

# **“Software Main Idea – [ Uni Transit ]”**

**Project ID : 6**

## **Team members:**

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### **Project idea:**

Designing a Smart Application for Managing and Organizing University Bus Operations, Aimed at Improving Transportation Efficiency for Students to and from the University. The system connects drivers and students on a single platform, similar to popular applications like Uber, with customization tailored to meet the needs of university transportation.

### **The problem that the project solves:**

The app addresses several issues, including the waiting time for female students for the buses, knowing the locations of the buses, and the departure and return times. It also provides solutions for all the problems that bus drivers may face, such as routes and knowing who is on the bus. Additionally, it resolves the issues faced by students regarding communication and having sufficient information about the timings and locations.

### **The target:**

-UQU Students

-Bus Companies

### **User interviews:**

Questions	yes	no	SomeWhat
1- Are the times clear enough for you?	3	1	0
2- Do you think the bus driver has difficulty knowing who is inside the bus?	4	0	0
3- Are you experiencing a long wait for the scheduled bus ?	2	0	2

-			
4 If the answer is yes, what is the average time usually wait			
Less than 5min	5-10 min	10-15 min	More than 15 min
0	1	1	2

## **Personal information (Name – ID number – Phone number ) :-**

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## **-Chapter 3 Glossary:**

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Term	Explanation
Analyze	Looking at information carefully to understand it.
Availability rate	The amount of time the system is operational and accessible.
AES-256	A strong encryption method used to protect data like passwords
Booking form	Booking is reserving a service, and a Booking form is the form used to enter reservation details.
CCV	A 3-digit number on the back of a bank card for security.
	Making sure something is correct.
Concurrent users	The number of users accessing the system at the same time.
Confirmation message	is the message sent to the user to confirm the successful completion of a particular process.
Database	A place in the computer where a lot of information is stored.
Downtime	The time when the system is unavailable and cannot be accessed.
DDoS Attack	t's an attack where many requests are sent to a website or service, causing it to slow down or crash.
Documentation	Documentation is written notes that explain how the system or program works.

Email is not already registered	Making sure the email has not been used before.
External Services	External services are services from other systems that your system uses.
Error Messages	Notifications that appear when something goes wrong in the system
e.g.	For example.
Failure	When the system stops working correctly
GPS	A technology that helps find your location on a map.
Geographical Location	refers to the physical position of a person or object on the Earth's surface
HTTPS encryption	A way to keep information safe when using the internet.
Input data	Information you type into an app, like your name or address.
Interface	The screen and buttons you see when using an app.
Live map	A moving map that shows locations in real-time.
Load	The number of users or transactions the system handles at a given time.
Mean Time Between Failures (MTBF)	The average time between each failure in the system
Manually input	means entering data by hand, instead of using automated methods like GPS or other systems.
Notification	A message that pops up to tell you something new.
New Features	New features mean adding new tools or functions to the system.
Operational hours	The time during which the system is working and providing services to users.
PDF format	A type of file that keeps documents looking the same on any device.
Feedback form	is a tool used to collect users' opinions on a product or service to improve quality.

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Performance degradation	A decrease in the system's speed or efficiency when handling transactions or requests.
Recovery Time	The time it takes for the system to return to normal after a failure
Regular Maintenance	Regular maintenance means checking the system regularly to make sure it works well and there are no issues.
Secure session	protecting data while you are using the system itself.
Secure Integration	protecting data when the system communicates with other services or systems.
Software Updates	Software updates are improvements added to the system to make it work better.
System	A set of rules that govern something.



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Transactions	Operations performed within the system, such as payments or bookings.
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Validate	Checking if the information you entered is correct.
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## **-Chapter 4**

### **Application type**

Interactive transaction-based applications

### **Functional requirements (user , system ):**

1. The users shall be able to **create a new account** in the system.
  - 1.1 the system shall provide an option to "Create a New Account."
  - 1.2 The system shall prompt the user to input basic information (name, email, password, and account type: student or company).
  - 1.3 The system shall validate the input data to ensure the email is not already registered.
  - 1.4 If the user tries to create an account with an **existing email**, the system shall display a message:  
"You already have an account. Please log in or recover your password."
  - 1.5 The new account must be stored in the data database.
  - 1.6 The system shall send an email confirmation for account activation.
2. The users shall be able to log in to the system using their (**username and password**) .
  - 2.1 The system shall validate the username and password by comparing them with the database.
  - 2.2 If the login credentials (Username, Password) are correct, the system shall create a secure session for the user.
  - 2.3 If the login credentials are incorrect, the system shall display an error message and provide a password recovery option.
  - 2.4 All login and account creation processes shall be secured using **HTTPS encryption**.

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- 3. The user (Student) shall be able to **upload their class schedule**.
    - 3.1 The system shall provide an interface for uploading the class schedule in **PDF** or **image** format.
    - 3.2 The system shall validate the uploaded file for type and size.
    - 3.3 The system shall save the class schedule in the student's profile.

4. The user (Student) shall be able to input their geographical location.
  - 4.1 The student shall be able to open the location setup page within the application.
  - 4.2 The system shall request location access permission from the user.
  - 4.3 If location access is denied, the system shall display a message indicating that access is required to proceed.
  - 4.4 If location access is granted, the system shall retrieve the student's current location using GPS.
  - 4.5 The system shall display the detected location on a map with a movable pin.
  - 4.6 The student shall be able to adjust the pin before confirming the final location.
  - 4.7 The system shall store the confirmed location in the database.
5. The user (Student) shall be able to book or cancel a bus reservation.
  - 5.1 The system shall display a list of suitable buses for the student based on their class schedule and location.
  - 5.2 The student shall be able to select a bus from the list and confirm the booking.
  - 5.3 The system shall allow the student to cancel a previously made booking.
  - 5.4 The system shall send a confirmation message after booking or cancellation.
  - 5.5 The system shall store the booking in the student's profile.
6. The user (Student) shall be able to complete the payment process after booking a bus.
  - 6.1 The system shall provide an interface that allows the student to select a preferred payment method before

proceeding with the payment process. The available payment options shall include:

- Credit/Debit cards
- Mobile payment services (e.g., Apple Pay, Google Pay)
- Installment plans over a period of 4 months, aligned with the academic term duration for UQU Al-Zahir female students.

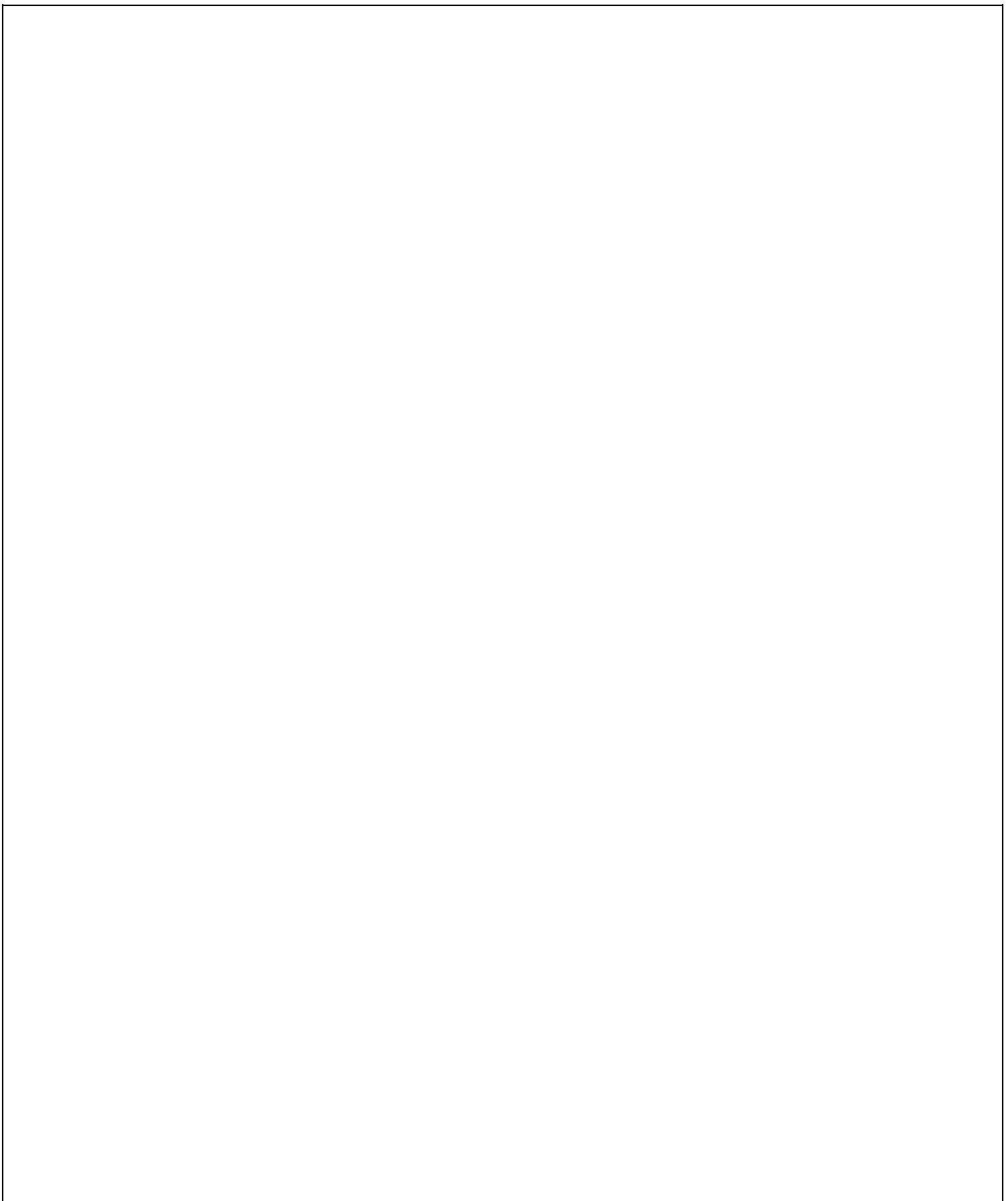
6.2 The system shall redirect the student to the Payment Gateway after selecting a payment method to complete the booking process.

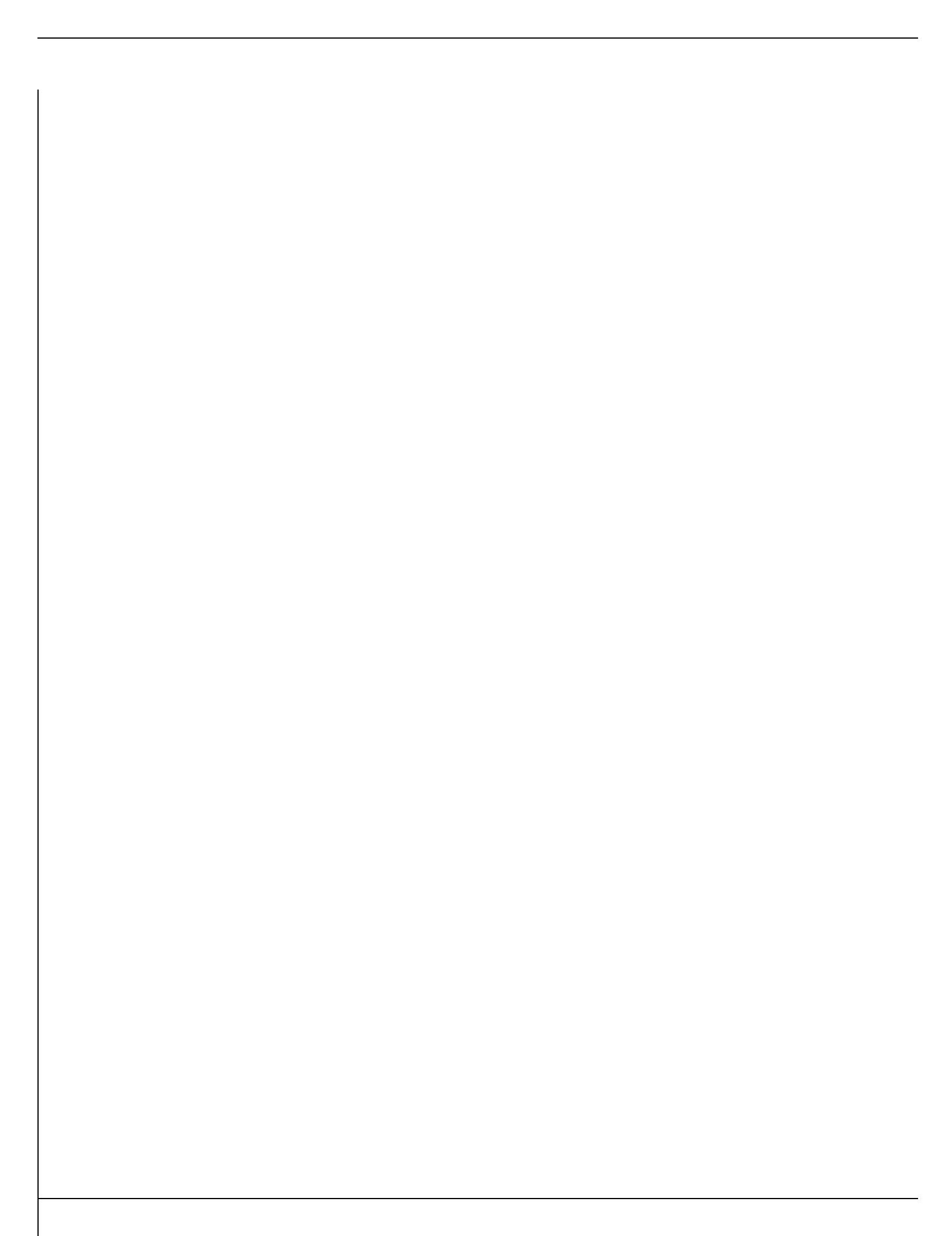
6.3 The system shall verify the payment transaction through the payment gateway before finalizing the booking.

6.4 The system shall retain the receipt if the payment is successful.

6.4.1 The system shall display the receipt to the user.

6.5 The system shall display a specific error message if the payment fails due to any reason (e.g., insufficient balance, invalid card details, expired card, transaction limit exceeded).





## 7. Tracking the Bus Location in Real-Time

- 7.1 The user (student) shall be able to track the bus location in real-time on a map showing its movement.
- 7.2 The system shall obtain the bus location using the location services of the mobile device inside the bus.
- 7.3 The system shall update the bus location every 60 seconds.
- 7.4 The system shall send the location data to the server.
- 7.5 The system shall store the location data in the database. 7.6 The system shall display the bus location on the map for the student.
- 7.7 The system shall calculate the distance between the bus and the student's home using the stored location data while displaying the estimated arrival time to the student. 7.8 The system shall send a notification to the student when the bus is within 500 meters of their home.

