American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

DIGITAL BUS SERVICE SYSTEM

A Software Engineering Project Submitted

By

Semester: Spring_22_23		**Section:A**	**Group Number:**	
SN	Student Name	Student ID	Contribution (CO1+CO2)	Individual Marks
1	Noshin Farzana	21-44647-1	24%	
2	Avijit Saha Anto	21-44630-1	24%	
3	Sadikul Mobasshir	21-44415-1	20%	
4	Md Rased Hasan Rokon	21-44574-1	20%	
5	Shaian Islam	20-44335-3	12%	

Submitted To

Farzana Bente Alam
Lecturer, CS
American International University-Bangladesh

Submission Date: 30 April 2023

The project will be Evaluated for the following Course Outcomes

CO1: *Analyze* the impact of software engineering models over various context of software development to assess societal, health, safety, legal and cultural issues.	Total Marks	
Project Background Analysis and feasibility (needs, goal, benefits, etc.)	[5 Marks]	
Analysis the impact of societal, health, safety, legal and cultural issues	[5Marks]	
Review of existing Studies and Relevant Example	[5Marks]	
CO2: *Explain* appropriate software engineering model, project management roles and their skills in the context of professional engineering practice and solutions to complex engineering problems in a software development environment.	Total Marks	
Appropriate Process Model Selection and Argumentation with Evidence	[5Marks]	
Evidence of Argumentation regarding process model selection	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar and Organization of the Project report	[5Marks]	

Description of Student's Contribution in the Project work

Student Name: Noshin Farzana
Student ID: 21-44647-1
Contribution in Percentage (%): 24%
Contribution in the Project:
Requirement Analysis (Registration, Non-functional Requirements)
Activity Diagram
Selection Process Model
Prototype
System Testing (80%)
COCOMO & Timeline Chart I
Earned Value Analysis (50%)

Noshin
Signature of the Student

Student Name: Avijit Saha Anto
Student ID: 21-44630-1
Contribution in Percentage (%): 24%
Contribution in the Project:
Requirement Analysis (Home)
Sequence Diagram
Difference between process models
System Testing (20%)
Timeline Chart II
Earned Value Analysis (50%)

Avi
Signature of the Student

Student Name: Sadikul Mobasshir
Student ID: 21-44415-1
Contribution in Percentage (%): 20%
Contribution in the Project:
Project Proposal (Solution to the Problem)
Requirement Analysis (Login, Admin)
Use Case Diagram (50%)
WBS (80%)

Mobasshir
Signature of the Student

Student Name: MD Rased Hasan Rokon
Student ID: 21-44574-1
Contribution in Percentage (%): 20%
Contribution in the Project:
Project Proposal (Background to the Problem)
Use Case Diagram (50%)
Class Diagram
WBS (20%)

Rokon
Signature of the Student

Student Name: Shaian Islam
Student ID: 20-44335-3
Contribution in Percentage (%): 12%
Contribution in the Project:
Project Proposal (Functionalities)
Risk Analysis

Shaian
Signature of the Student

Rubric for Project Assessment (CO1)

Marking Criteria	Marks Distribution (Maximum 3X5=15)				Acquired Marks
	Inadequate (1-2)	**Satisfactory (3)**	**Good (4)**	**Excellent (5)**	
Criteria	**Marks distribution (Max 3X5= 15)**				**Acquired Marks**
Background Analysis	No background information regarding the project is given; project goals and benefits are missing.	Insufficient background information is given; project goals and benefits are poorly stated	Sufficient background information is given; the purpose and goals of the project are explained.	Thorough and relevant background information is given; project goals are clear and easy to identify.	
Analysis the impact of societal, health, safety, legal and cultural issues	Student vaguely discuss the impact of societal, health, safety, legal and cultural issues in their project	Student provided with partial relevance to the impact of societal, health, safety, legal and cultural issues in their project	Student fairly provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	Student comprehensively provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	
Existing Studies and Relevant Example	Ambiguous representative example.	Partially identify / indicate towards reallife example.	Real-life example is fairly connected towards the definition.	Comprehensively defend with real life example.	
				Acquired Marks:	
				CO Pass / Fail:	

Rubric for Project Assessment (CO2)

	Inadequate (1-2)	Satisfactory (3)	Good (4)	Excellent (5)	
Argumentation of Model selection with Evidence of Argumentation	Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model	Articulates a position or argument for choosing models that is unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice	Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model	Clearly articulates a position or argument for the choosing software engineering models. Presents sufficient amount of evidence to support argument for the model selection	
Role identification and Responsibility Allocation	The project has poor project management plans for identifying roles and assigning the responsibilities	Identify few roles in the project management where some of the roles are left alone with any project responsibilities	Identify most of the roles in the project management and assign their responsibilities	Well planned project with proper role identification and responsibility allocation in the project management activities	
Submission, Completeness, Spelling, grammar and Organization of the Project report	Project report is not complete and Several errors in spelling and grammar. Present a Confusing organization of concepts, supporting arguments, and real-life example. Sentences rambling, and details are repeated.	Some errors in spelling and grammar. Some problems of organizing the answer in a logical order of defining, elaborating, and providing real-life examples.	Few errors in spelling and grammar. Presents most of the details in a logical flow of organization in definition, details, and example.	Project report is complete and No errors in spelling and grammar. Consistently presents a logical and effective organization of definition, details, and real-life example of the topic.	
				Acquired marks:	
				CO Pass / Fail:	

Digital Bus Service System

1. PROJECT PROPOSAL

- **Background to the Problem**

  - ❖ The technical scope associated with the development and implementation of this **Digital Bus Service System** project will allow passengers to check-in and check-out of their bus rides using a smart card or mobile device. With the help of this project, we can introduce the concept of online-based digital bus service to our audience and encourage them to put their faith in such applications. This system will use GPS technology to track the location of buses in real time and provide estimated arrival and departure times to the passengers. Passengers have access to information through an app, such as current seat capacity and total passenger count of the buses. Scanner machines will be installed on buses to allow passengers to check-in and check-out of their buses. There will be two scanners in the bus. One scanner will be attached at the entrance of the bus where passengers will scan their card to get onto the bus. Another scanner will be attached at the exit door of the bus. The GPS tracker will be installed in the scanner device. Passengers must scan to check-in and check-out from the bus. If and only if a passenger scans the card, he will get access to the bus. Otherwise, the gate of the bus will remain closed. Also, by using GPS technology the system will calculate fares based on the distance travelled and allow passengers to pay using their smart card or mobile devices. For check-out a passenger needs to scan the card so that the fare can be deducted from the card. The exit door will open automatically once the payment is complete. When necessary, a passenger can recharge their card using mobile banking. In case of emergency, when the card balance has run out one can take loan by using the app. In that case, a temporary QR code will be generated in the app and by scanning the code a passenger can check out. The loan amount will be deducted after the next recharge. This allows individuals to provide information such as name, password, gender, age, occupation, and other necessary details for the registration of smart card and getting access to the app. After registration, a smart card will be provided to each person. Students must show their student ID, NID, or birth certificate and other necessary documents during registration to be eligible for the half-pass and the student pass will expire after a certain period of time. We do not need any helpers or ticket checkers on the buses. So, the journey will become more comfortable because it is completely contactless and there is no interaction with ticket checkers.

  - ❖ In our traditional bus service system, the proper fare is not taken according to the destination as no GPS system is used for calculating the exact distance. As a result, it creates chaos between the passengers and helpers. The feature of scanning the card at the entrance and exit to open the gate of the buses was not available in the previous system. So, there can be a tendency to check-out without paying the fare. It also takes extra time to pick up and drop off passengers. Some of the passengers take advantage of half-pass using expired student id cards as it is very time consuming for the helpers to check the validity of id. This project will help to overcome all the problems concerning these situations.

- **Solution to the Problem**

  - **Project objective:** The main objective of **Digital Bus Service System** is to introduce a smart card-based system for check-in and check-out from buses. Keeping our objective in mind, we want to create an online application that can be used worldwide. Also, as this concept is not so familiar in our country, we want people to use and trust our system.

  - **The problem, solution, necessity of using this application:** There is no digital bus service application in our country because it is not widely used here. But the thing is the traditional way of bus service system is actually a mess considering different situations. Sometimes passengers get harassed, the exact fare is not taken, and many more unwanted situations can happen. Since our world is getting modernized and almost everything is now online based so we thought of developing a system which people can rely on. Now as there is already some application based on this problem our project is going to be in category B. So here the question arises, why we want to develop this kind of system again. The answer is a huge part of our population don't trust online based platforms. Also, in our **Digital Bus Service System** we have implemented some new features which were missing in the previous system. So, our target is to make an online application for bus service which is strongly secured, requires verification of the users, safe and user friendly.

  - **The target group of users:** There will be two types of users of the system. The admins and the passengers. Passengers who are having issues with the traditional bus service system can easily register with our system. They can see the information of the bus location along with the departure time. It will save their time as well. Admins will maintain the data and activity of the passengers and if they find any suspicious things going on they can take legal actions like blocking the card of the passengers.

  - **Functionality:**

  1) Admin Features:

    - Login
    - Logout
    - Confirm registration
    - Monitor passengers' activities through app
    - Monitor bus location using GPS
    - Block the card and user from system

  2) Passenger Features:

    - Register
    - Login
    - Logout
    - Scan smart card for check-in and check-out
    - Card Recharge

- Can take loan (Emergency situations)
- Use student half-pass without any hassle
- See the current location of bus
- Check the departure time
- Check the availability of seats

3) Scanner Device Features:

- Save the user information
- Scans the card
- Using GPS deduct the calculated fare from the card according to distance
- Deduct loan amount after next recharge

4) App Features:

- Save all the user information
- Provide a user guide
- Provide help center contact information
- Card Recharge
- Give loans in emergency situation and generates temporary QR code

2. REQUIREMENT ANALYSIS

- **Functional Requirements:**

  ❖ **Login Page:**

  - The login page has two options, login and register. It will allow users to login to the system with their given username and password.
  - For login to the system database records will be compared with the username and password.
  - If the login is successful, the homepage will be shown.
  - The system will randomly generate a verification code and send it to the user's email address to try again if the entered username and password are incorrect.
  - If a user attempts to login more than three times, the system will display "Forgot Password?"
  - Anyone who selects the "Forgot Password" option will see a page where they must enter their mailing address. The user's mailbox will receive a verification code.
  - The user will be able to change the password once they have entered the verification code. The user will then be automatically logged in and the home page will appear.
  - If the user is new, they will click for register option, and it will take user to the register page.

