + Grant and revoke access based on employment status.
* **Approve Bus Pass Module**:
  + Admins review new applications submitted by users.
  + Approve or reject applications, including verifying candidate details.
* **Generate QR Code Module**:
  + After approval, the system generates a QR code for each bus pass.
  + QR code contains encrypted information such as the pass ID, validity period, and user details.
* **Create Bus Details Module**:
  + Admins can add bus details (bus number, bus type, etc.).
  + Manage and update information on buses.
* **Create Route Information Module**:
  + Admins define routes with "From", "To", timings, and stopping points.
  + Real-time updates can be provided to users based on the current location of the bus.

#### **B. User Module**

Users can apply for a bus pass, renew it, purchase tickets, and track buses in real time.

* **Register Module**:
  + Users provide their personal information to register.
  + Input details like name, address, email, school (students) or organization (for route passes).
* **Login Module**:
  + User login with credentials to access their profile and services.
* **Add Money – eWallet Module**:
  + Users can top up their eWallet balance for bus pass renewals, ticket purchases, etc.
  + Supports multiple payment gateways for convenience.
* **Buy Bus eTicket Module**:
  + Users can buy digital tickets from the eWallet.
  + These tickets are stored in the user’s account with a generated QR code for conductor verification.
* **Apply New Bus Pass Module**:
  + Users can submit an application for a new bus pass (student or route pass).
  + They need to fill in details like personal info, school/organization, and upload necessary documents.
* **Renewal of Bus Pass Module**:
  + Users can renew their pass on a monthly basis.
  + Automatic deduction of renewal charges from the eWallet based on the selected period.
* **Apply for Student & Route Pass Module**:
  + Users have the option to apply for either a student pass or a route pass based on their requirements.
* **Get QR Code for Bus Pass Module**:
  + After applying or renewing, the system generates a new QR code for the user’s bus pass.
  + The QR code is saved in the user’s account for conductor verification.
* **Calculate Expected Time to Reach Module**:
  + Users can track the real-time location of the bus.
  + The system calculates the estimated time for the bus to reach their stop using GPS data.

#### **C. Conductor Module**

Conductors are responsible for verifying the validity of bus passes and tickets using the QR code system, as well as updating the bus location.

* **Login Module**:
  + Conductor login with secure credentials.
  + Role-based access to perform bus verification tasks.
* **Scan QR Code Module**:
  + Conductors scan the QR code from the user’s bus pass or eTicket using a mobile device.
  + The system verifies the validity of the pass or ticket in real time.
* **Verify Bus Pass ID Module**:
  + The scanned QR code displays the pass details, allowing the conductor to check the pass ID for authenticity.
* **Verify Bus Ticket Module**:
  + Conductors verify the eTicket QR code to ensure it is valid for the journey.
* **Update Bus Location Module**:
  + Conductors update the real-time location of the bus using GPS tracking.
  + This information is available to users to track the bus arrival time.

### **3. System Workflow**

1. **Admin**: Manages the system by setting up routes, buses, and conducting verification of user bus passes.
2. **User**: Registers for the bus pass system, applies for/renews passes, and uses their QR code for ticketing and bus boarding.
3. **Conductor**: Scans the user's QR code and verifies their pass/ticket, updating bus information for users in real time.

### **4. Technology Stack**

* **Frontend**: HTML, CSS, JavaScript for user interaction.
* **Backend**: Node.js/Express or Django/Flask for managing business logic.
* **Database**: MySQL/PostgreSQL for storing user information, pass details, bus routes, etc.
* **QR Code Generation**: External libraries (e.g., qrcode.js) for creating and verifying QR codes.
* **GPS Tracking**: Integration with Google Maps API or OpenStreetMap for real-time tracking.
* **Security**: Use of HTTPS, encryption for QR code data, and role-based access control.