## 8. Modifying the Daily Schedule

- 8.1 The user (Student) shall be able to modify a specific time for a selected day.
- 8.2 The system shall provide an option in the student's interface to set their attendance status for a specific day:
  - “Absent.”
  - “Modify Schedule.”
- 8.3 The system shall exclude the student's home from the bus route when the status is set to “Absent.”
- 8.4 The system shall prompt the student to select a new pickup or drop-off time when choosing “Modify Schedule.” 8.4.1 The system shall validate the entered time before applying any changes.
- 8.4.2 The system shall analyze other student requests on the same bus before confirming the schedule modification.
- 8.5 The system shall apply the schedule adjustment only for the selected day and revert to the original schedule the next day.
- 8.6 The system shall notify the driver about any route adjustments, including the removal of the student's home when applicable.
- 8.7 The system shall update the driver's route based on the new request. 8.7.1 The system shall provide the driver with the updated stop timing.

## 9. Student Check-In During Return Trip

- 9.1 The user (Student) must confirm their presence inside the bus during the return trip.
- 9.2 The system shall display a real-time list of student names for the driver at the start of the return trip. 9.3 The student shall confirm their presence by selecting the “Check-in” option in the app within the allowed time frame.
- 9.4 The system shall check if the student has not confirmed their presence within 5 minutes after the trip starts.
- 9.5 The system shall place a checkmark (✓) next to the name of the student who has checked in.
- 9.6 The system shall send an alert to the driver to check whether the student has not boarded the bus or has no internet connection.
- 9.7 The system shall exclude the student after verifying their absence from the bus. 9.8 The system shall provide an option for the driver to manually confirm a student’s presence.
- 9.9 The system shall allow the driver to manually confirm the student’s presence using the system’s interface.
- 9.10 The system shall update attendance list after any status change.

## 10 The user (driver)shall be able to **communicate** in group chats with the students.

- 10.1 The system shall provide a group chat including all students assigned to a bus and the driver.
- 10.2 The system shall allow the driver to send general notifications, such as "The bus is on its way" or "The bus is near your home."
- 10.3 The system shall **not allow** messages to ensure privacy.

## 11 The user shall **send notifications** when the bus arrives.

- 11.1 The system shall send a notification to the student when the bus is 5 minutes away from their home.
- 11.2 The system shall send a notification when the bus reaches the designated gate at the university.
- 11.3 The system shall start a countdown timer (e.g., 3 minutes) when the bus arrives at the student’s location.
- 11.4 The system shall check if the student boards the bus within the time limit.
- 11.5 The system shall allow the bus to proceed to the next stop if the student does not board within the time limit.

- 12 The user(student )shall always know the **gate** where the bus will stop.
  - 12.1 The system shall assign a fixed gate for each bus based on its schedule.
  - 12.2 The system shall display the assigned gate to the student in the tracking interface.
  - 12.3 The system shall use GPS to determine the exact location of the bus at the gate.
- 13 The user shall be able to evaluate by users of the system
  - 13.1 The system shall provide a feedback form displayed after each trip.
  - 13.2 The system shall allow the student to give a rating from 1 to 5 and **add** comments.
  - 13.3 The system shall store the evaluations in the database for review by administrators.

### **Non-Functional Requirements:**

#### 1. Performance:

- 1.1 The system shall respond to login or account creation requests within 3 seconds.
- 1.2 The system shall display buses and class schedules within 5 seconds under a load of up to 100 concurrent users.
- 1.3 The system shall process at least 6,000 transactions daily without performance degradation.

#### 2. Availability:

- 2.1 The system shall have an availability rate of 99.9% during operational hours.
- 2.2 Downtime shall not exceed 1 minute per day.

### 3. Security:

- 3.1 All data exchanged between the user and the system shall be encrypted using HTTPS.
- 3.2 Sensitive user data (e.g., passwords and payment information) shall be encrypted using AES-256.
- 3.3 The system shall alert administrators of suspicious login attempts.
- 3.4 The system shall be protected against DDoS attacks and other potential threats.
- 3.5 The system shall ensure secure integration with external services, using encrypted connections to protect user data.

### 4. Usability:

- 4.1 The system shall provide an intuitive and user-friendly graphical interface suitable for all user categories.
- 4.2 The system shall include an integrated user manual and help feature for guidance.
- 4.3 Error messages shall be clear and provide steps for issue resolution.

### 5. Reliability:

- 5.1 The system shall not experience more than 1 failure per week.
- 5.2 The Mean Time Between Failures (MTBF) shall not be less than 500 hours.
- 5.3 In case of failure, the system shall recover within 5 minutes.

### 6. Maintainability:

- 6.1 The system shall support software updates without interrupting ongoing services.
- 6.2 The system shall be designed to allow the addition of new features with minimal effort.
- 6.3 Comprehensive documentation of code and processes shall be maintained.

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6.4 The system shall undergo regular maintenance every month to ensure optimal performance and reliability.

7. Scalability:

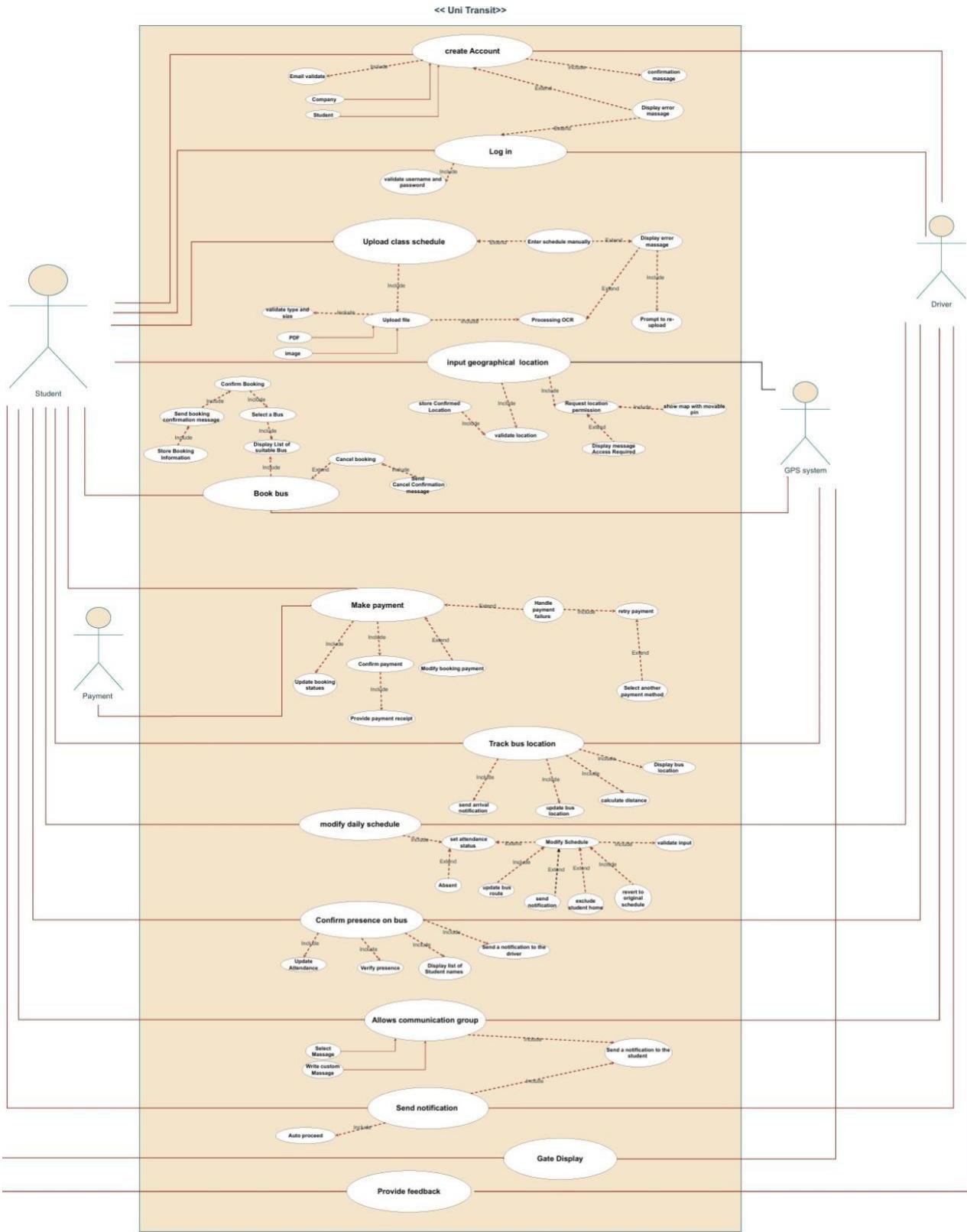
7.1 The system shall scale to support a 50% increase in user load during peak periods.

7.2 The system shall handle 10,000 transactions per day when necessary.

7.3 The system shall be designed to integrate efficiently with external services (e.g., payment gateways, GPS mapping tools) without impacting performance.

## - Chapter 5

### Use Case Diagram:





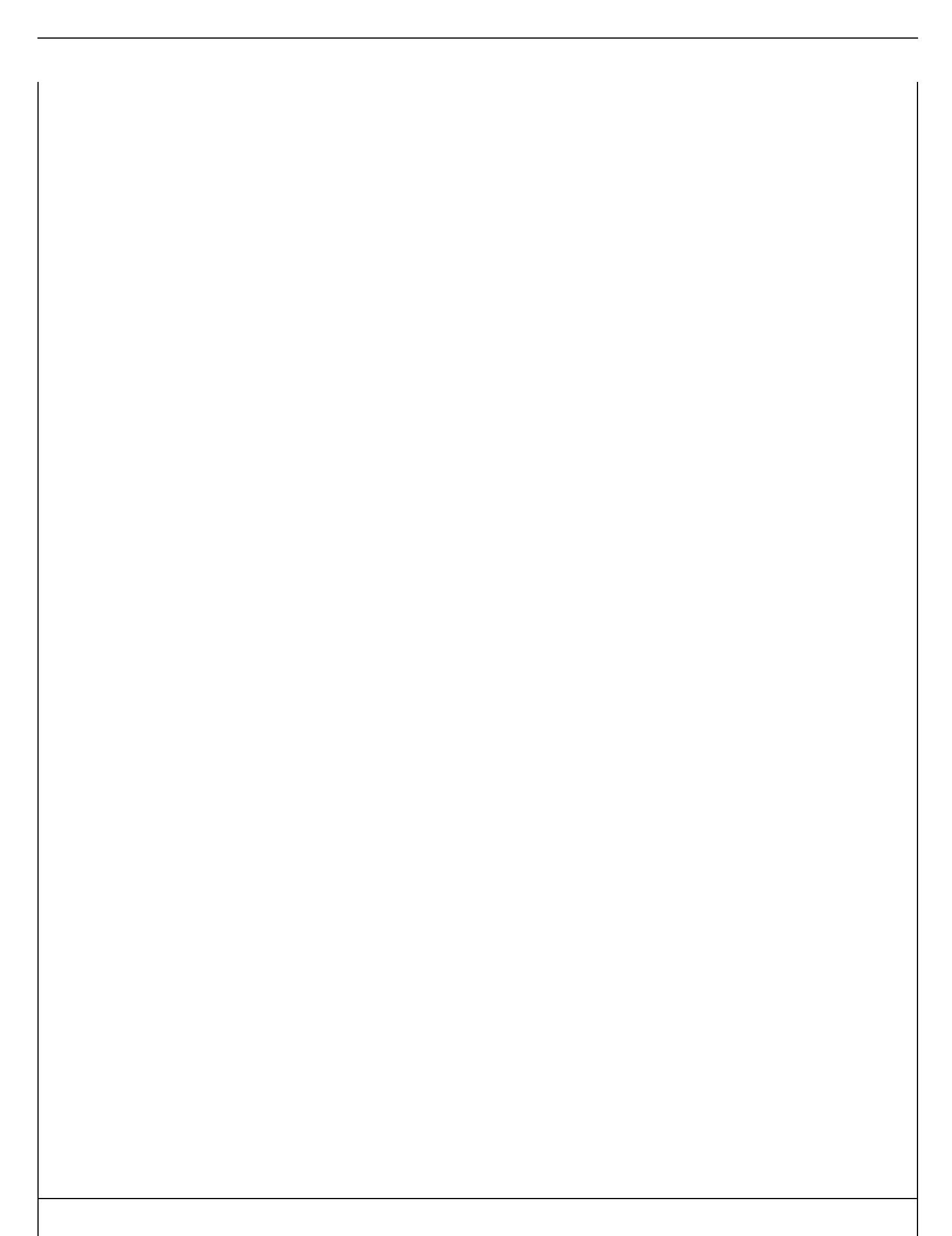
- 
- **Use Case Scenario**

<b>Create Account</b>	
Actors	Student, Driver
Description	<p>the system shall provide an option to "Create a New Account."</p> <p>The system shall prompt the user to input basic information (name, email, password, and account type: student or company).</p> <p>The system shall validate the input data to ensure the email is not already registered.</p> <p>If the user tries to create an account with an existing email, the system shall display a message: "You already have an account. Please log in or recover your password."</p> <p>The new account must be stored in the data database.</p> <p>The system shall send an email confirmation for account activation</p>
Data	Name, Email, Password, Account Type (student or student or company).
Sitmulus	User requests to create a new account
Response	Account creation confirmation, error message if the email is already registered, email confirmation for account activation.
Comments	

<b>Log in</b>	
Actors	Student, Driver
Description	<p>The system shall validate the username and password by comparing them with the database.</p> <p>If the login credentials (Username, Password) are correct, the system shall create a secure session for the user.</p> <p>If the login credentials are incorrect, the system shall display an error message and provide a password recovery option.</p> <p>All login and account creation processes shall be secured using HTTPS encryption.</p>
Data	Username, password
Sitmulus	User requests to log in
Response	A secure session is created or an error message is displayed
Comments	Include password recovery options and encrypt sensitive data

upload class schedule	
Actors	Student
Description	<p>The system shall provide an interface for uploading the class schedule in PDF or image format.</p> <p>The system shall validate the uploaded file for type and size.</p> <ul style="list-style-type: none"> <li>▪ The system shall save the class schedule in the student's profile.</li> </ul>
Data	the class schedule in PDF or image format.
Sitmulus	when the user uploading the class schedule
Response	Confirmation message displayed after successful upload save the class schedule in database
Comments	Invalid files are rejected, and the system must validate the format and size

Input Geographical Location	
Actors	Student, GPS system
Description	<p>The system shall provide an option for the student to manually input their location or use GPS to determine it.</p> <p>The system shall validate the accuracy of the manually entered or GPS-detected location.</p> <p>The system shall save the geographical location in the student's profile.</p>
Data	Manually entered location or GPS-detected location.
Sitmulus	When the user (student) inputs their location.
Response	Geographical location saved in the student's profile.
Comments	



<b>View Available Buses</b>	
Actors	Student,GPS system
Description	<p>The system shall identify the suitable buses based on the student's class schedule and geographical location.</p> <p>The system shall display a list of available buses, including departure times and routes.</p> <p>The list shall update automatically if any relevant data changes.</p>
Data	Class schedule, geographical location
Sitmulus	When the user (student) views available buses.
Response	List of available buses, including departure times and routes.
Comments	