  ❖ **Registration Page:**

  - Users must register to log in to the system.
    - In this registration process the user must provide country code, mobile number & email address.

  - Basic information form will be filled by user.
    - In this form the user needs to provide his/her name.
    - Users should set a password for further login.
    - Also, they have to provide date of birth, gender, occupation description, NID number as well as picture of NID, picture of birth certificate and student id (optional).
    - User must include his/her photo.

  - After giving all the information, the user needs to click the submit button.
    - User will submit the code which has sent via email or phone number.
    - Admin will verify all the information.

  - User has to wait for the confirmation of admin.
  - After getting confirmation from admin, the user will be successfully registered to the system.

❖ **Home Page:**

- Menu bar
  - Home
  - Passengers can search for multiple things by using the app.
    - They can search for bus location.
    - They can check the departure time.
    - They can search the availability of the seats.
  - When necessary, a passenger can recharge their card using mobile banking.
  - In case of emergency, when the card balance has run out one can take loan by using the app. In that case, a temporary QR code will be generated in the app and by scanning the code a passenger can check out. The loan amount will be deducted after the next recharge.
  - Passengers can report if they will face any kind of problem regarding the system.
  - For any query, they can call to the help center.
  - Passengers can check the privacy policy to know about the security of the system.
  - Passengers can logout from the app whenever they want.

❖ **Admin Page:**

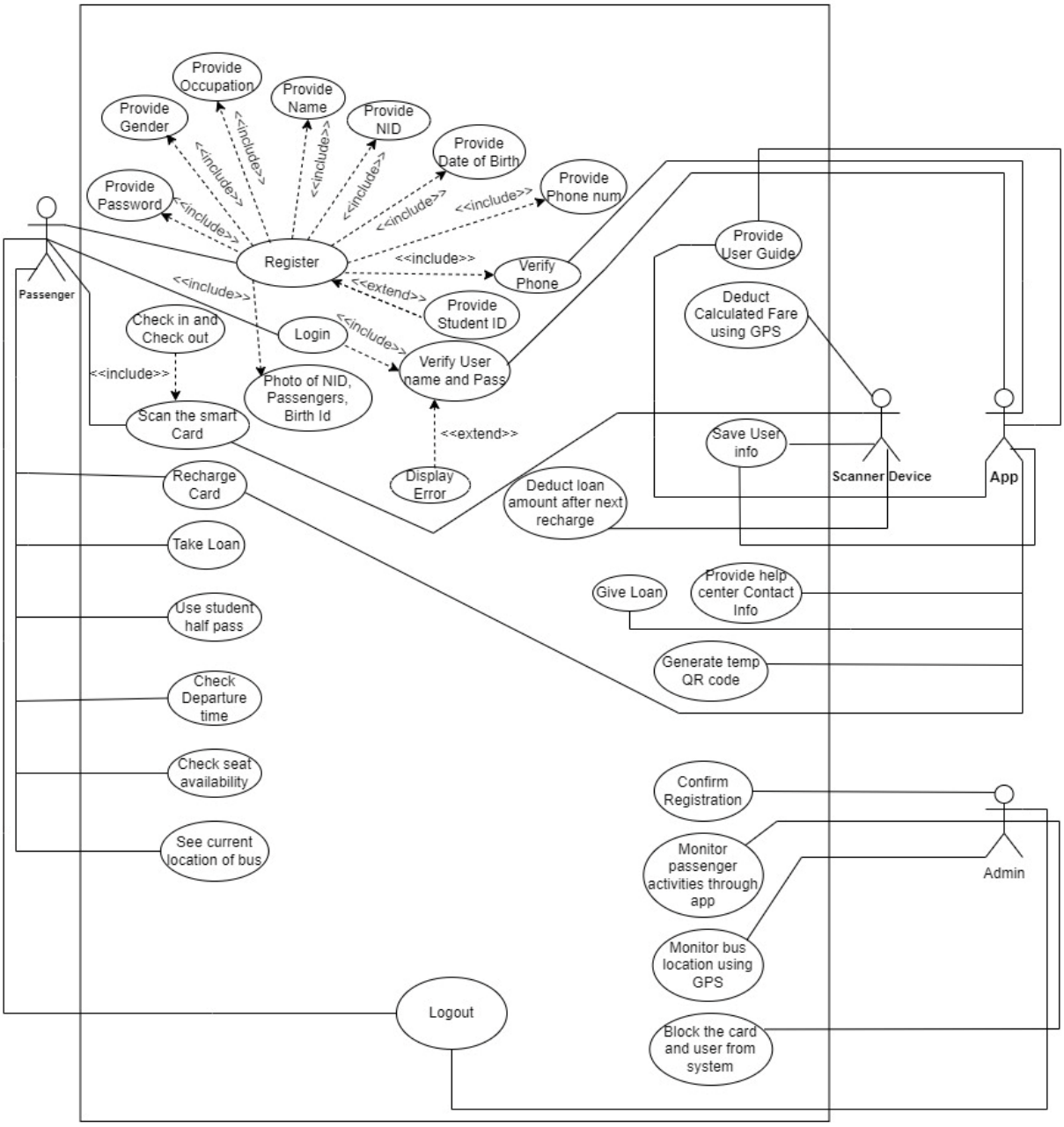
- Admin can login to the system.
- Admin can logout from the system.
- These following features are visible to admins only:
  - Admin confirm the registration of passengers.
  - Admin monitor passengers' activity.
  - Admin monitor bus location using GPS tracker.
  - If Admin find any suspicious things going on, they can take legal actions or can block the card of the passengers.

- **Non-functional Requirements:**

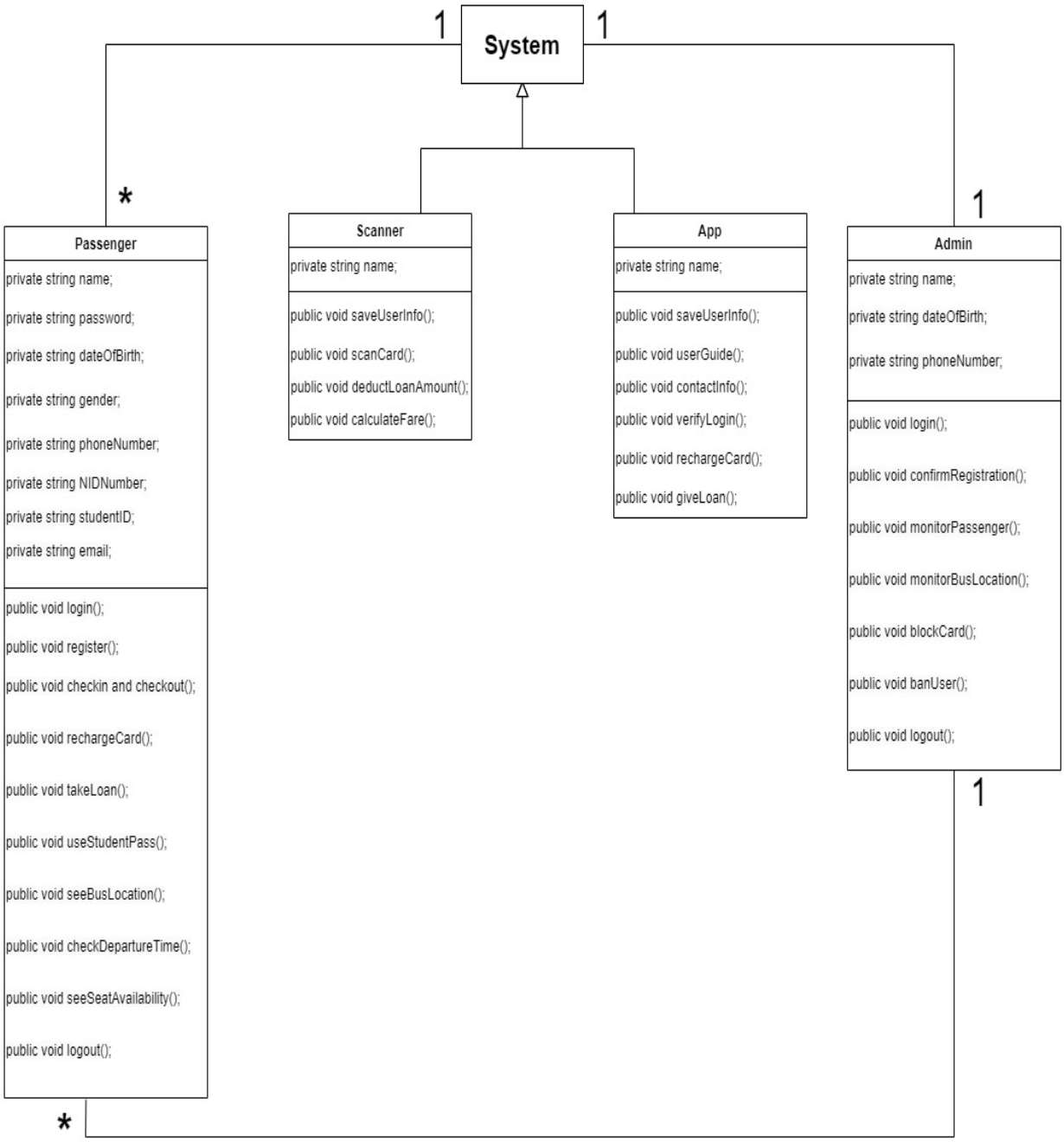
- **Security:** The system maintains the privacy of user information.
- **Ease of use:** The system is very user friendly.
- **Reliability:** Our system will run without a failure for a given period under predefined conditions.
- **Availability:** Our system is accessible for all type of user.
- **Performance:** The system returns the results quickly.