**Implementation:**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Bus Pass System</title>

<style>

\* {

margin: 0;

padding: 0;

box-sizing: border-box;

}

body {

font-family: Arial, sans-serif;

background-color: #f0f0f0;

color: #333;

padding: 20px;

}

header {

background-color: #4CAF50;

padding: 20px;

text-align: center;

color: white;

}

nav {

margin: 20px 0;

text-align: center;

}

nav ul {

list-style-type: none;

}

nav ul li {

display: inline;

margin: 0 15px;

}

nav ul li a {

text-decoration: none;

color: #4CAF50;

font-weight: bold;

}

h1, h2 {

margin-bottom: 20px;

}

.operations {

list-style-type: disc;

margin: 20px;

padding-left: 20px;

}

.operations li {

margin-bottom: 10px;

font-size: 18px;

}

section {

background-color: white;

padding: 20px;

margin-bottom: 20px;

border-radius: 8px;

box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);

}

footer {

text-align: center;

padding: 20px;

background-color: #4CAF50;

color: white;

position: fixed;

bottom: 0;

width: 100%;

}

</style>

</head>

<body>

<header>

<h1>Bus Pass System</h1>

</header>

<nav>

<ul>

<li><a href="#admin">Admin</a></li>

<li><a href="#user">User</a></li>

<li><a href="#conductor">Conductor</a></li>

</ul>

</nav>

<section id="admin">

<h2>Admin Panel</h2>

<ul class="operations">

<li>Login</li>

<li>Manage student & route pass</li>

<li>Manage conductor login</li>

<li>Approve bus pass</li>

<li>Generate QR Code</li>

<li>Create Bus details</li>

<li>Create Route Information (From, To, Time, Route Stopping)</li>

</ul>

</section>

<section id="user">

<h2>User Panel</h2>

<ul class="operations">

<li>Register</li>

<li>Login</li>

<li>Add Money – eWallet</li>

<li>Buy Bus eTicket</li>

<li>Apply New bus pass</li>

<li>Renewal bus pass</li>

<li>Apply Student & Route pass</li>

<li>Get QR Code for Bus pass</li>

<li>Calculate expected time to reach</li>

</ul>

</section>

<section id="conductor">

<h2>Conductor Panel</h2>

<ul class="operations">

<li>Login</li>

<li>Scan QR</li>

<li>Verify bus pass ID</li>

<li>Verify Bus ticket</li>

<li>Update bus location</li>

</ul>

</section>

<footer>

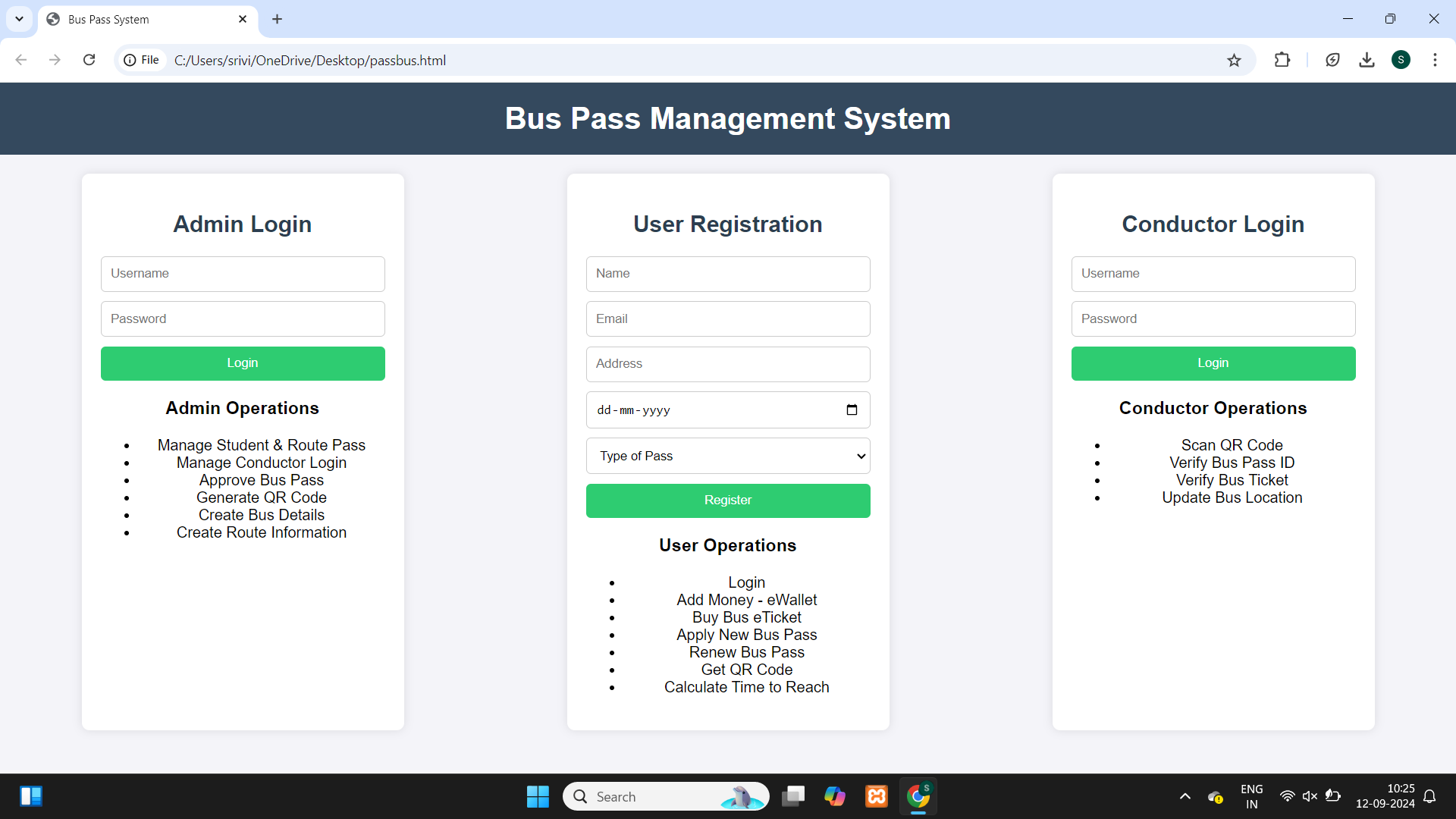
<p>&copy; 2024 Bus Pass System</p>

</footer>

</body>

</html>

**Output:**

****

**conclusion:**

### **Admin Enhancements:**

1. **Advanced Analytics and Reporting**:
   * Implement dashboards for analyzing pass usage, revenue generation, peak times, and route efficiency.
   * Generate reports on user demographics, pass renewal rates, and bus performance.
2. **Automated Approval System**:
   * Develop an automated system for initial pass approval based on predefined criteria to speed up processing.