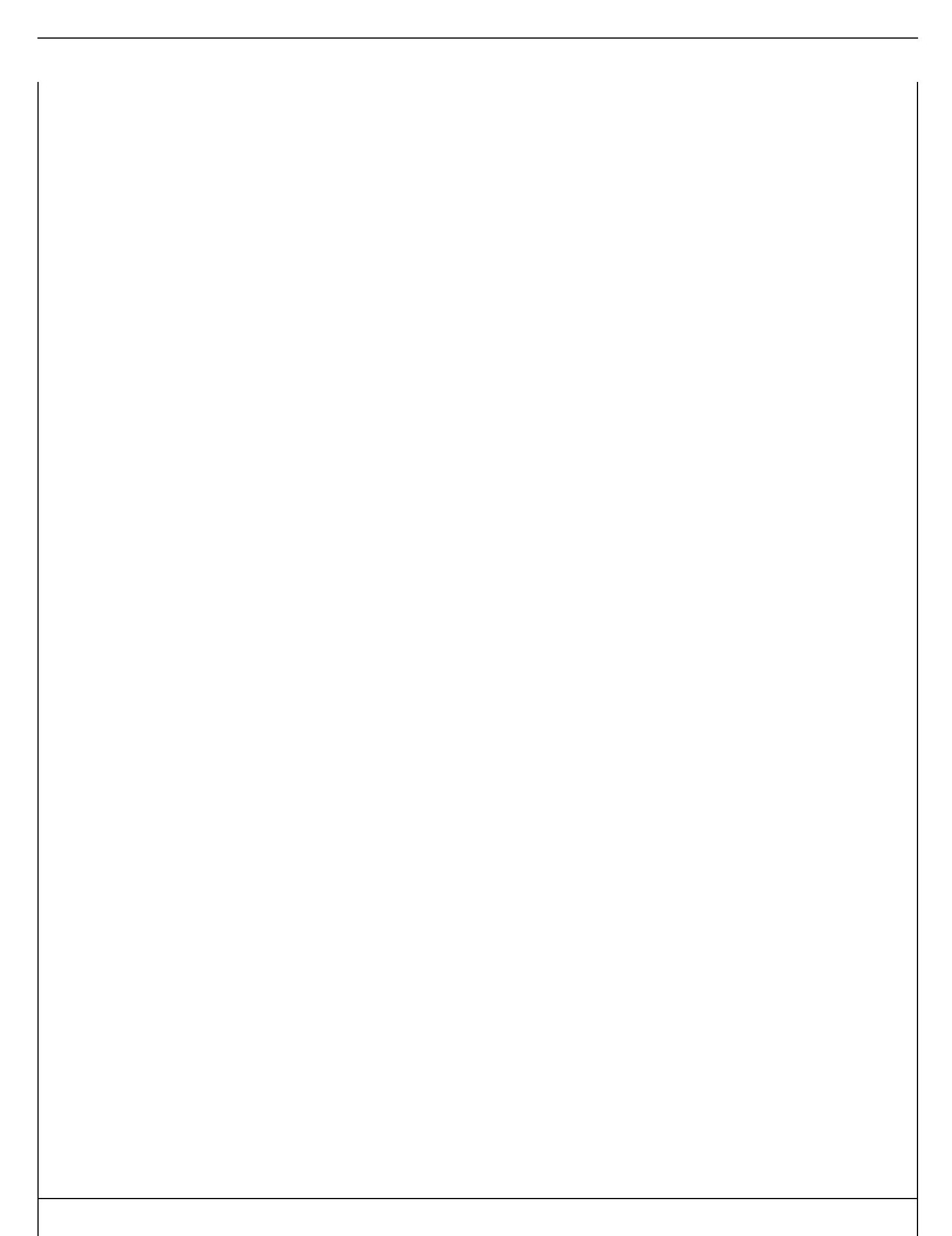
Book Bus	
Actors	Student
Description	<p>The system shall open a booking form when the user clicks the "Book Now" button.</p> <p>The system shall <b>validate</b> the user's input (e.g., name, date, and time) in the booking form.</p> <p>The system shall <b>check the availability</b> of the requested date and time in the database before confirming the booking.</p> <p>The system shall save the booking details (name, date, time, service) in the database upon successful booking.</p> <p>The system shall send a confirmation message to the user after the booking is completed.</p> <p>The system shall allow the user to cancel or modify their booking if needed.</p> <p>The system shall display an error message if the requested time is unavailable or if the input is invalid.</p>
Data	Name, date, time.
Sitmulus	When the user clicks the "Book Now" button.
Response	Booking confirmation, error message if the requested time is unavailable or if the input is invalid.
Comments	

<b>Make Payment</b>	
Actors	Student, Payment
Description	<p>The system requests the user to enter the cardholder's name</p> <p>The system requests the user to enter the card number.</p> <p>The system requests the user to enter the expiration date.</p> <p>The system requests the user to enter the CCV code.</p> <p>The system verifies that the payment has been successfully processed</p>
Data	cardholder's name, card number, expiration date, CCV code.
Sitmulus	When making the payment to confirm the reservation
Response	The seat reservation on the bus is successfully completed.
Comments	

<b>Track Bus Location</b>	
Actors	Student, GPS system
Description	<p>The system shall provide a live map displaying the bus location using GPS.</p> <p>The system shall update location data every minute to ensure accuracy.</p> <p>The system shall send a notification to the student when the bus is approaching their home.</p>
Data	GPS data
Sitmulus	When the user (student) tracks the bus location.
Response	The gate details are displayed to the student
Comments	Live map displaying bus location, notification when the bus is approaching their home.

Edit Specific Time	
Actors	Student, Driver
Description	<p>The system shall provide an option in the student's interface to specify their status for a specific day:</p> <ul style="list-style-type: none"> <li>"Present."</li> <li>"Absent."</li> <li>"Modify Schedule."</li> </ul> <p>If the student selects "Absent," the system shall automatically adjust the bus route to exclude their home.</p> <p>If the student selects "Modify Schedule," the system shall prompt them to enter a new time for the start or end of their day.</p> <p>The system shall validate the entered time.</p> <p>The system shall analyze other student requests on the same bus.</p> <p>This adjustment applies only to the specified day, and the system shall revert to the original schedule for the following days.</p> <p>The system shall notify the driver of the updated route excluding the student's home.</p> <p>The driver shall receive an alert with the new route and stop timing.</p>
Data	Status for a specific day ("Present", "Absent", "Modify Schedule"), new time for start or end of day.
Sitmulus	When the user (student) selects their status for a specific day.
Response	Updated bus route excluding the student's home, alert to the driver with the new route and stop timing.
Comments	This feature allows the student to modify the schedule in case of absence, attendance, or a professor's apology. The modification must be visible to the driver.





Confirm presence on Bus	
Actors	Student ,Driver
Description	<p>The system shall display a list of student names for the driver.</p> <p>The student shall confirm their presence by marking a "check" next to their name in the app.</p> <p>If the student does not confirm their presence within a specified time, the system shall send an alert to the driver.</p>
Data	Student marks a "check" next to their name
Sitmulus	During the return trip.
Response	Alert to the driver if the student does not confirm their presence within a specified time.
Comments	

Allows communication group	
Actors	Driver,Student
Description	<p>The system shall provide a group chat including all students assigned to a bus and the driver</p> <p>The system shall allow the driver to send general notifications, such as "The bus is on its way" or "The bus is near your home."</p> <p>The system shall not allow messages to ensure privacy.</p>
Data	General notifications from the driver
Sitmulus	When the driver sends notifications.
Response	Display of notifications to students
Comments	



<b>Send notification</b>	
Actors	Student, Driver
Description	<p>The system shall send a notification to the student when the bus is 5 minutes away from their home.</p> <p>The system shall send a notification when the bus reaches the designated gate at the university.</p> <p>The system shall start a countdown timer (e.g., 3 minutes) when the bus arrives at the student's location.</p> <p>The system shall check if the student boards the bus within the time limit.</p> <p>The system shall allow the bus to proceed to the next stop if the student does not board within the time limit.</p>
Data	GPS data.
Sitmulus	When the bus is 5 minutes away or when it reaches the designated gate.
Response	Notification to the student, countdown timer, allow the bus to proceed if the student does not board within the time limit
Comments	

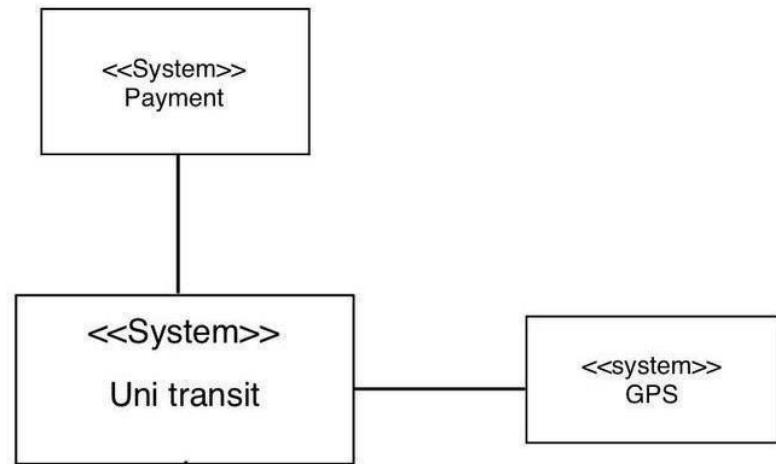


<b>Gate Display</b>	
Actors	Student, GPS system
Description	<p>The system shall assign a fixed gate for each bus based on its schedule.</p> <p>The system shall display the assigned gate to the student in the tracking interface.</p> <p>The system shall use GPS to determine the exact location of the bus at the gate.</p>
Data	Bus schedule, GPS data.
Sitmulus	When the user (student) views the tracking interface.
Response	Display assigned gate, use GPS to determine the exact location of the bus at the gate.
Comments	

<b>Provide Feedback</b>	
Actors	Student, Driver
Description	<p>The system shall provide a feedback form displayed after each trip.</p> <p>The system shall allow the student to give a rating from 1 to 5 and add comments.</p> <p>The system shall store the evaluations in the database for review by administrators.</p>
Data	Rating from 1 to 5, comments.
Sitmulus	After each trip
Response	Evaluations stored in the database
Comments	

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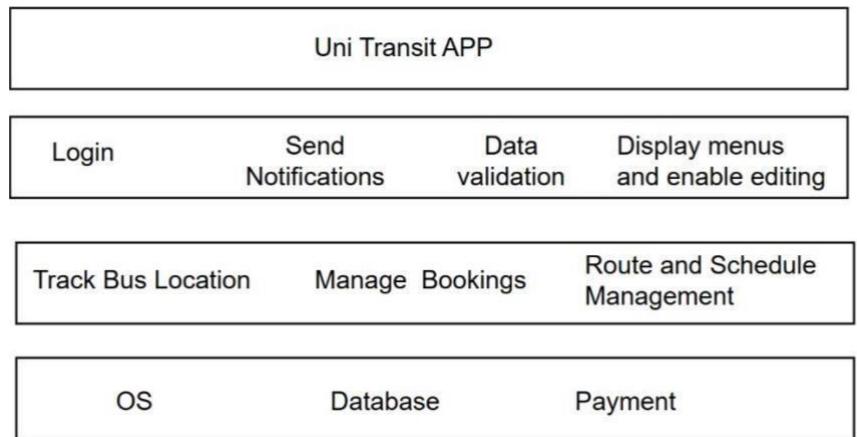
**context Diagram:**