3. System Design Specification

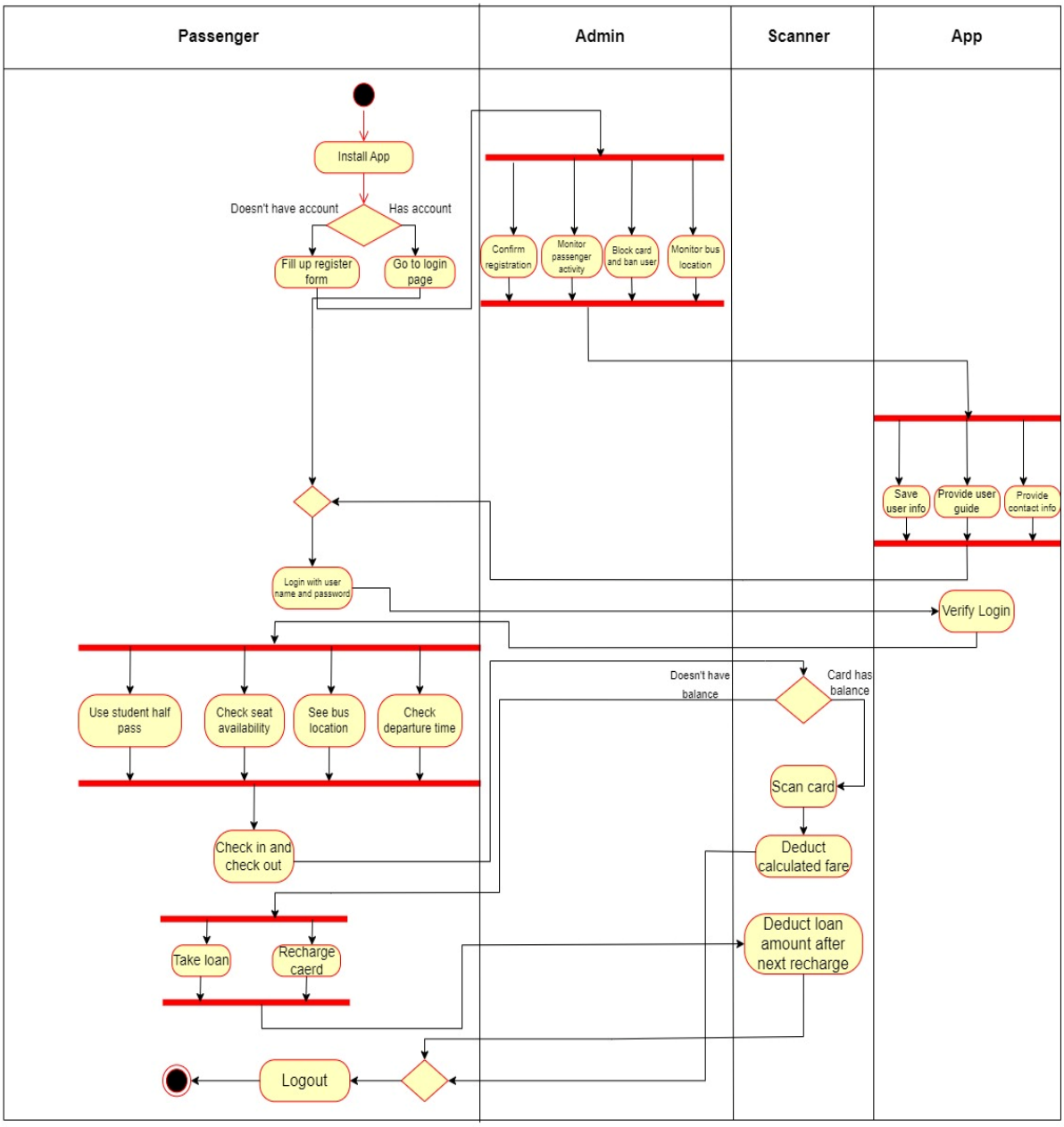
- **Use Case Diagram:**



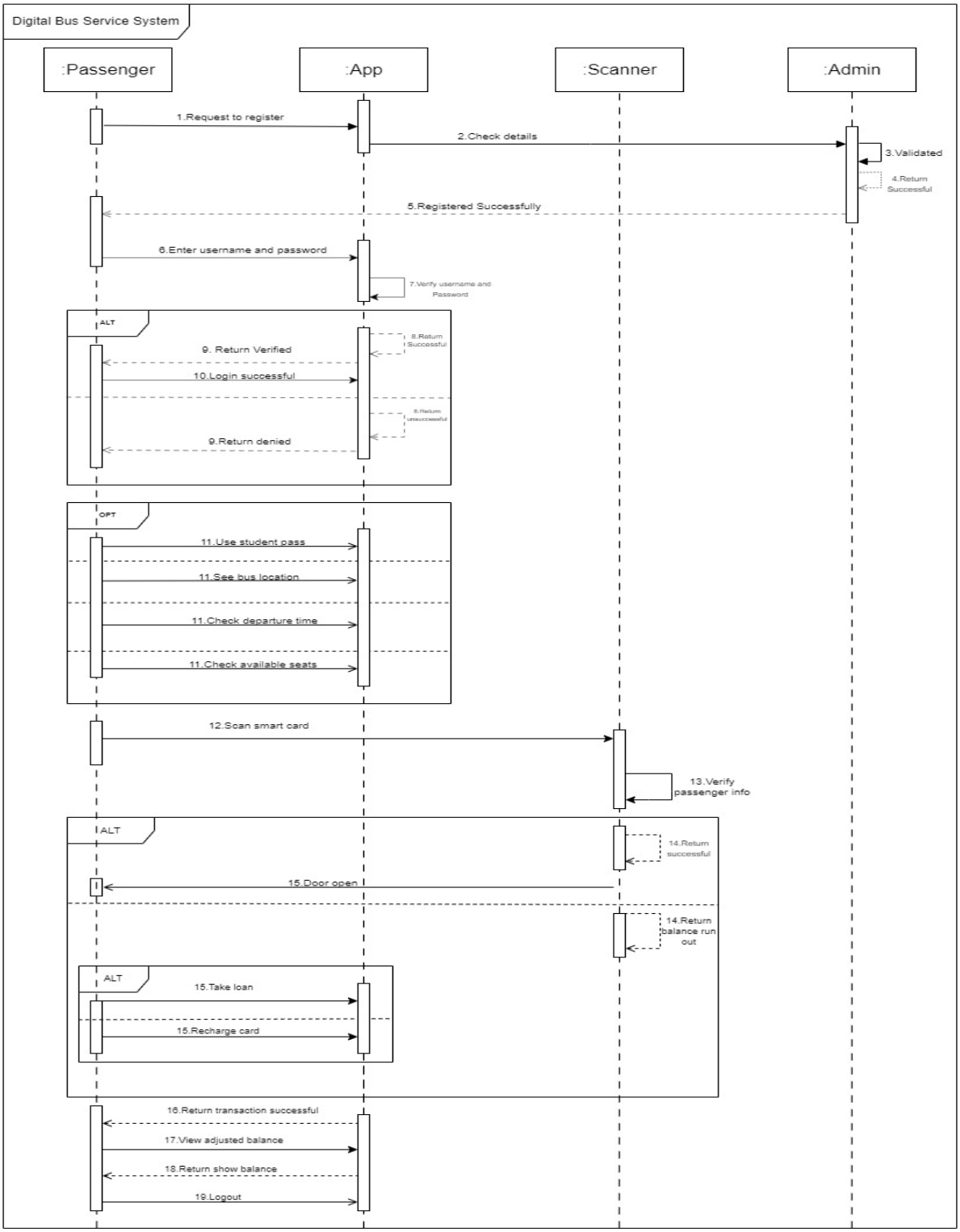
- **Class Diagram:**



- **Activity Diagram**



- **Sequence Diagram**



4. Selection Process Model:

After studying several Software Engineering process models, we have decided to use Agile (SCRUM). We believe that this model is appropriate for our project **Digital Bus Service System**.

Among all other process model to develop our proposed software we chose SCRUM process model because:

SCRUM has 3 phases-

1. Pre-game

   Pre-game phase includes 2 sub-phases-
   a. Planning
   b. Architecture

2. Development/ Game phase
3. Post-game

As our proposed system is **Digital Bus Service System** and it goes to category B, we preferred to have a product backlog list where all the currently known requirements are listed as well as the requirements are prioritized, and effort needed for the implementation is estimated. Our product backlog list will be constantly updated with new and more detailed items, as well as with more accurate estimations and new priority orders. The architecture phase work is based on our current items in the product backlog list. In case we need any enhancement to our existing system, we can do this in this phase.

Next, the development/game phase is divided into parts. Each division is called sprint. In each sprint traditional phases of software development like requirements, analysis, design, evolution, and delivery are used.

Lastly, the post-game phase entered when an agreement has been made such as the requirements are completed. This phase does the work of integration, system testing and documentation. After this our project is going to be ready for release.

During the processing SCRUM has several meetings which will help our team to complete project deliverables quickly and efficiently. As our **Digital Bus Service System** is quite a long project and we need to change the requirements at any time, SRUM is best. SCRUM divided it into easily manageable sprints. Here developments are coded and tasted during sprint review. For, fast moving development project SCRUM works well. Moreover, SCRUM ensures effective use of time and money.

Project Role Identification and Responsibilities:

- **SCRUM Master:** SCRUM Master interacts with the project team as well as with the customer and the management during the project. He is responsible for ensuring that the project is carried out according to the practices, values, and rules of SCRUM and that it progresses as planned.
- **Product Owner:** The Product Owner is officially responsible for the project, managing, controlling, and making visible the Product Backlog list.

- **SCRUM Team:** SCRUM Team is the project team that has the authority to decide on the necessary actions and to organize itself to achieve the goals of each Sprint. The SCRUM team is involved in effort estimation, creating the Sprint Backlog, reviewing the product Backlog list, and suggesting impediments that need to be removed from the project.
- **Customer:** Customer participates in the tasks related to product Backlog items for the system being developed or enhanced.
- **Management:** Management oversees final decision making, along with the agreements, standards, and conventions to be followed in the project.

SCRUM, Waterfall, and DSDM (Dynamic Systems Development Method) are project management methodologies used in software development. Here are the main differences between these methodologies:

- **SCRUM:** It is a flexible and iterative approach to project management. In this methodology, the development team works in short sprints, typically one to four weeks long, to deliver a working product iteratively. The focus is on delivering value to the customer and adapting to changing requirements as the project progresses. The team is self-organizing, and there is a high degree of collaboration between team members, stakeholders, and the customer.