3. **Integrated Feedback System**:
   * Allow users to provide feedback on routes, buses, and overall service directly through the system.
4. **Route Optimization Tool**:
   * Incorporate tools that analyze route efficiency and suggest improvements based on traffic data and user feedback.
5. **Admin Notifications and Alerts**:
   * Set up notifications for important events such as expiring passes, critical issues with buses or routes, and system updates.
6. **Enhanced Security Features**:
   * Implement multi-factor authentication (MFA) for admin logins to enhance security.

### **User Enhancements:**

1. **Personalized Notifications**:
   * Send reminders for pass renewals, upcoming travel, and account updates via email or SMS.
2. **Real-Time Bus Tracking**:
   * Integrate a real-time bus tracking system so users can view the live location of their bus.
3. **Travel History and Reports**:
   * Provide users with a detailed travel history and reports on past trips and expenditures.
4. **Customizable Pass Options**:
   * Allow users to select and customize their pass types (e.g., weekly, monthly) based on their travel needs.
5. **Integrated Travel Planner**:
   * Add a feature that helps users plan their journeys by suggesting routes, connections, and travel times based on real-time data.
6. **User Profile Management**:
   * Enhance user profiles with options to update personal details, manage multiple passes, and review transaction history.
7. **Accessibility Features**:
   * Improve accessibility for users with disabilities, such as screen reader compatibility and voice commands.

### **Conductor Enhancements:**

1. **Advanced Scanning Features**:
   * Implement high-speed, error-correcting QR code scanners to reduce verification time and errors.
2. **Real-Time Communication**:
   * Integrate a communication system for conductors to report issues or updates directly to the admin or control center.
3. **Mobile App for Conductors**:
   * Develop a dedicated mobile app for conductors with offline capabilities, allowing them to operate even in areas with poor connectivity.
4. **Automated Location Updates**:
   * Use GPS data to automatically update the bus location, minimizing manual input and errors.
5. **Conductor Training and Support**:
   * Provide interactive training modules and support resources to help conductors use the system effectively.
6. **Incident Reporting System**:
   * Implement a feature for conductors to report incidents or issues directly from their devices, including photos and descriptions.

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