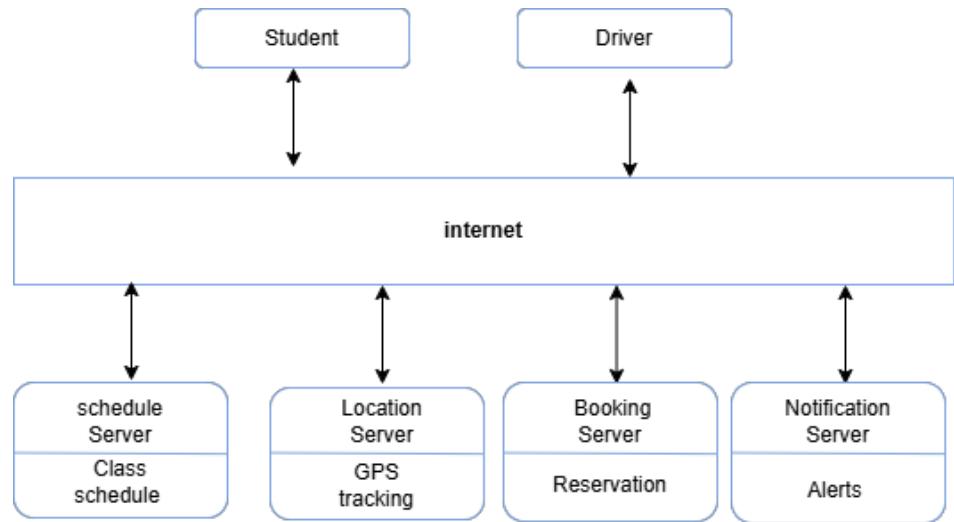
**AD diagrams :**

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- Layered architecture



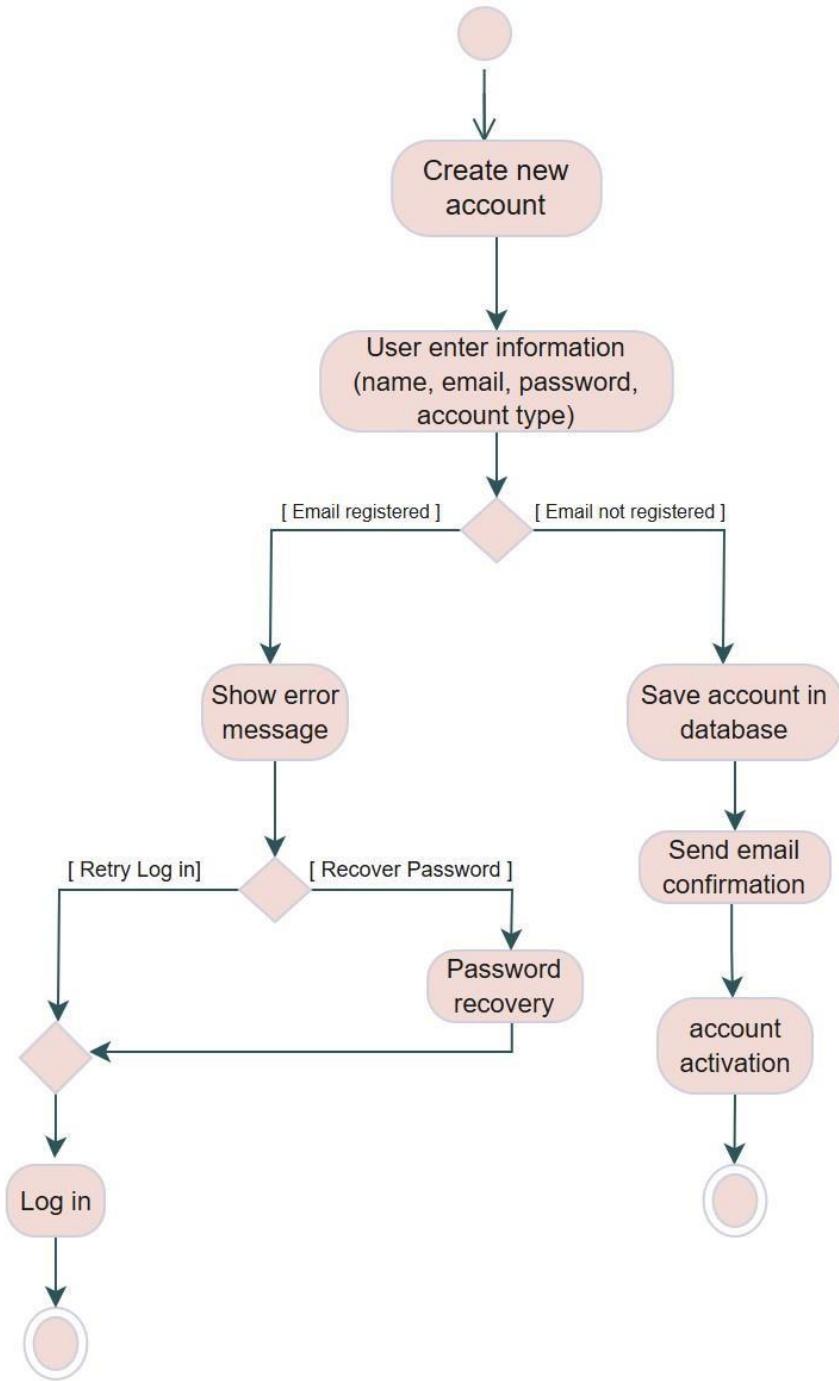
## Client – Server architecture



-Chapter 6

**Activity Diagrams:**

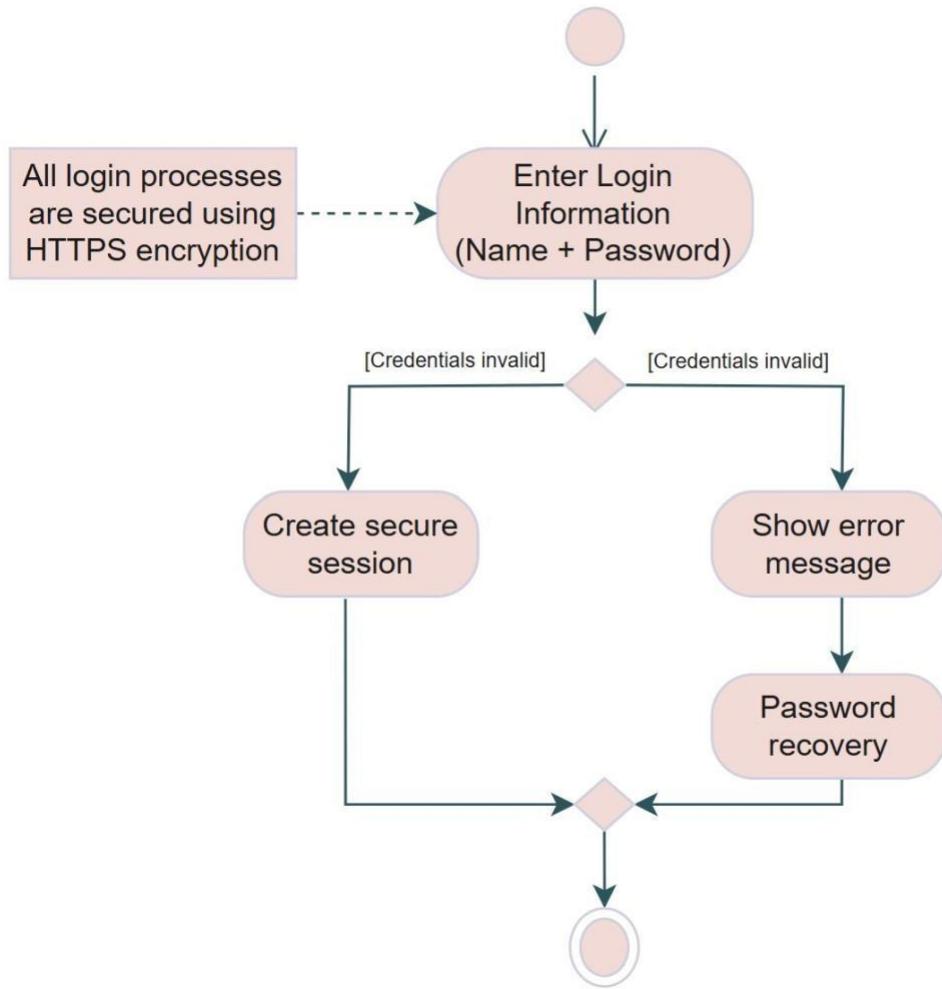
## 1.Create new account





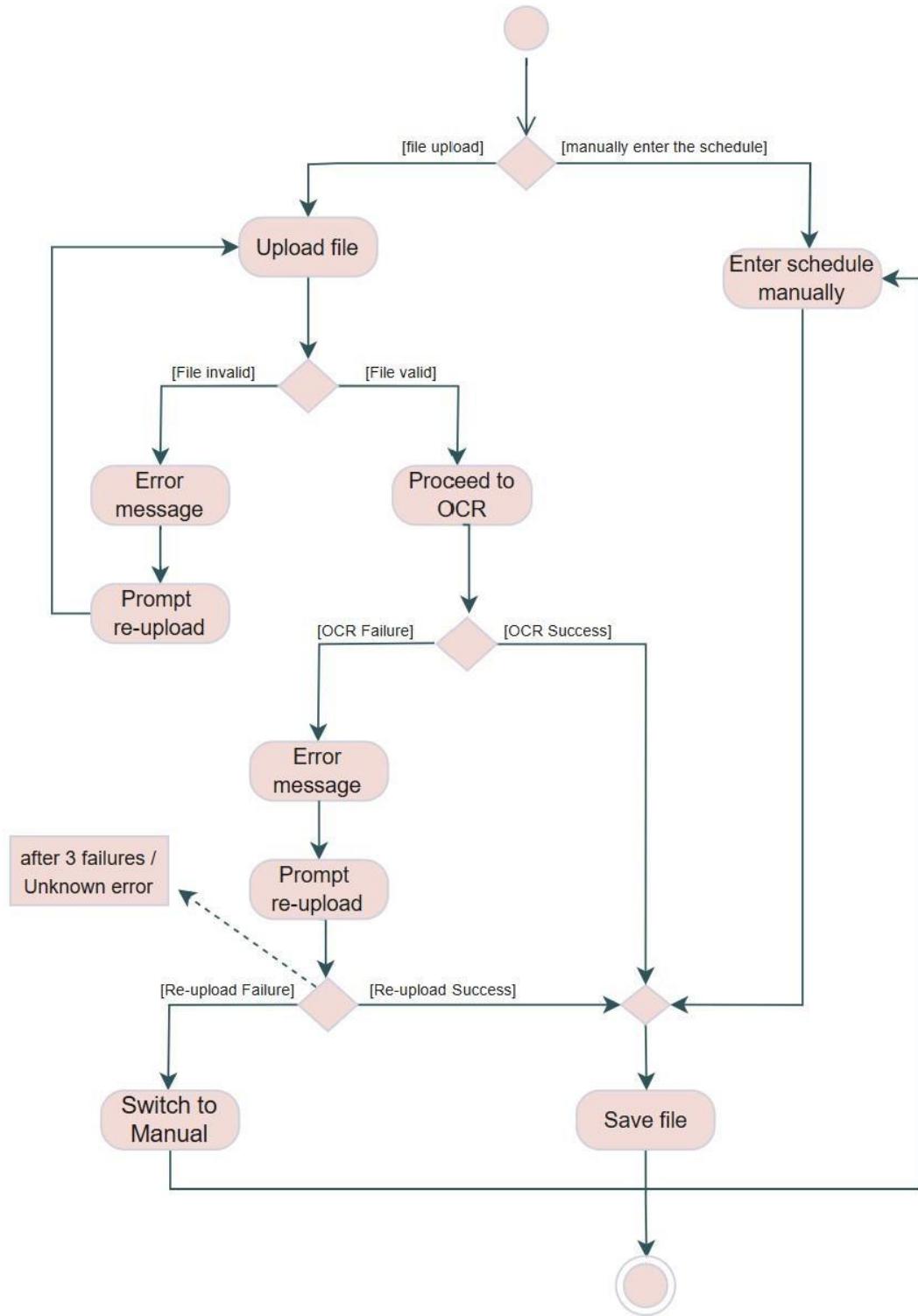
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## **2.Log in**



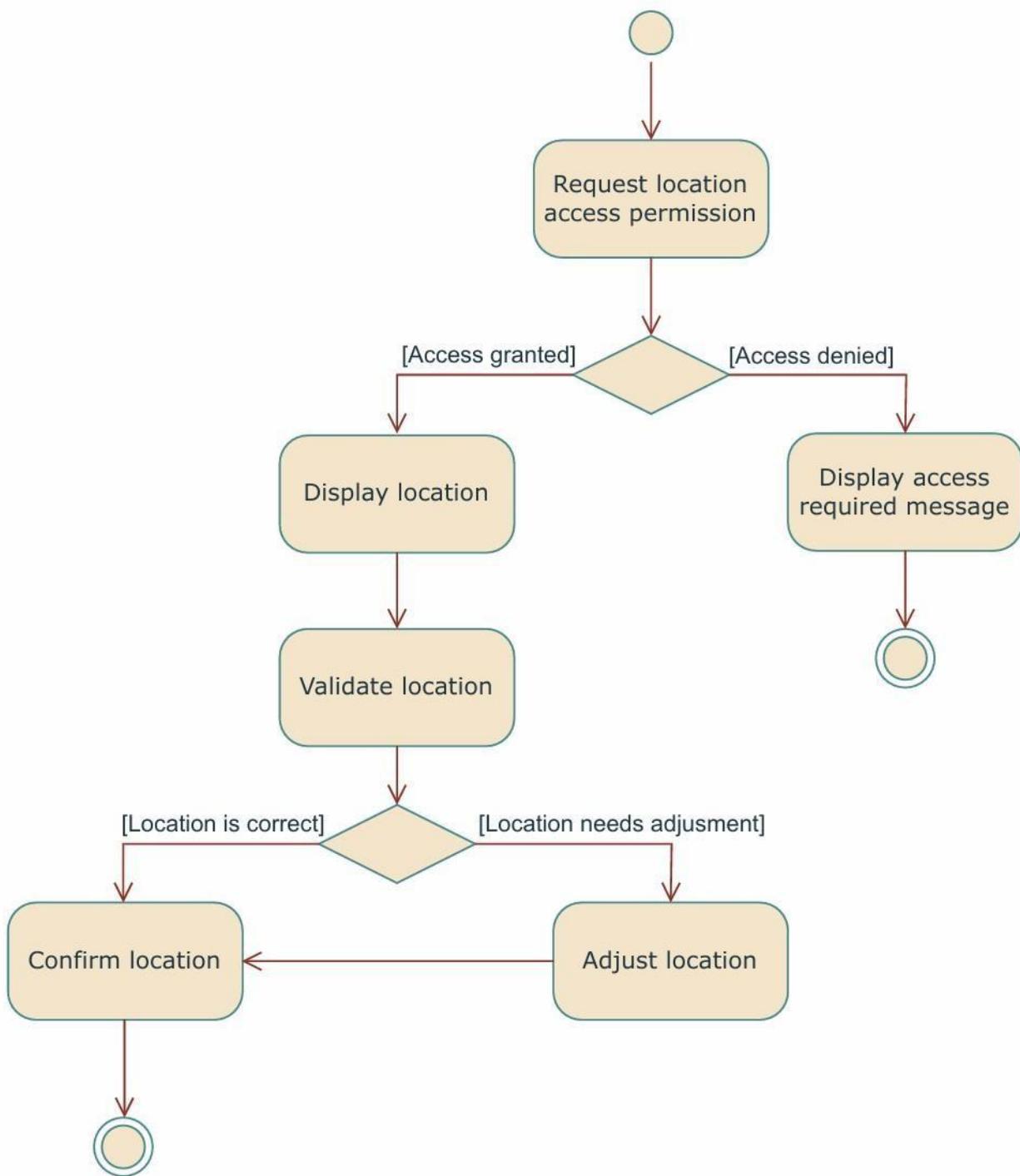
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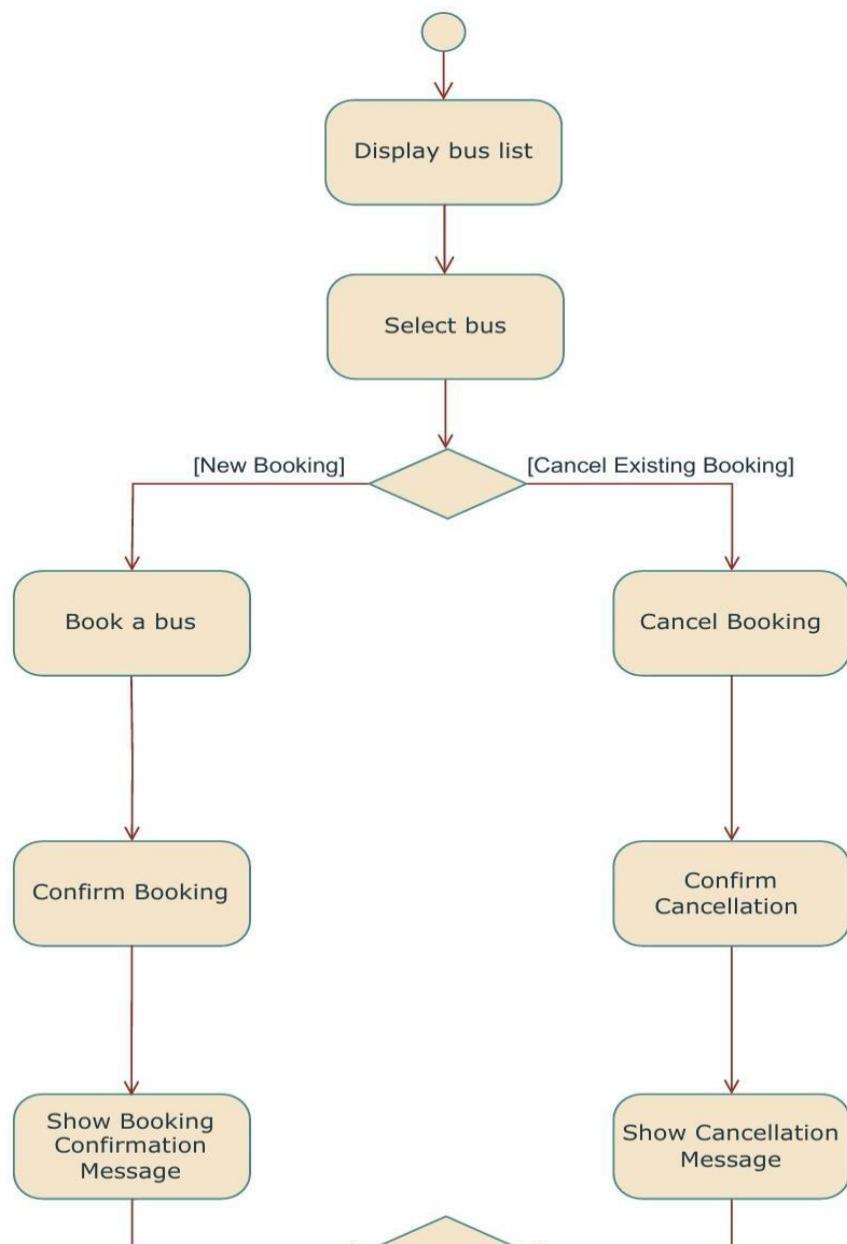
**3.Enter schedule**