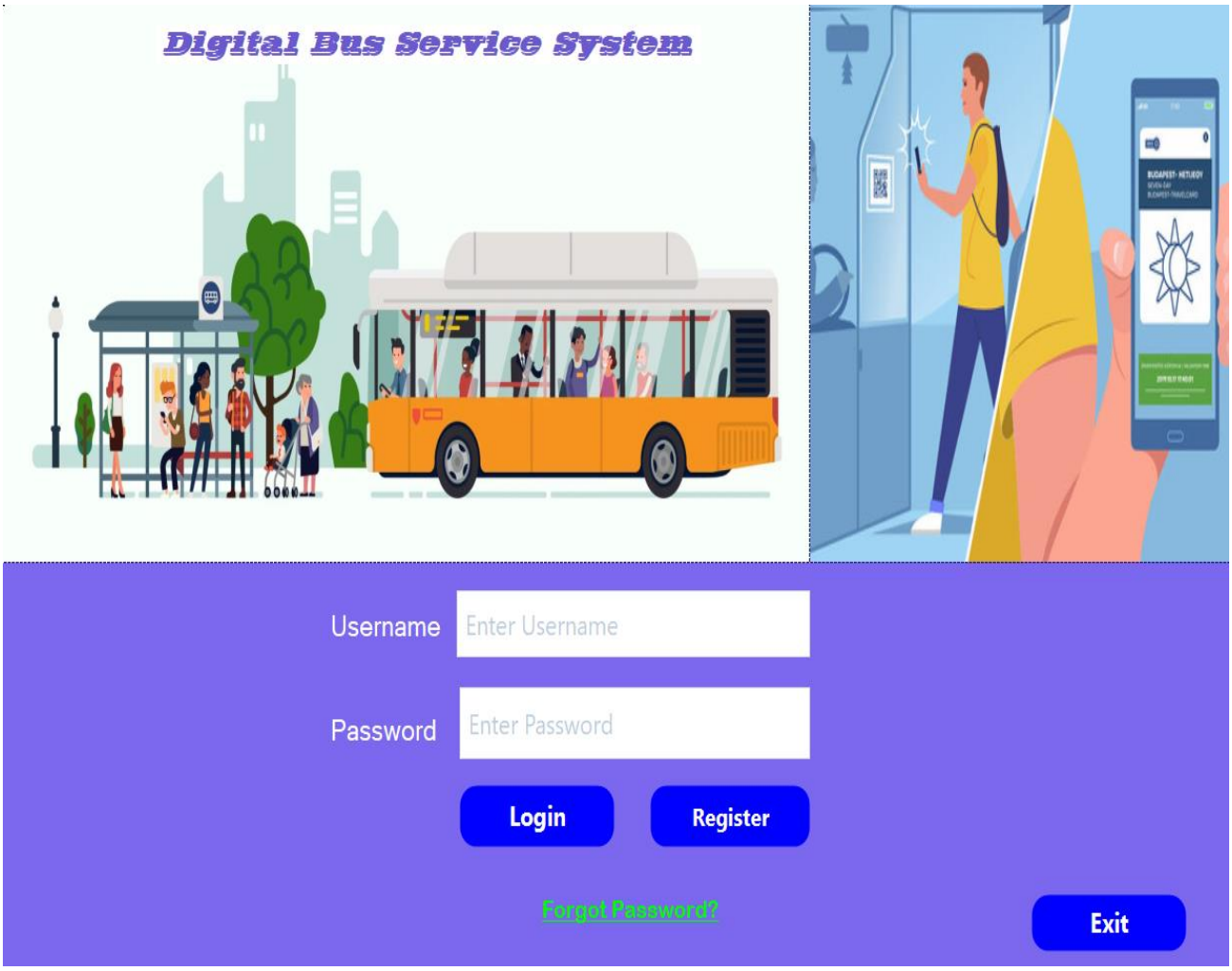
- **Waterfall (Plan-Driven):** Waterfall is a linear, sequential approach to project management. In this model, the project is divided into distinct phases, such as planning, design, development, testing, and deployment. Each phase must be completed before moving on to the next one. The focus is on completing each phase before moving on to the next, and the project's requirements and objectives are defined at the beginning of the project. We cannot go back to the previous phase to change the requirements. This methodology is less flexible than SCRUM and can result in longer development times and less customer involvement. So, we cannot use this model for our project as in our project requirements are continuously changing and customer interaction is needed.

- **DSDM (Dynamic Systems Development Method):** DSDM is an Agile process that focuses on the development of systems that are timeboxed and have a fixed cost. The model is based on iterative development, and the focus is on delivering a working product while ensuring that the system's quality is maintained. The team is self-organizing and there is a high degree of collaboration between team members, stakeholders, and the customer.

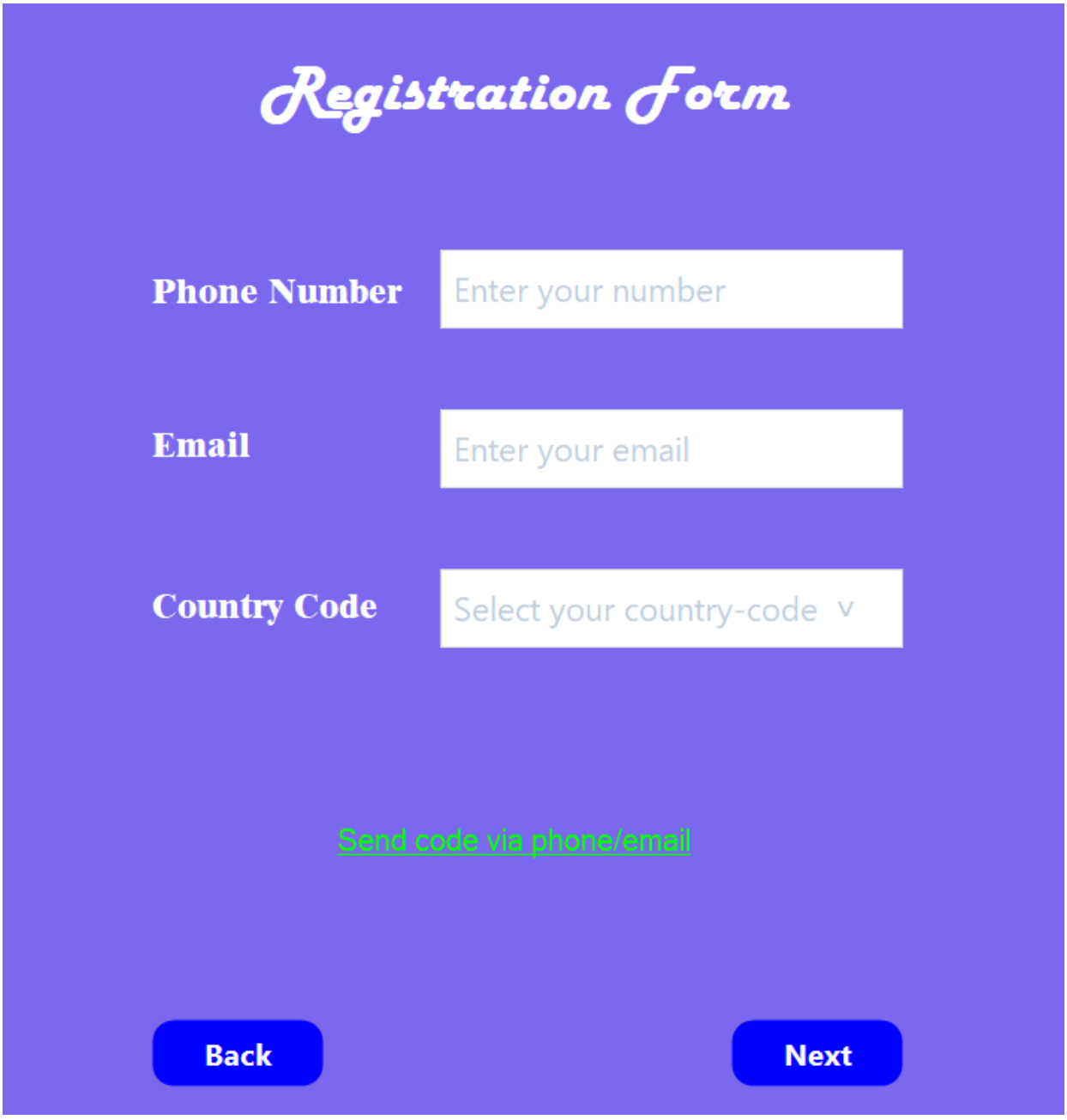
In summary, SCRUM is a flexible, iterative approach to project management, Waterfall is a linear, sequential approach, and DSDM focuses on timeboxing and fixed costs. Comparing with all these process models, we have selected SCRUM model for our project.

5. Prototype:

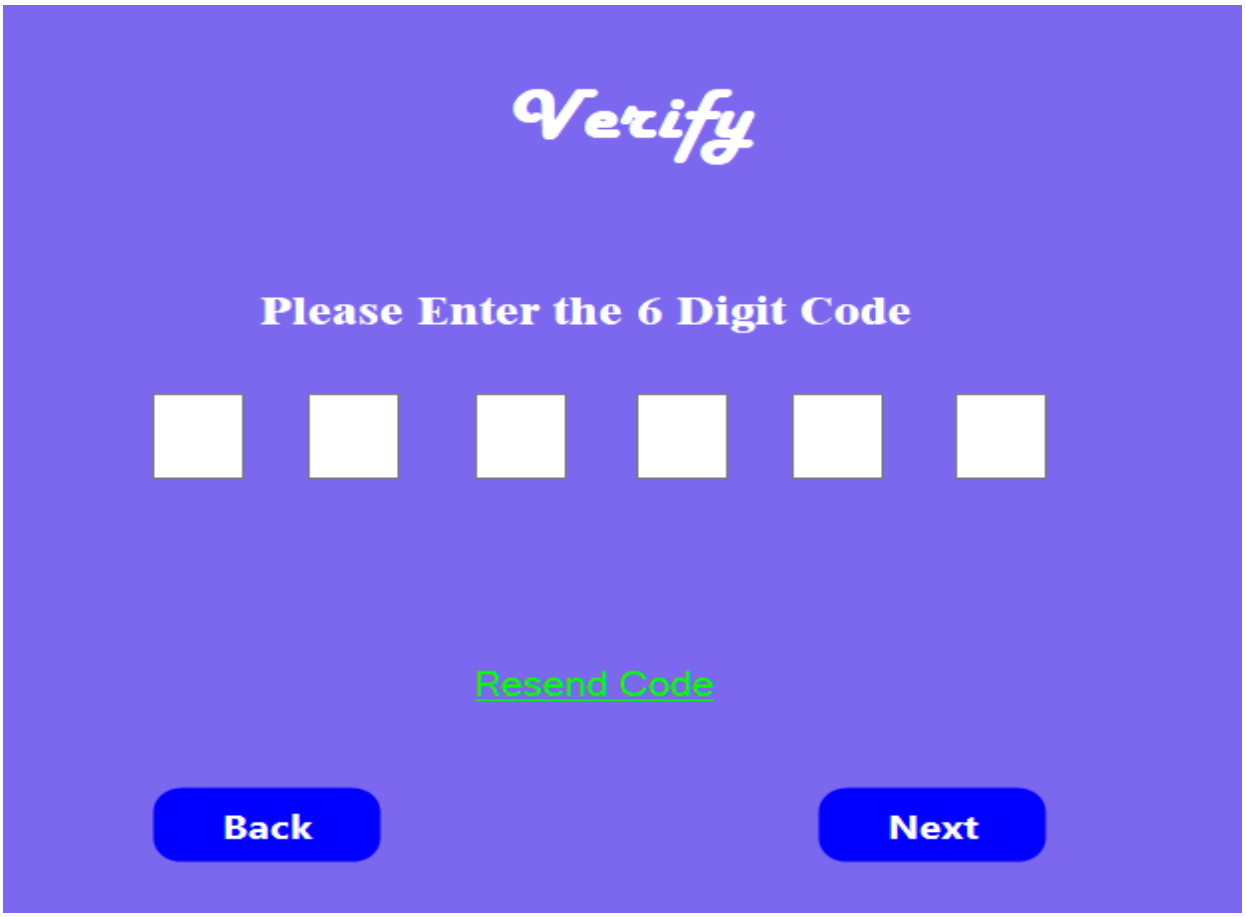
First the users will see this Login page.



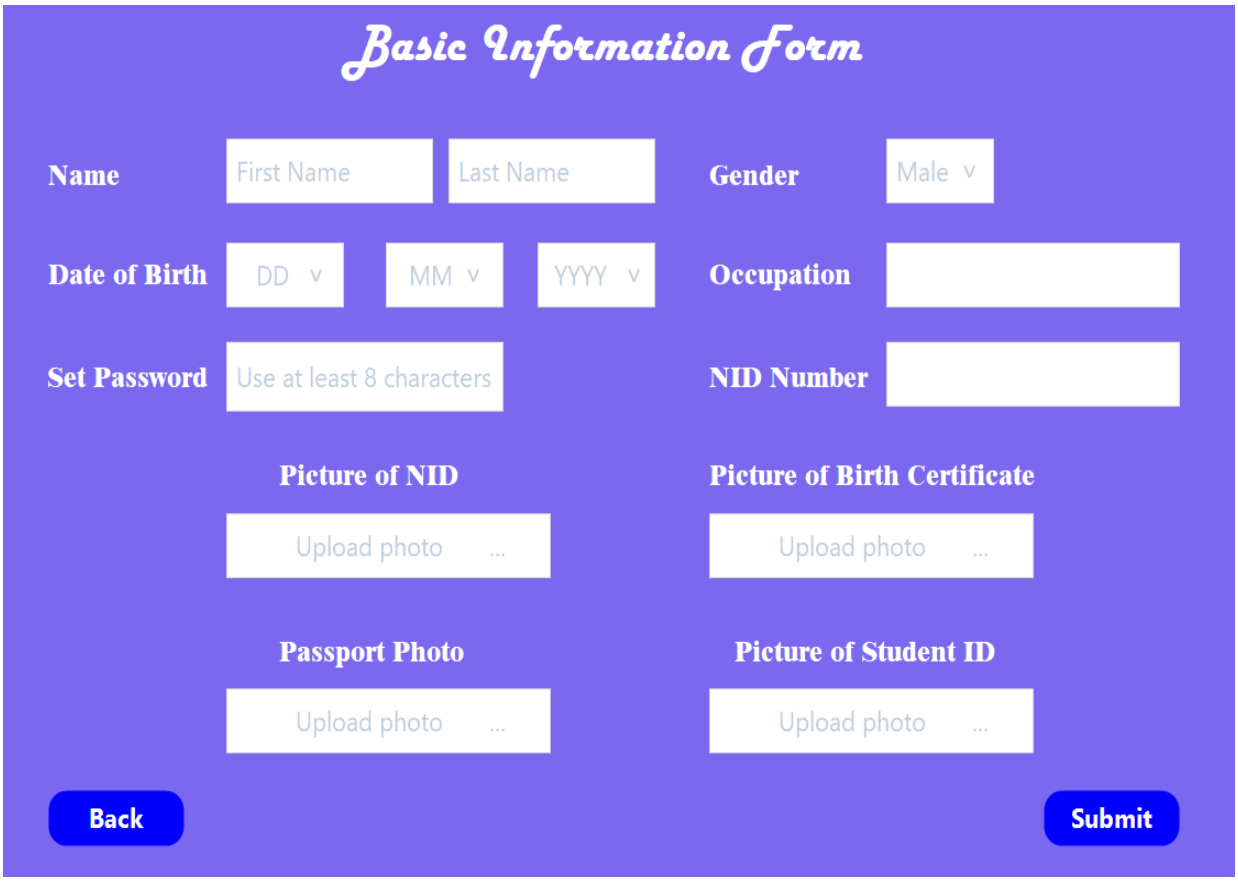
Then, if the user already has an account, he or she needs to login with their username and password. If not, then by clicking the Register button the users can create their account. Also, if any user forgot the password, he can recover it through “Forgot password?” button.



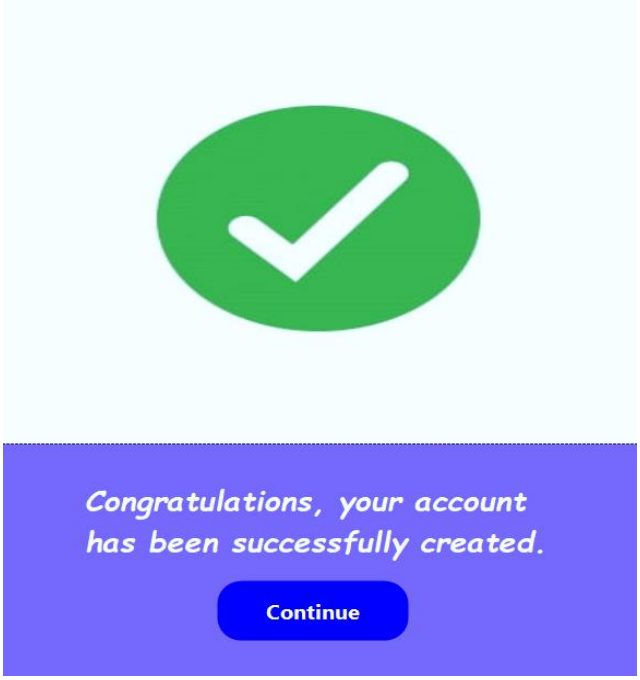
Verification page.



Basic information page.

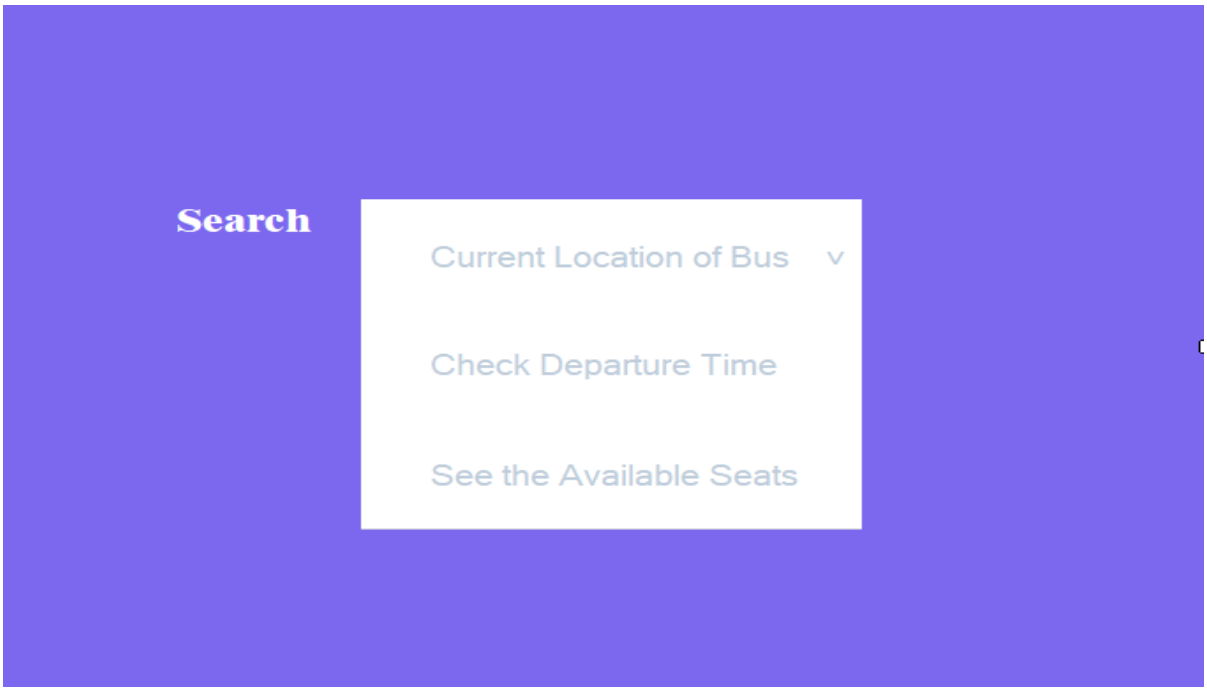


After submitting, Admin will verify the information and confirm registration. Then this box will be shown.