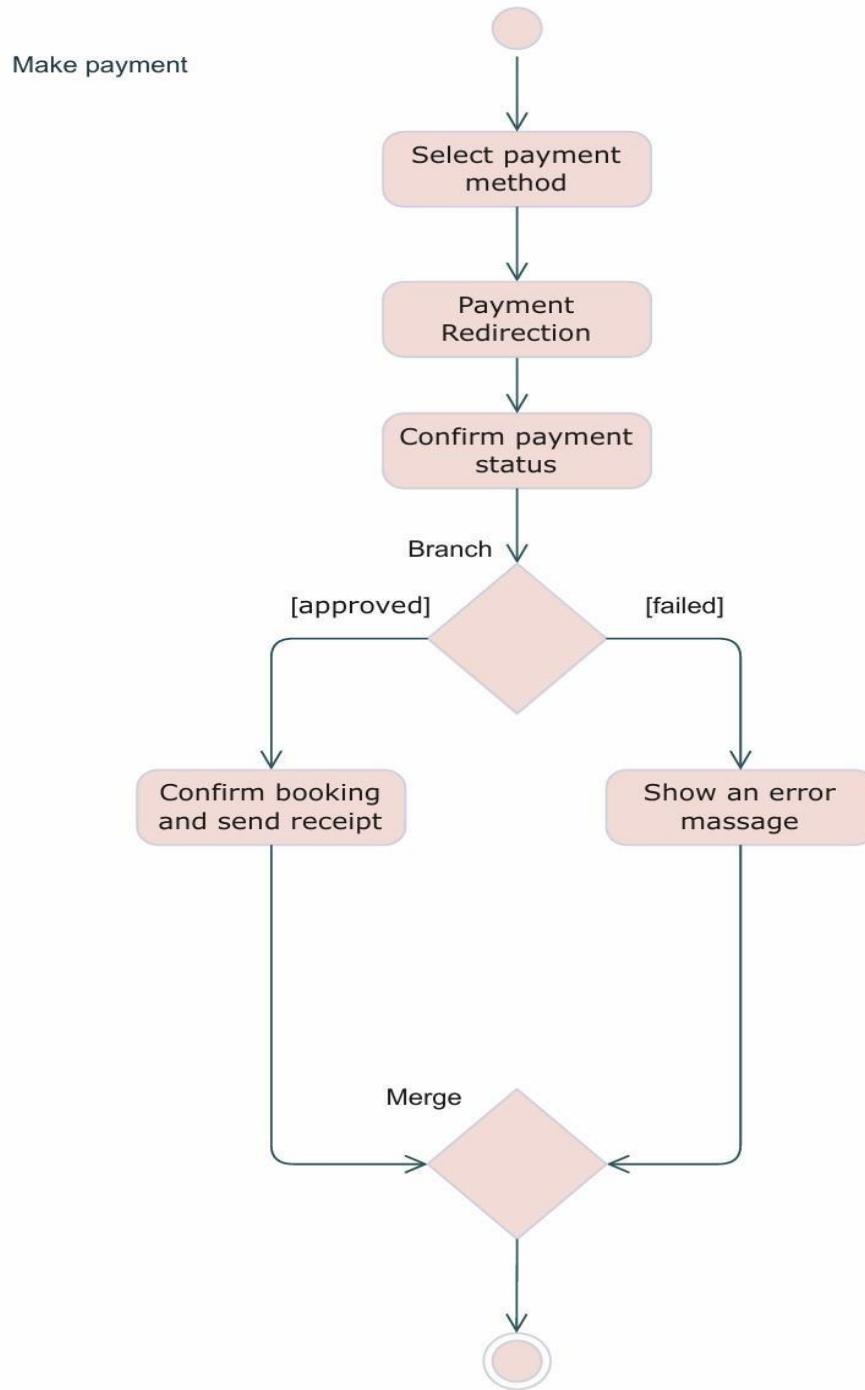
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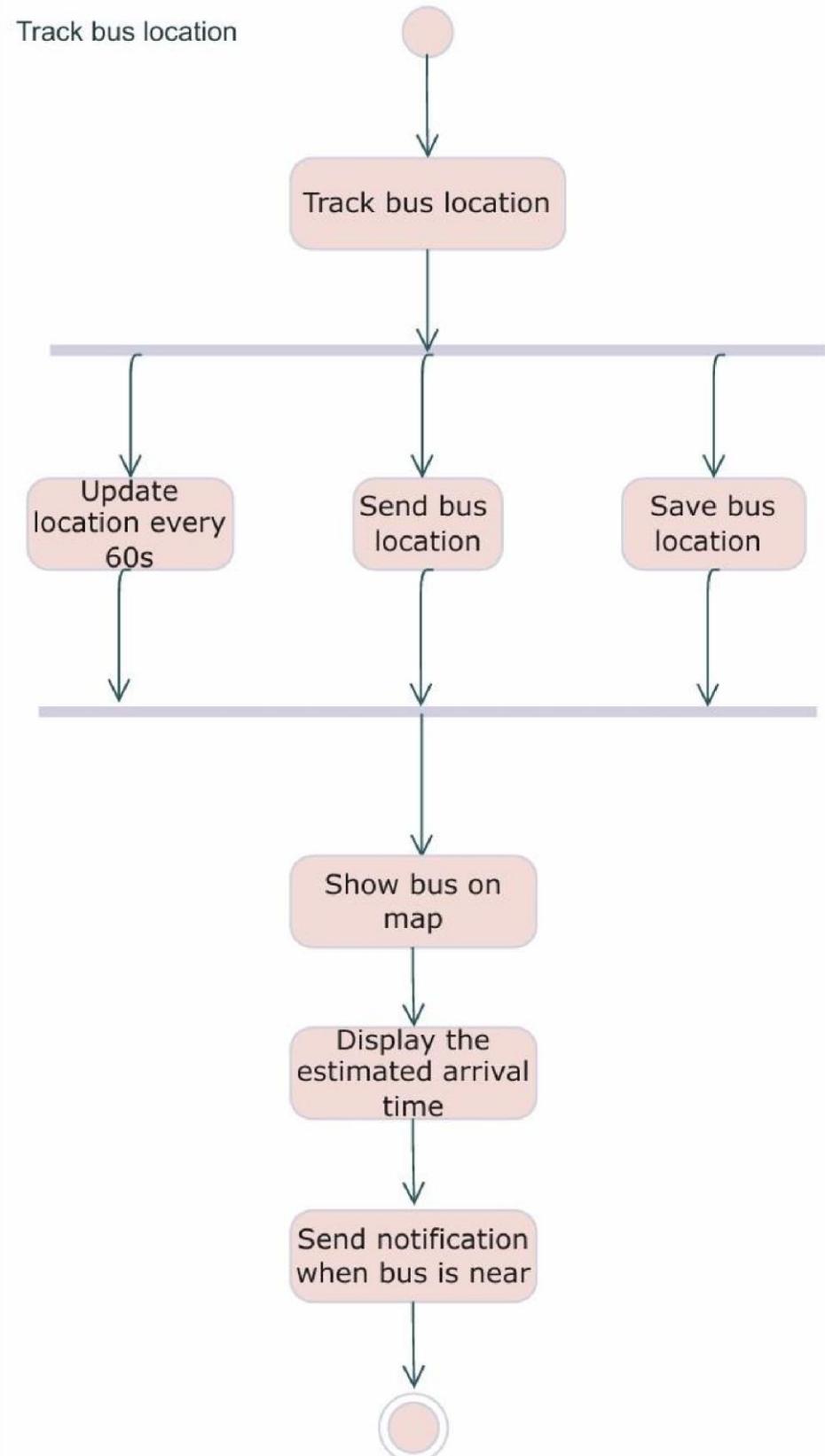
**4.Enter geographical location.**





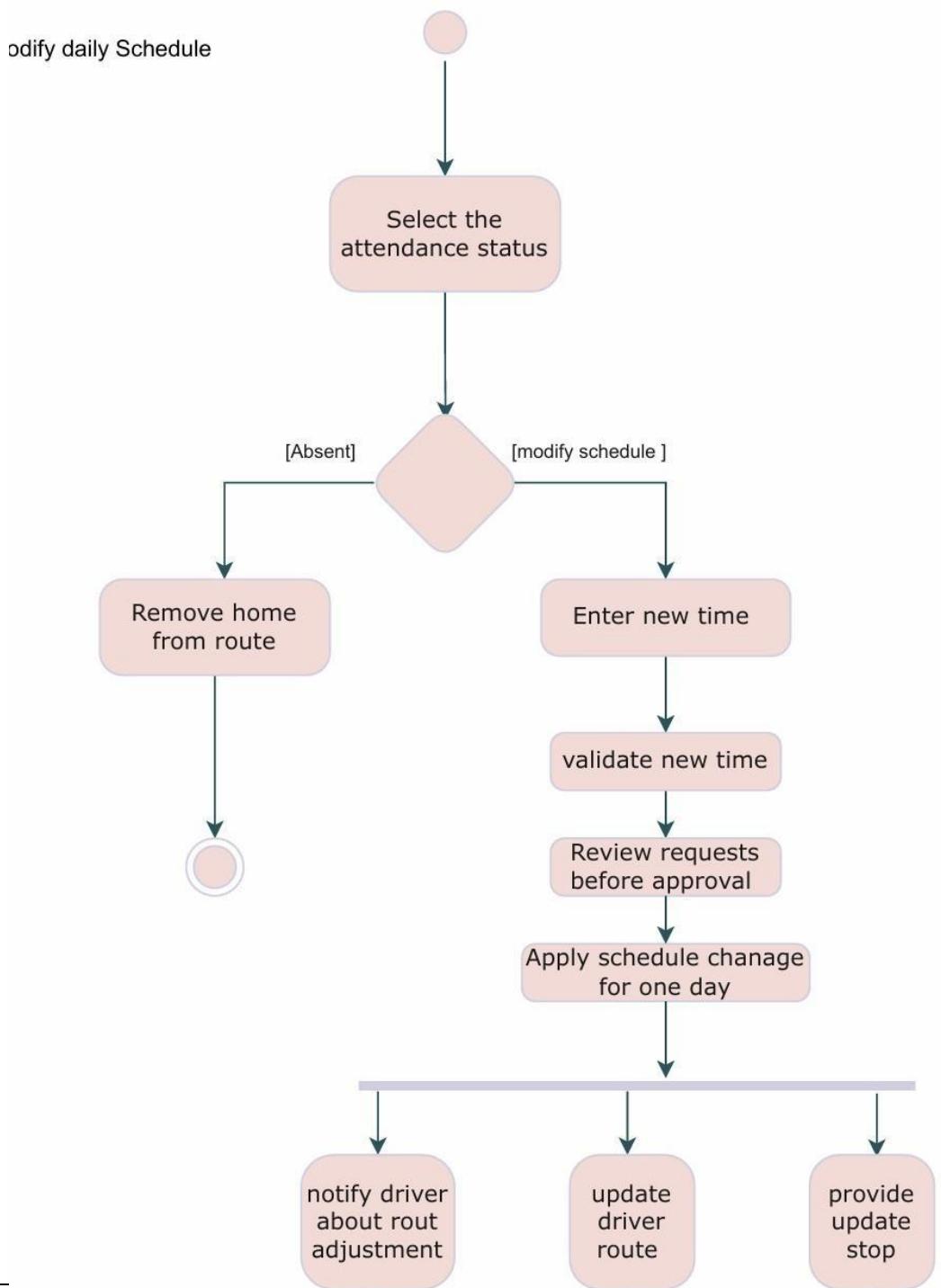
**Make payment**





**Make payment**

**.Modify daily  
schedule**

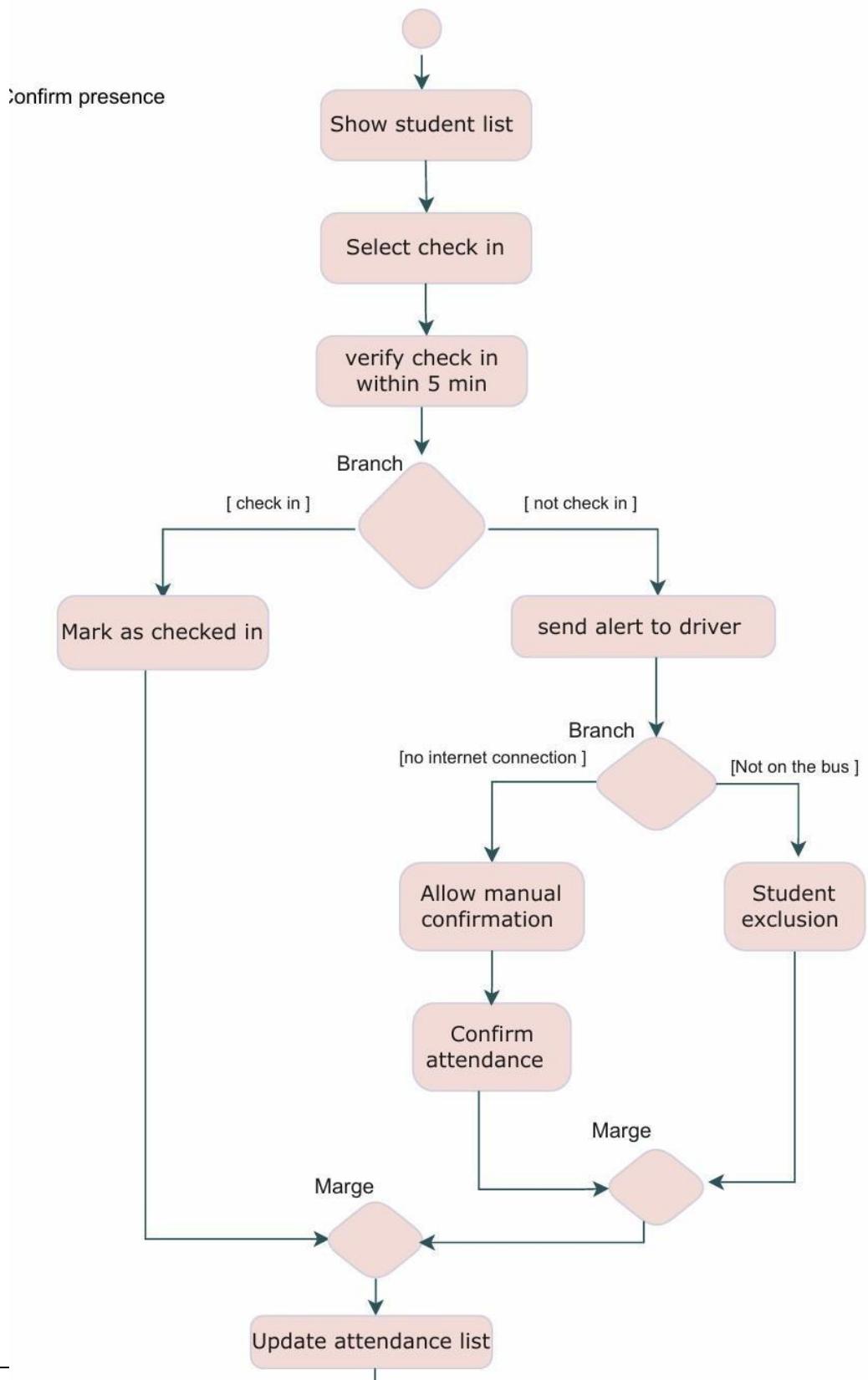


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**11.**

**Confirm presence**

12.