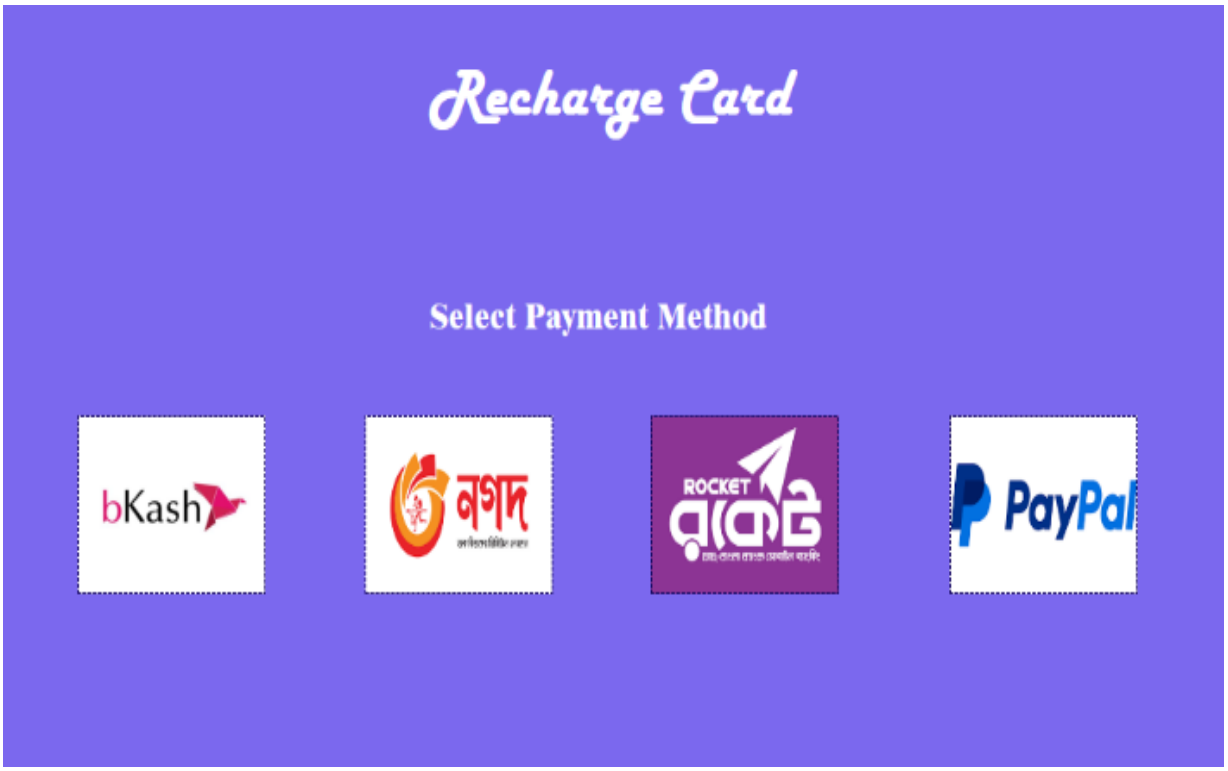


This is the home page view for the Passengers.

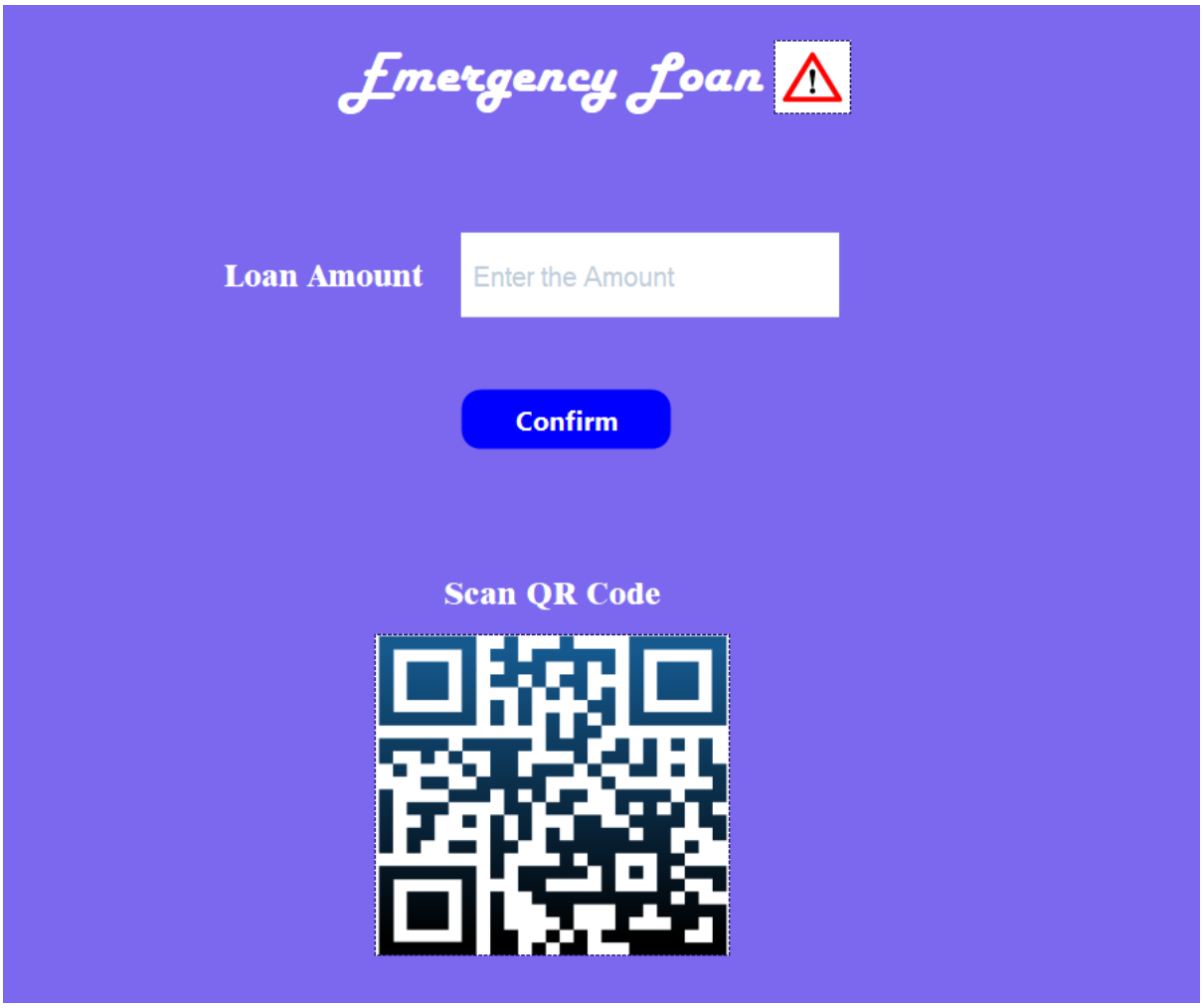
Search page.


Search
Current Location of Bus
Check Departure Time
See the Available Seats

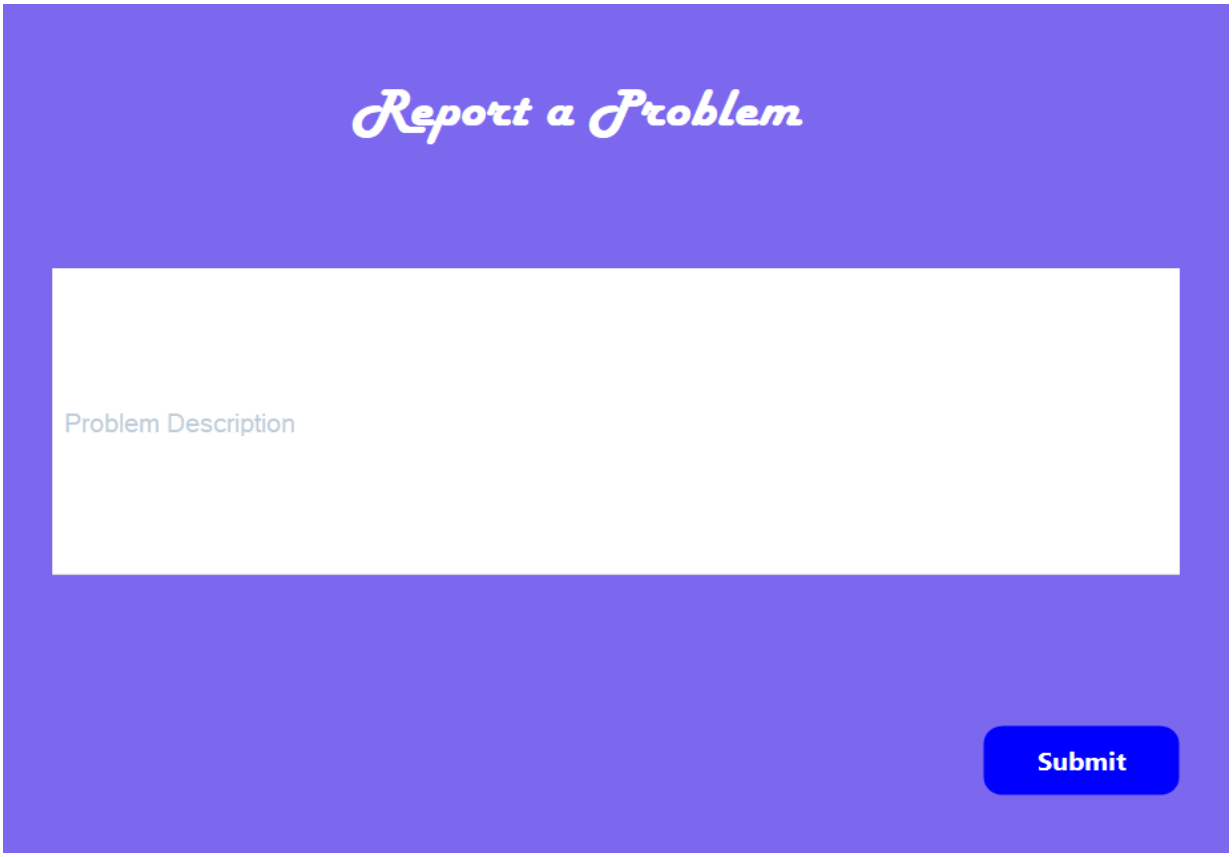
Recharge page.



Passengers can take a loan in emergency situations.

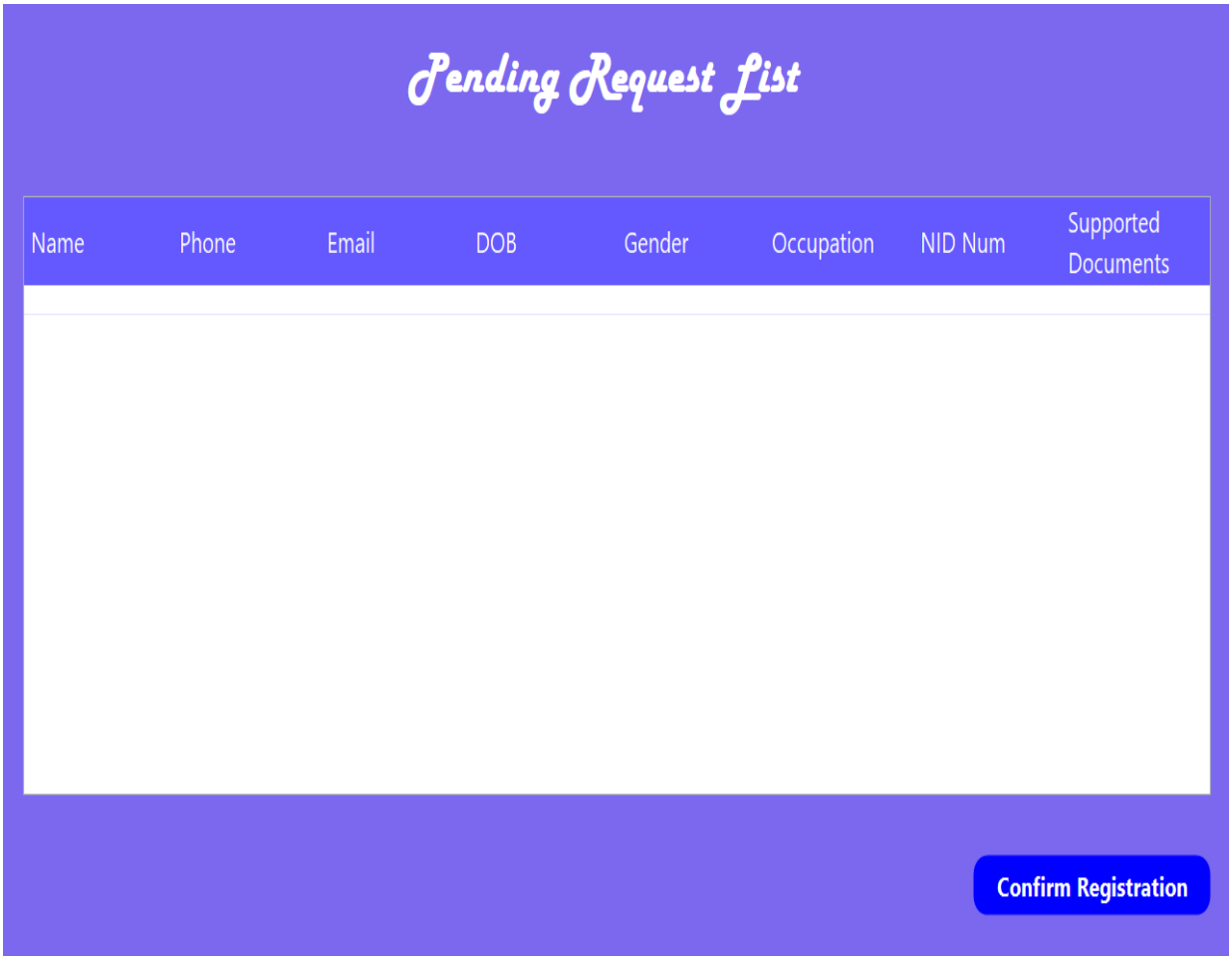


If Passengers face any kind of problem, they can report.



This is the homepage view for Admin.

After verifying the information, Admin can confirm the Passenger's registration.



Admin can see the passenger details and if he notices any kind of suspicious activity, he can block the card of the Passenger.

6. System Testing:

<table>
<tr><td colspan="3">Project Name: Digital Bus Service System</td><td colspan="2">Test Designed by: Avi</td></tr>
<tr><td colspan="3">Test Case ID: FR_1_1

Test priority (Low, Medium, High): High

Module Name: Login</td><td colspan="2">Test Designed date: 23-03-2023

Test Executed by:

Test Execution date:</td></tr>
<tr><td colspan="5">Test Title: Verify login with valid username and password</td></tr>
<tr><td colspan="5">Description: Test app login page

Precondition (If any): User must have valid username and password</td></tr>
<tr><td>Test Steps</td><td>Test Data</td><td>Expected Results</td><td>Actual Results</td><td>Status (Pass/Fail)</td></tr>
<tr><td>1. Go to app
2. Enter username
3. Enter password
4. Click login</td><td>Username: Noshin Farzana

Password: 667</td><td>User should login into the application</td><td>As expected</td><td>Pass</td></tr>
<tr><td colspan="5">Post Condition: User is validated with database and successfully login to account. The account session details are logged in the database.</td></tr>
</table>

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_1_2 Test priority (Low, Medium, High): High Module Name: Login				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Verify login with wrong username and password				
Description: Test app login page Precondition (If any): User doesn't need valid username and password				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Enter username 3. Enter password 4. Click login	Username: Nfe Password: 123	User should not login into the application	As expected	Pass
Post Condition: User is not validated with database and could not login to account.				

Project Name: Digital Bus Service System			Test Designed by: Avi	
Test Case ID: FR_2 Test priority (Low, Medium, High): High Module Name: Logout			Test Designed date: 23-03-2023 Test Executed by: Test Execution date:	
Test Title: Logout from the system				
Description: Test app logout Precondition (If any): User must login to the system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Click logout button		User should be able to logout anytime from homepage	As expected	Pass
Post Condition: User is validated with database and successfully logged out from system.				

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_3 Test priority (Low, Medium, High): High Module Name: Forgot Password				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Set new password				
Description: Test app forgot password Precondition (If any): User must have valid username, phone number and email				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Click forgot password 3. Enter username 4. Enter phone number 5. Enter email 6. Verify details 7. Set new password	New Password: abcd	User will be able to set new password	As expected	Pass
Post Condition: User successfully set new password.				

Project Name: Digital Bus Service System	Test Designed by: Noshin
Test Case ID: FR_4 Test priority (Low, Medium, High): High Module Name: Registration	Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Register to the system	
Description: Test app registration page Precondition (If any): User must have valid phone number and email	

Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Click register 3. Enter phone number 4. Enter email 5. Choose country code 6. Enter 6 digit code to verify 7. Fill the basic information form 8. Click submit	Phone: 01752930004 Email: noshinfarzana681@gmail.com Country code: +880 Verify Code: 146808 Name: Noshin Farzana Gender: Female Date of Birth: 30/11/2001 Occupation: Student Set password: 667 NID number: 1234567890 Picture of NID: ■ Picture of Birth Certificate: ■ Passport Photo: ■ Picture of Student ID: ■	User should be able to do registration by enter phone number, email, and country code. User should be able to submit verification code and verify. User should be able to fill the basic information form.	As expected	Pass

Post Condition: User is successfully registered to the system.

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_5 Test priority (Low, Medium, High): High Module Name: Search				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Search options in app				
Description: Test app search page Precondition (If any): User must login to the system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click search 4. Search for current location of bus 5. Search for departure time 6. Search for available seats	See the available seats	User will be able to search	As expected	Pass
Post Condition: User successfully searched all the options.				

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_6 Test priority (Low, Medium, High): High Module Name: Recharge Card				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Recharge the smart card for check-in and check-out				
Description: Test app recharge card Precondition (If any): User must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click recharge card 4. Select payment method	Payment method: Bkash	User will be able to recharge	As expected	Pass
Post Condition: User successfully recharged the card.				

Project Name: Digital Bus Service System			Test Designed by: Noshin	
Test Case ID: FR_7 Test priority (Low, Medium, High): High Module Name: Emergency Loan			Test Designed date: 23-03-2023 Test Executed by: Test Execution date:	
Test Title: Take loan in emergency situations				
Description: Test app emergency loan Precondition (If any): User must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click emergency loan 4. Enter loan amount 5. Confirm	Loan Amount:150	User will be able to take emergency loan	As expected	Pass
Post Condition: User successfully took loan from the app.				

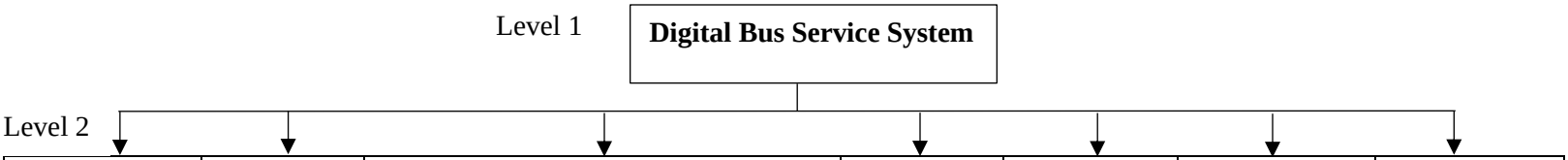
Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_8 Test priority (Low, Medium, High): Medium Module Name: Report a Problem				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Report any kind of problem				
Description: Test app report a problem Precondition (If any): User must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click report a problem 4. Write problem description 5. Submit	Problem Description: Server is down.	User will be able to report	As expected	Pass
Post Condition: User successfully submitted the report.				

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_9 Test priority (Low, Medium, High): High Module Name: Current Balance				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: See the current balance of card				
Description: Test app current balance Precondition (If any): User must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click current balance	Current Balance: 700	User will be able to see current balance	As expected	Pass
Post Condition: Has successfully seen the balance.				