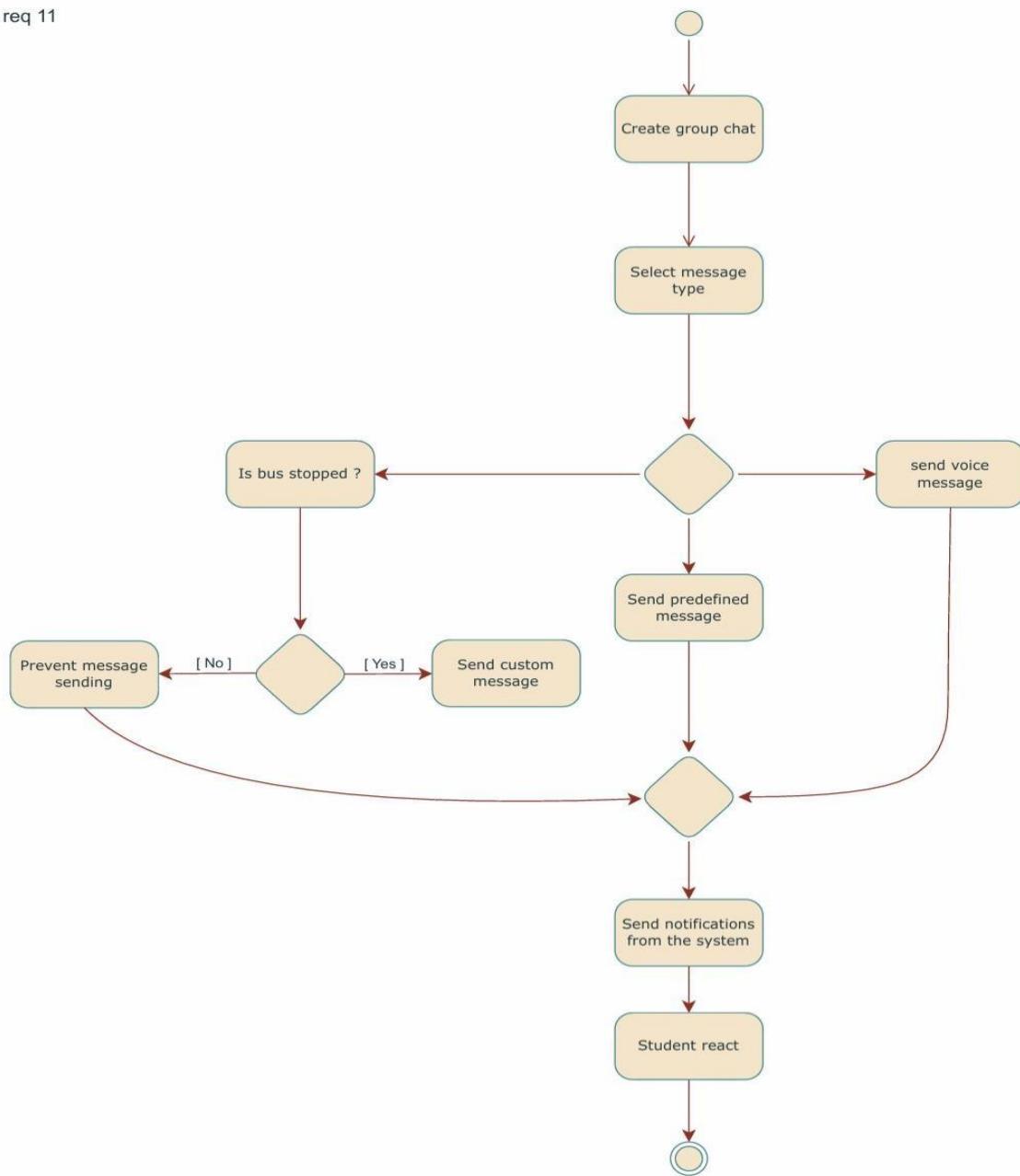
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**13.**

---

## 14. communication

المرجع req 11



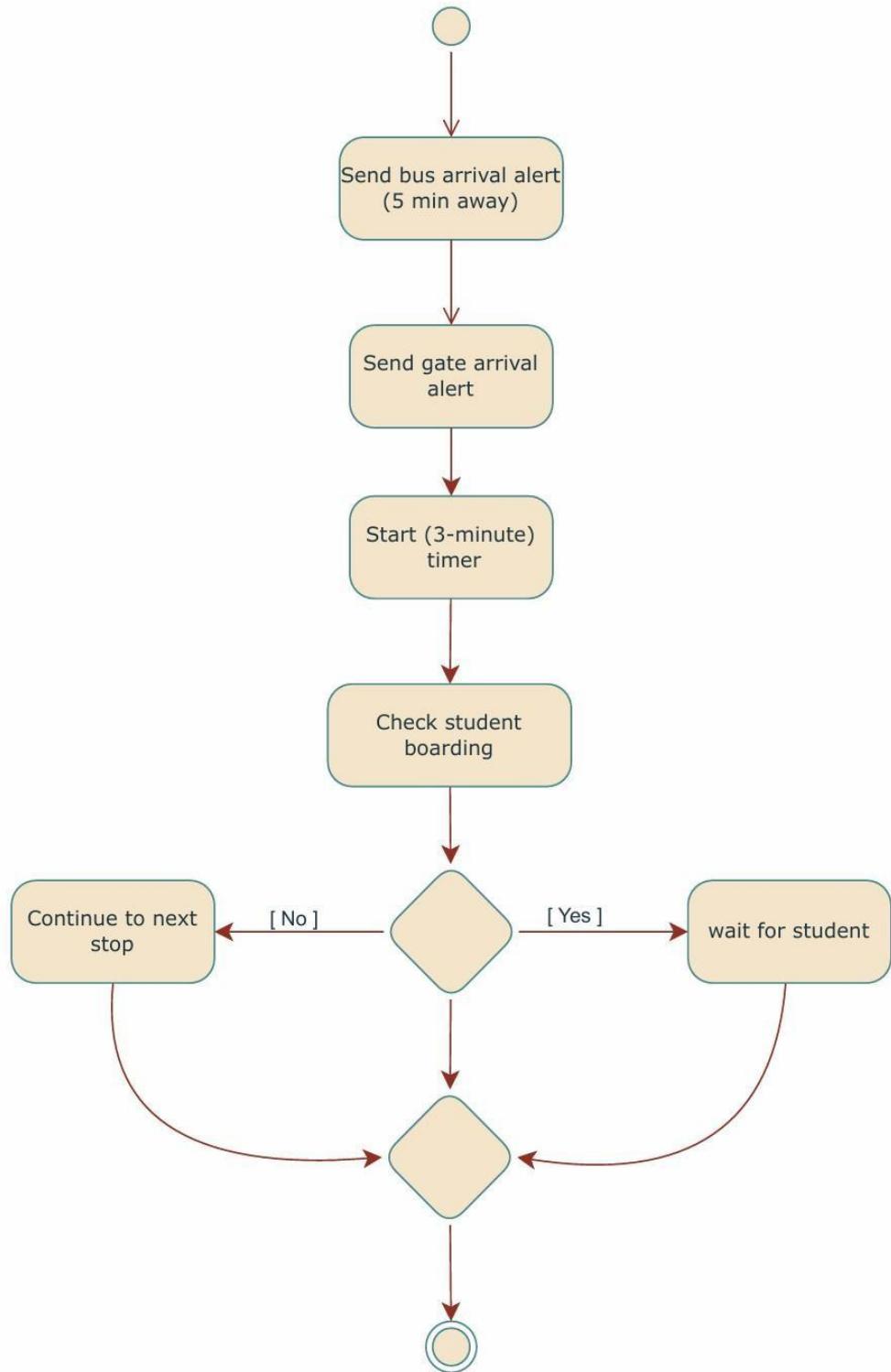
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**15.**

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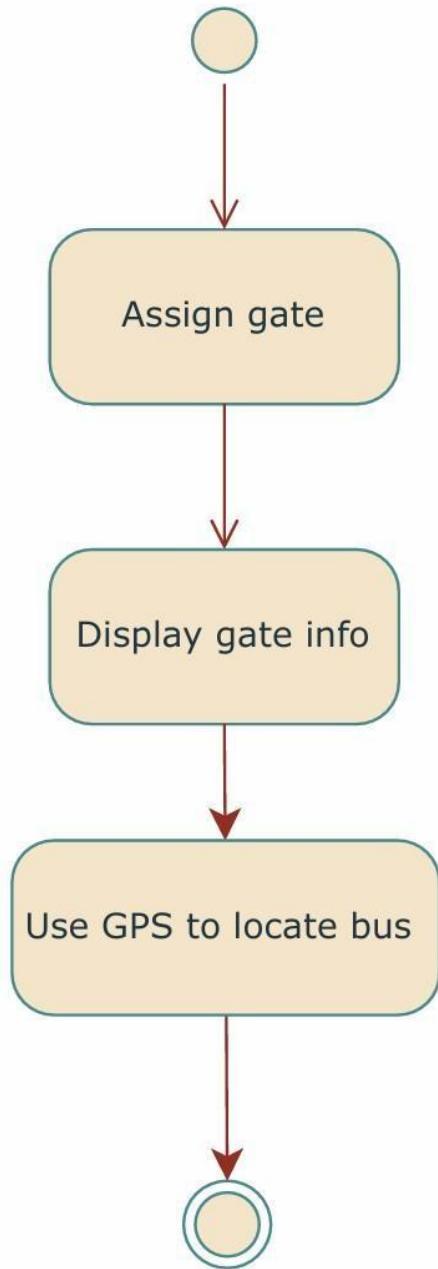
**16.**

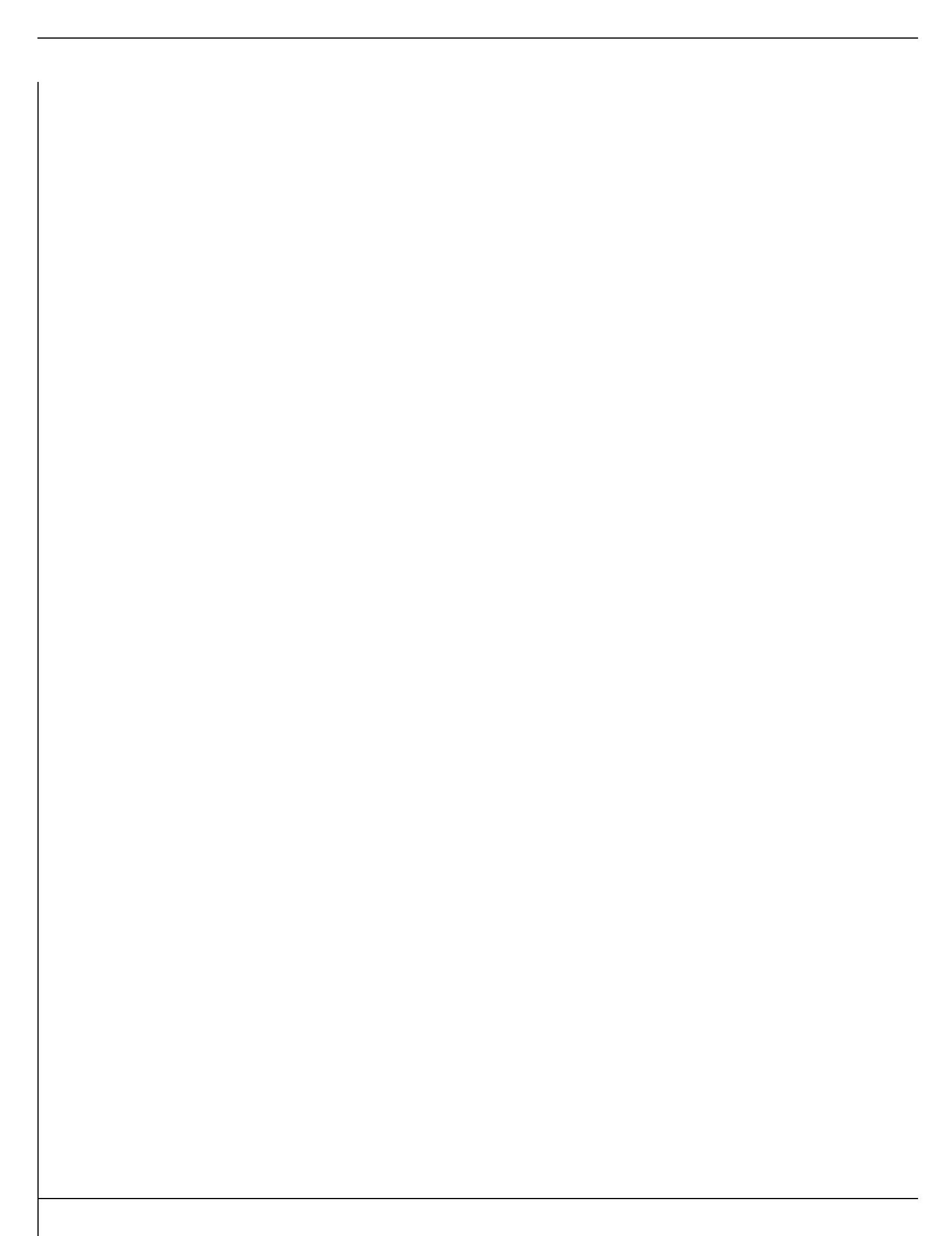
### notifications



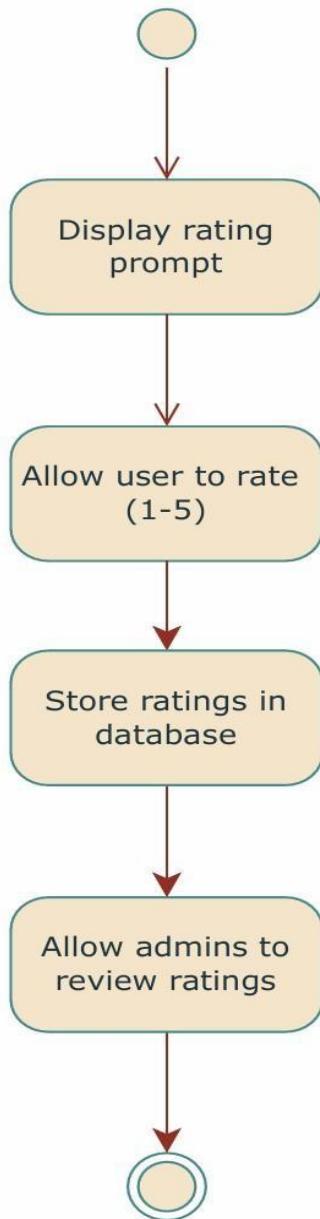
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**12.Gate location**