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_10 Test priority (Low, Medium, High): High Module Name: Pending Request List				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: Confirm pending request list				
Description: Test app pending request list Precondition (If any): Admin must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click pending request list 4. Select passenger 5. Confirm registration	Select Noshin Farzana	Admin will be able to confirm registration	As expected	Pass
Post Condition: Admin successfully confirmed passenger request.				

Project Name: Digital Bus Service System				Test Designed by: Noshin
Test Case ID: FR_11 Test priority (Low, Medium, High): High Module Name: Passenger Details				Test Designed date: 23-03-2023 Test Executed by: Test Execution date:
Test Title: See passenger details and ban passenger if needed.				
Description: Test app passenger details Precondition (If any): Admin must login to system				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to app 2. Login 3. Click passenger details 4. Select passenger 5. Ban	Select XYZ	Admin will be able to ban	As expected	Pass
Post Condition: Admin successfully banned passenger from the system.				

7. WBS:



Project Management	System Engineering	Software			Hardware	System Test	Support Services	Installation
		Software Design	Software Build	Unit Testing				
1.Analysis 2.Planning 3.Cost & Schedule Management 4.Scope Management 5.Task Management 6.Project Communication 7.Human Resources Management 8. Space & Facilities Planning 9.Risk Management 10.Procurement Management 11.Quality Management	1.Technical Planning 2. Technical Supervision 3. Business Requirement Definition 4.System Requirement Definition 5.System Architecture Design	1.Software Requirement Specification 2.Software Prototyping 3.Software Unit Detailed Design	1.Software Unit Coding 2.Software Unit Debugging	1.Unit Test Planning 2.Unit Test Case Preparation 3.Unit Test Conduct 4.Unit Test Records	1.Hardware Requirement Planning 2.Hardware System Definition 3.Hardware Component Selection 4.Hardware Unit/ Component Testing	1.Module & Subsystem Testing 2.System Integration Testing 3.Acceptance Testing 4.Defect Classification Tracking & Metrics	1.Configuration Management 2.Quality Assurance 3.Development Tools & Utilities 4.Development Environment 5.Team Technical Training	1.Installation Planning 2.User Support Documentation 3.Installation Management & Coordination 4.Installation Testing & Verification 5.Installation Performance Monitoring

8. Project Estimation:

Software project type: Organic

So, Coefficient = 2.4

P = 1.05

T = 0.38

SLOC = 5000

$PM = Coefficient_{<Effort\ Factor>} * (SLOC/1000)^{P}$

$= 2.4 * (5000/1000)^{1.05}$

$= 13$

$DM = 2.50 * (PM)^{T}$

$= 2.50 * (13)^{0.38}$

$= 6.62$ months

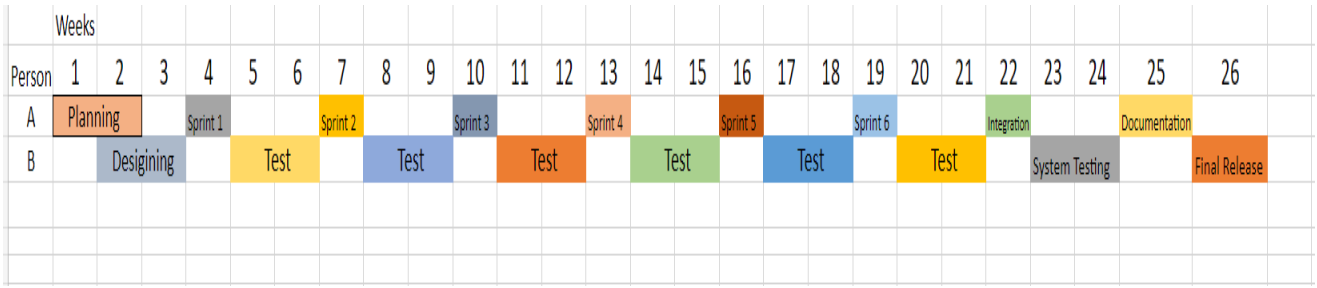
ST = PM/DM

= 13/6.62

= 1.96

≈ 2 people

Timeline Chart (I)



Weeks = DM × 4

= 6.62 × 4

= 26.48

≈ 26 weeks

Activity key:

A : Planning

B : Designing

A : Sprint 1

B : Testing of Sprint 1

A : Sprint 2

B : Testing of Sprint 2

A : Sprint 3

B : Testing of Sprint 3

A : Sprint 4

B : Testing of Sprint 4

A : Sprint 5

B : Testing of Sprint 5

A : Sprint 6

B : Testing of Sprint 6

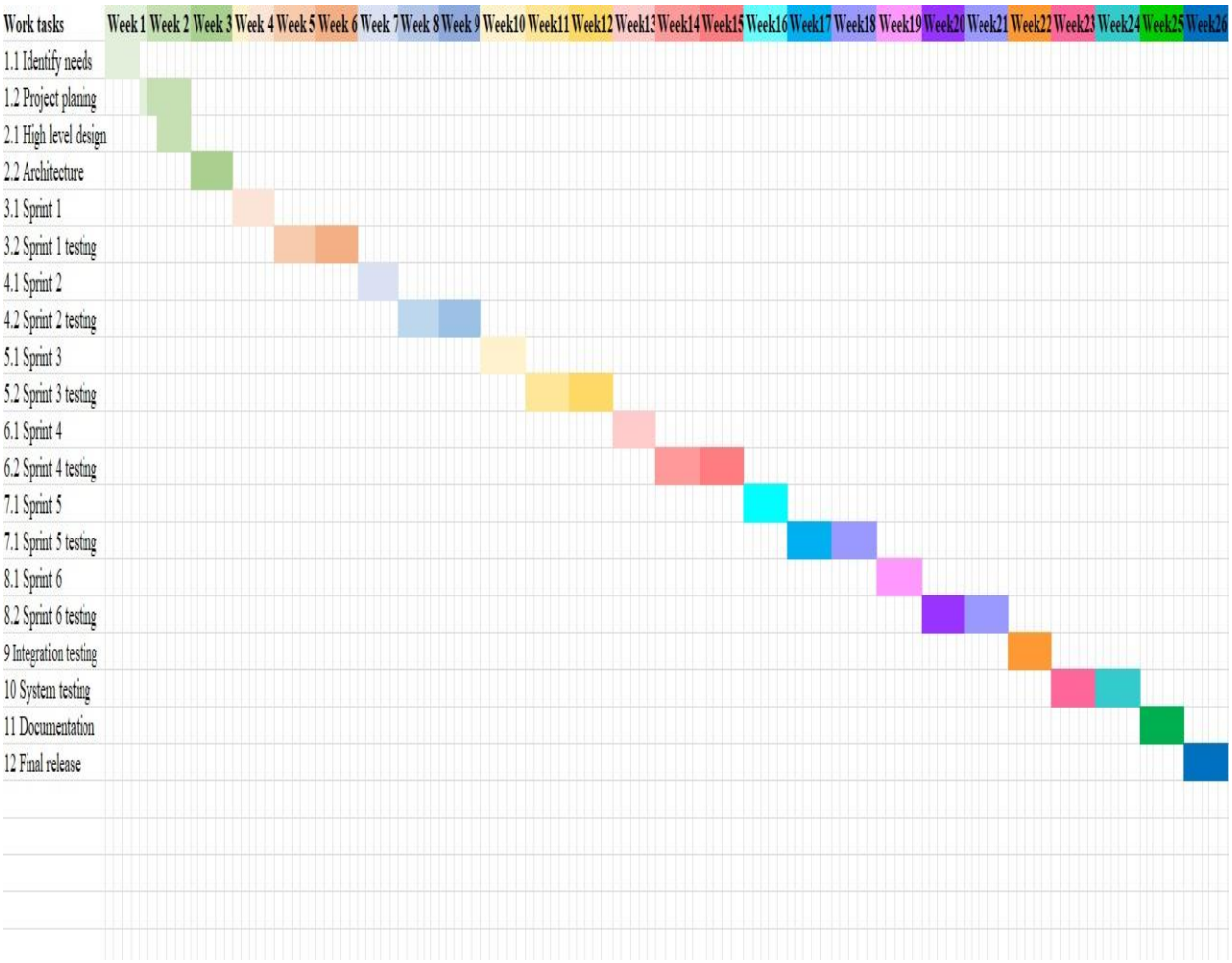
A : Integration Testing

B : System testing

A : Documentation

B : Final Release

Timeline Chart (II)



9. Earned Value Analysis:

Schedule weeks = 26

Effort estimated = 13 * 30

= 390 person-day

Total task = 20

10 tasks have been completed but the project schedule indicates that 15 tasks should have been completed in that time.

Task	Planned effort	Actual effort
1	12.0	12.5
2	15.0	11.0
3	13.0	17.0
4	8.0	9.5
5	9.5	9.0
6	18.0	19.0
7	10.0	10.0
8	4.0	4.5
9	12.0	10.0
10	6.0	6.5
11	5.0	4.0
12	14.0	14.5
13	16.0	-
14	6.0	-
15	8.0	-

BCWP

BCWS

ACWP

BAC = 390

BCWP = 107.5

BCWS = 156.5

ACWP = 109

SPI = BCWP/BCWS = 107.5/156.5 = 0.68690

SV = BCWP – BCWS = 107.5 – 156.5 = - 49 person-day

CPI = BCWP/ACWP = 107.5/109 = 0.98624

CV = BCWP – ACWP = 107.5 – 109 = - 1.5 person-day

% Schedule for completion = BCWS/BAC

= 156.5/390

= 40.12 %

[% of work schedule to be done at this time]

% Complete = BCWP/BAC

= 107.5/390

= 27.56 %

[% of work completed at this time]

10. Risk Analysis:

Risks	Category	Probability	Impact
Size estimate may be significantly low	PS	60%	2
A larger number of users than planned	PS	35%	3
Less reuse than planned	PS	65%	2
End users resist system	BU	30%	3
The delivery deadline will be tightened	BU	40%	2
Funding will be lost	CU	80%	1
Customers will change requirements	PS	70%	2
Technology will not meet expectations	TE	40%	1
Lack of training on tools	DE	60%	3
Staff experienced	ST	40%	2
Staff turnover will be high	ST	60%	2
Fails to meet the requirements	DE	40%	1
Scheduling problem	DE	30%	2
Real time performance problem	DE	50%	1
Some shortage of financial resources	DE	30%	2