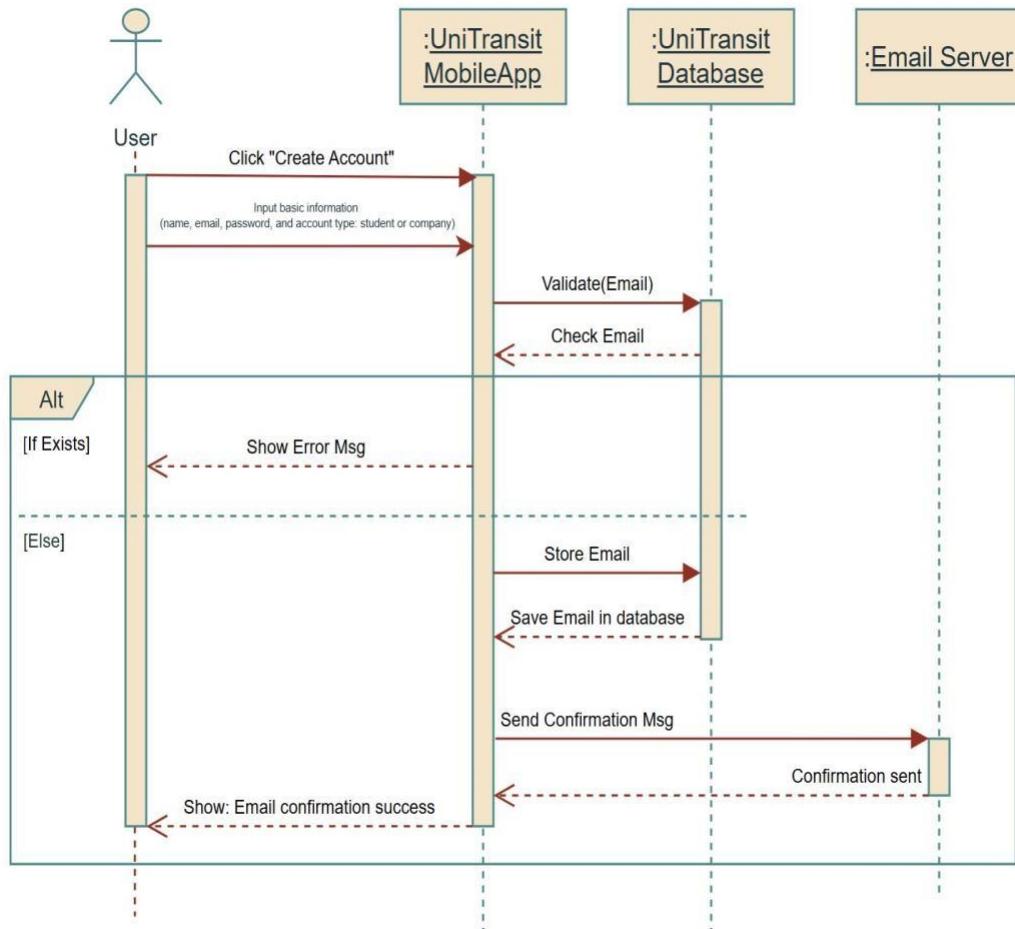
### 13.Feedback







## Chapter 7

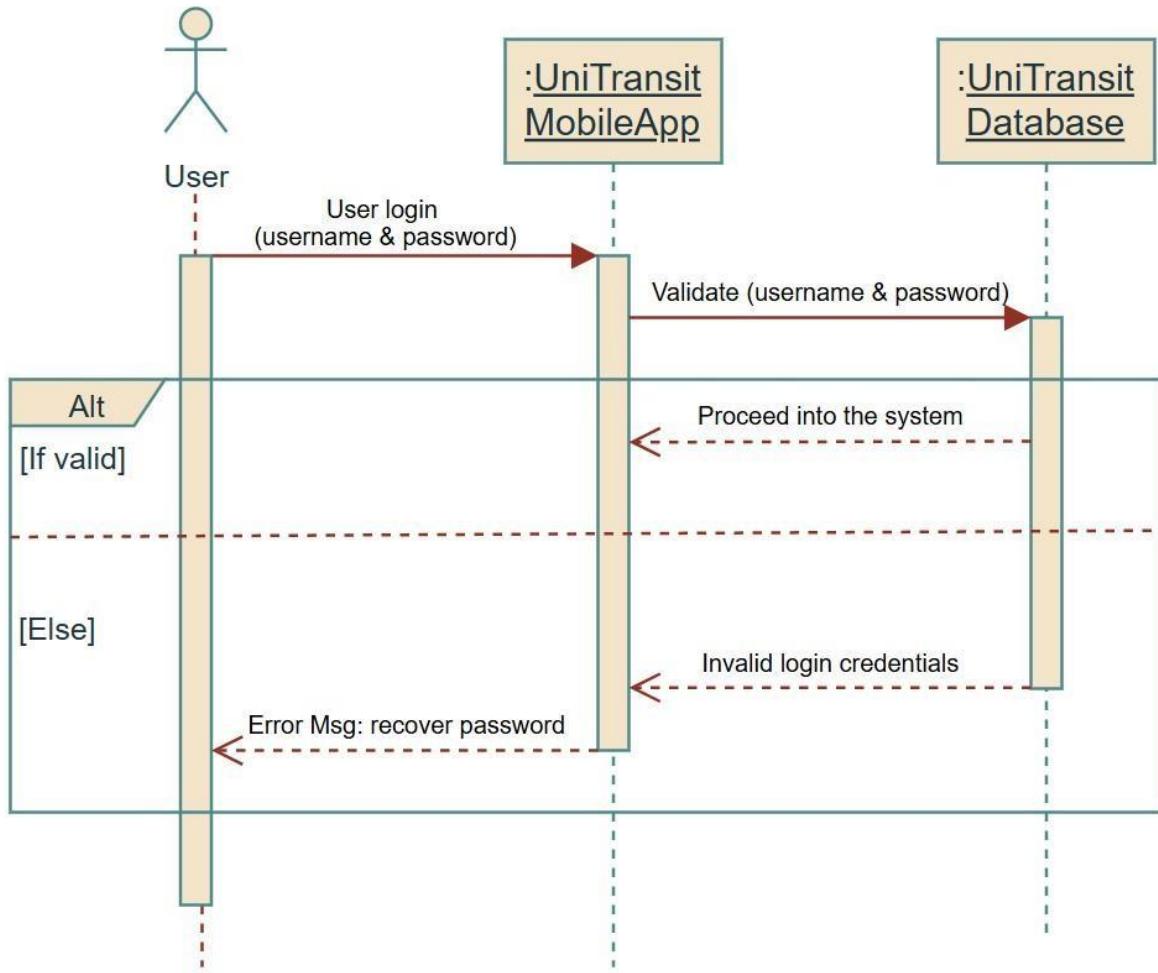


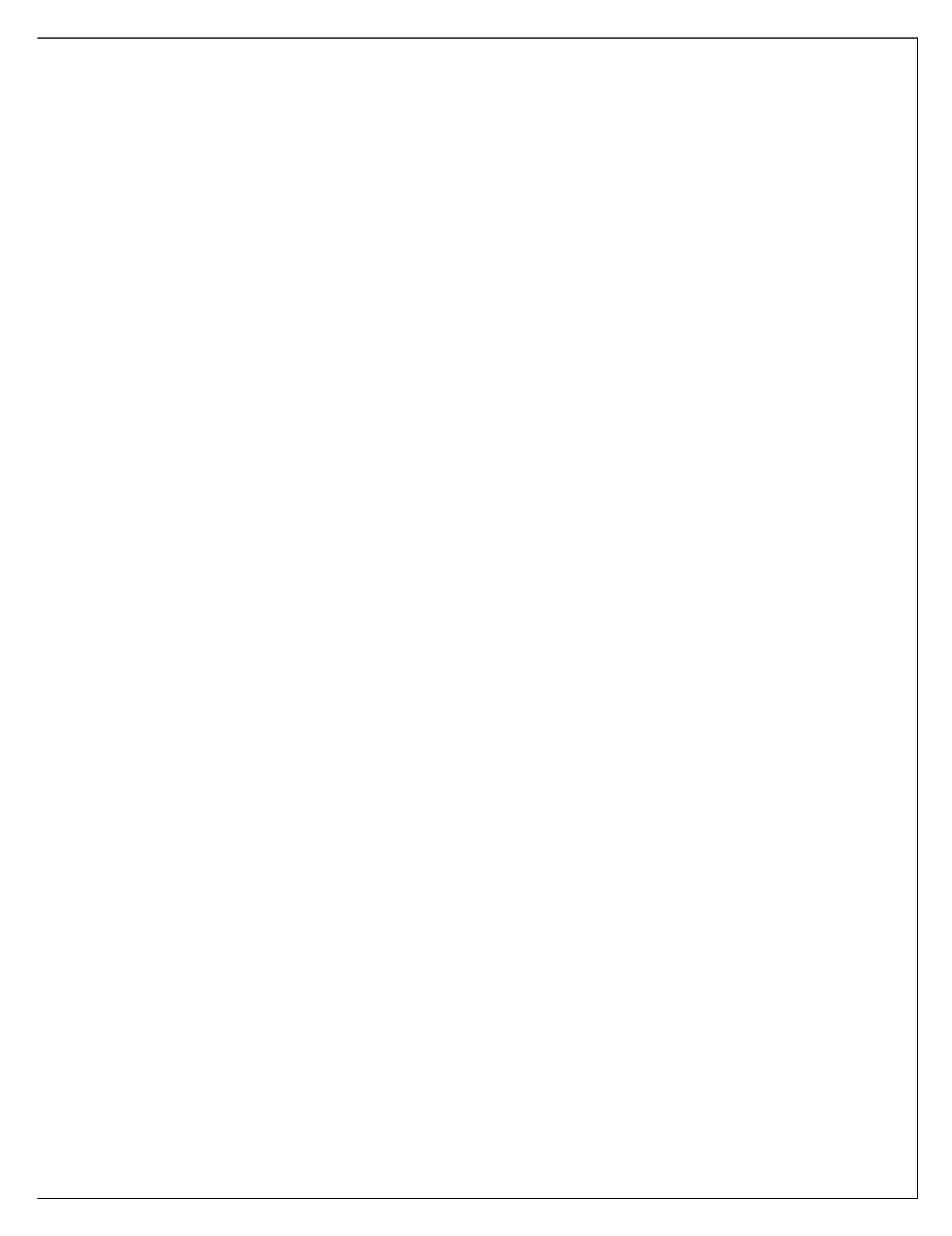
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## **Sequence Diagrams:**

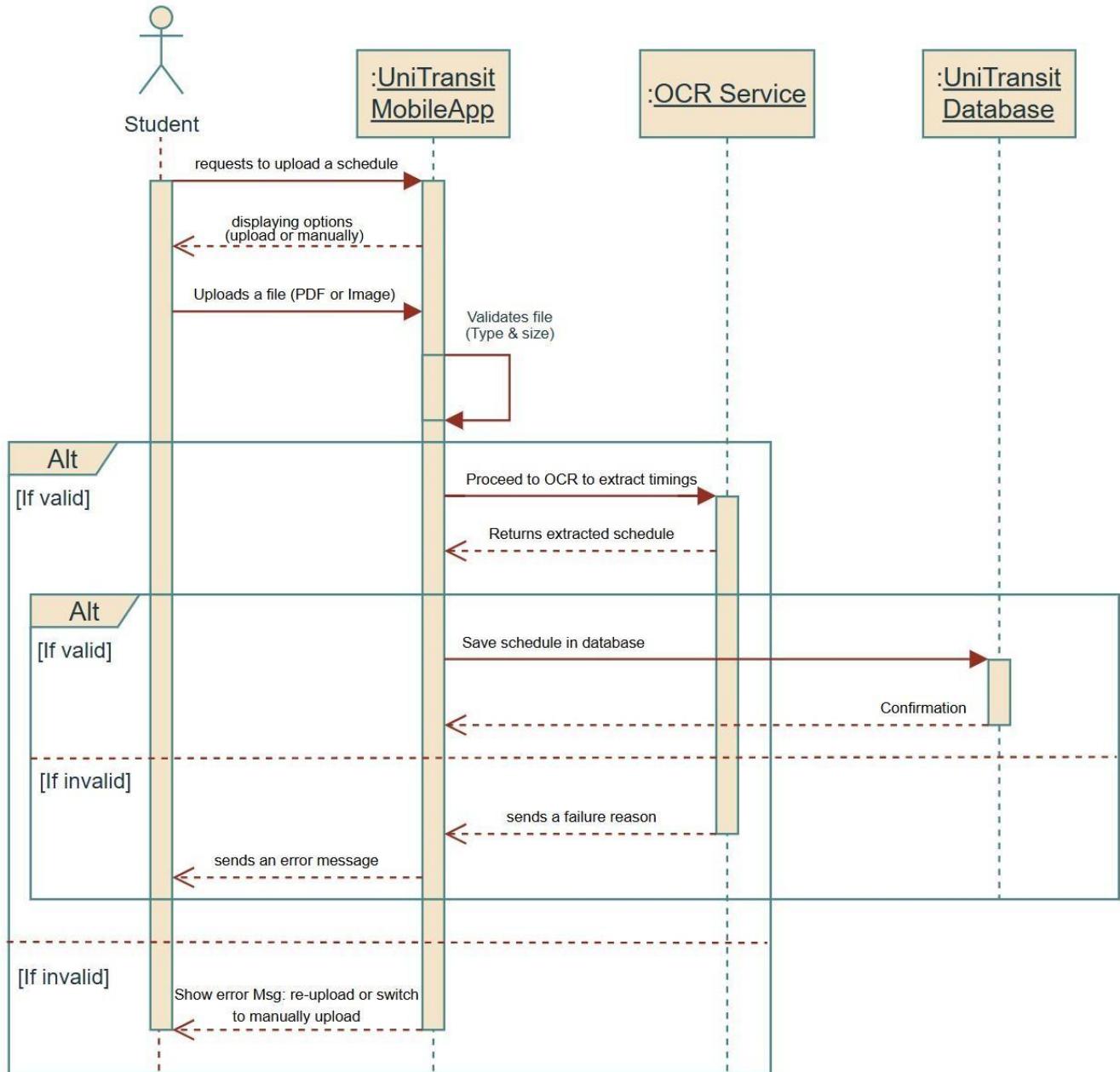
### **1.Create new account**

## 2. Log in

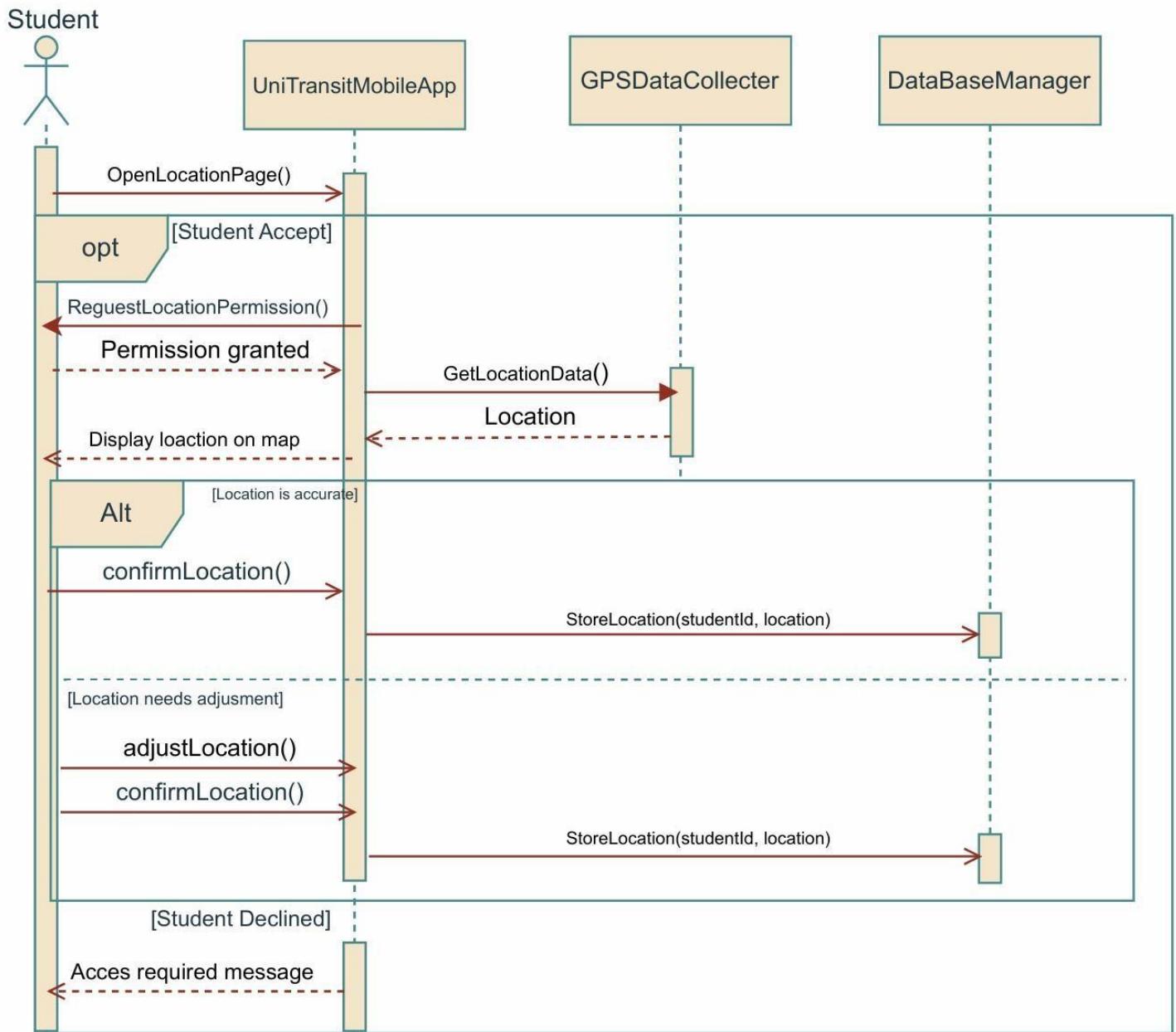




### 3.Enter schedule

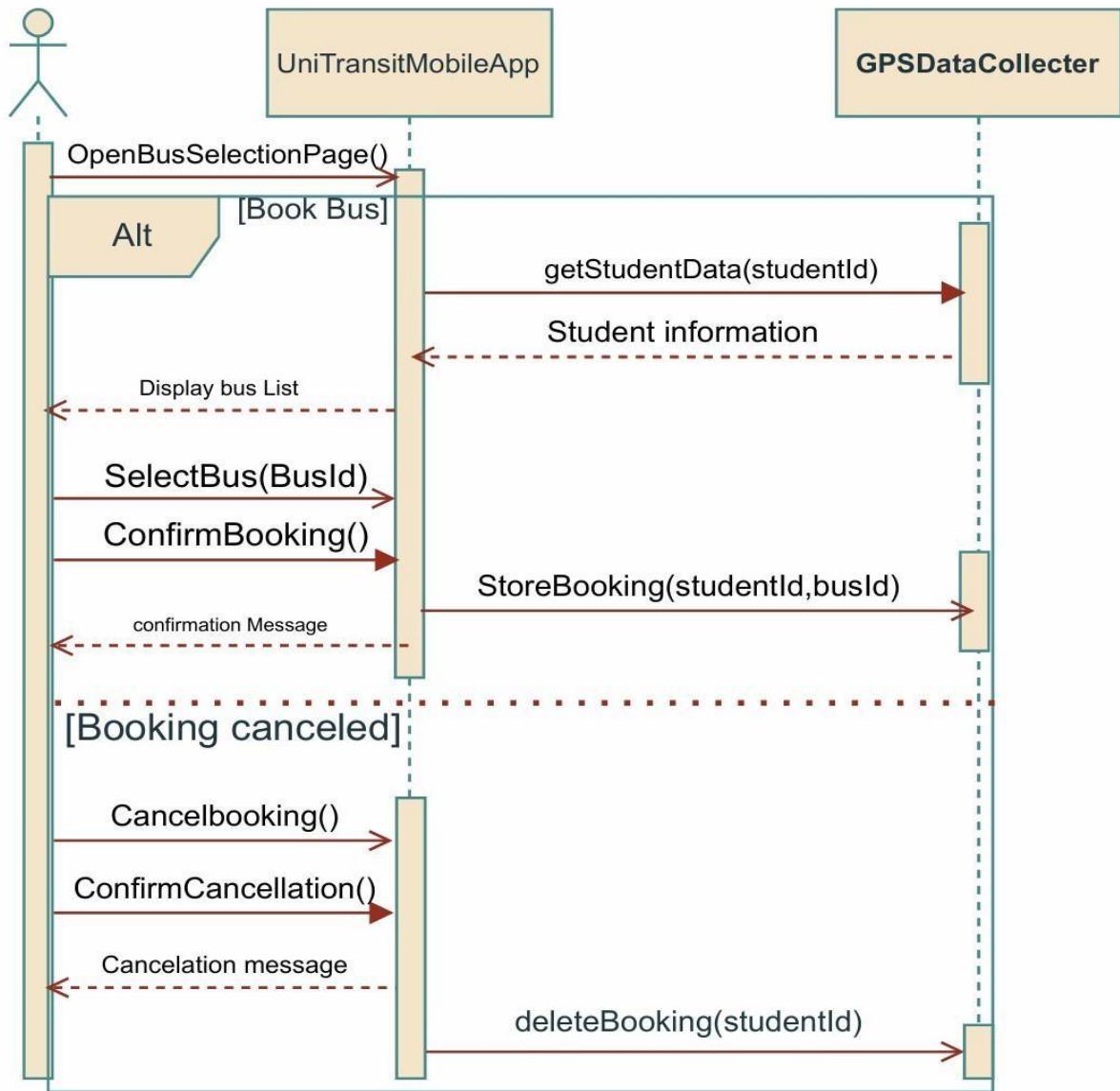


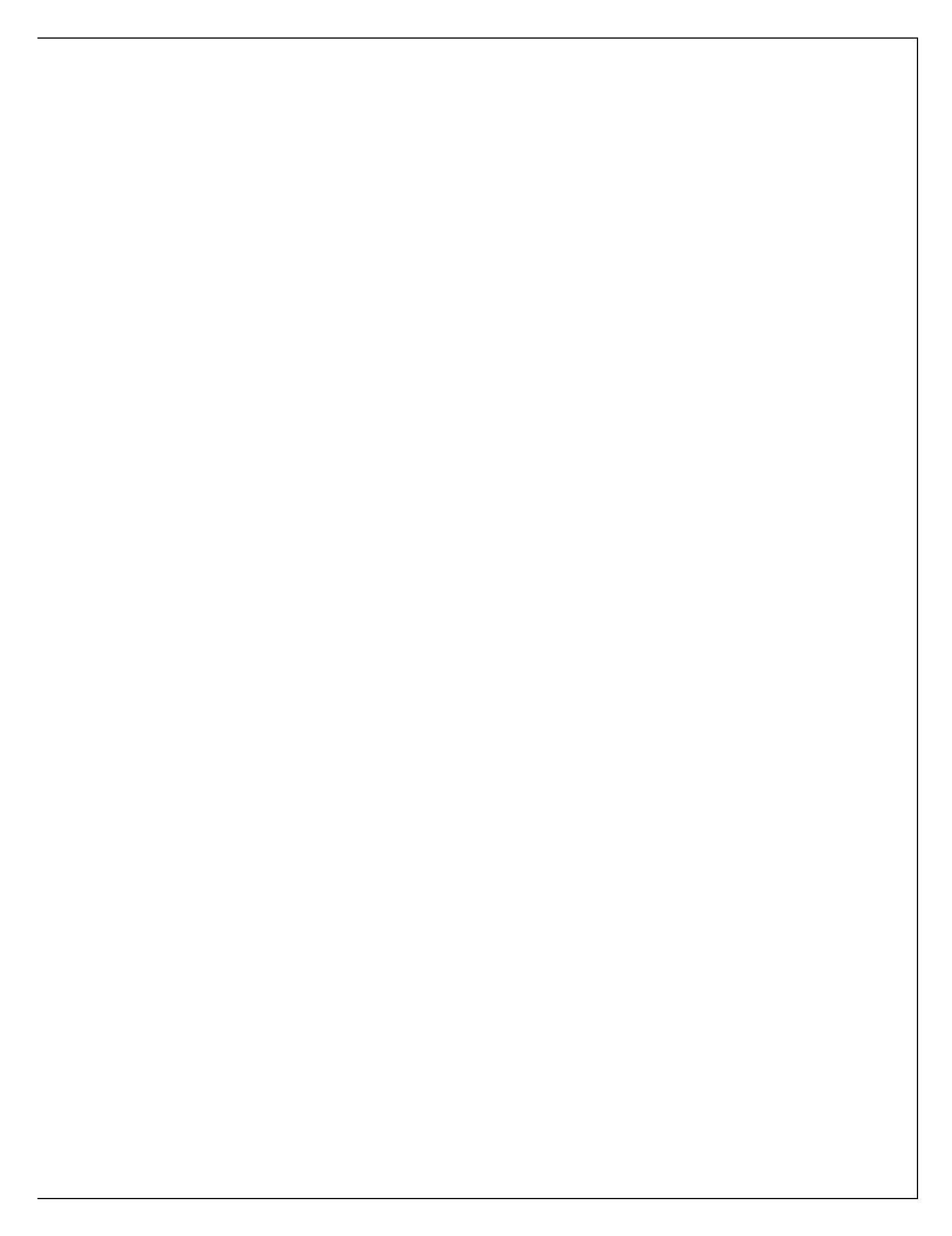
#### 4. Enter geographical location



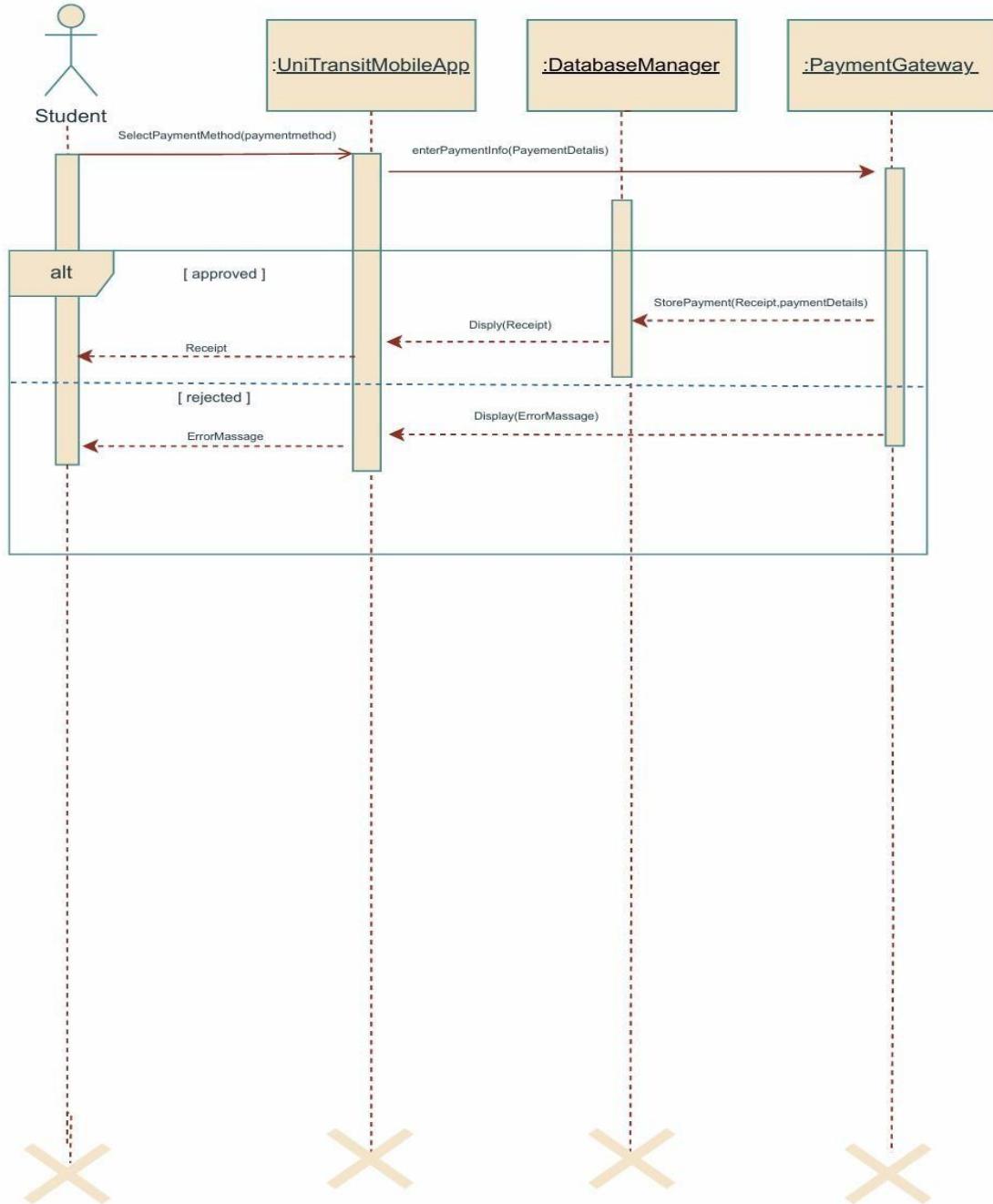
## 5.Book a bus

Student



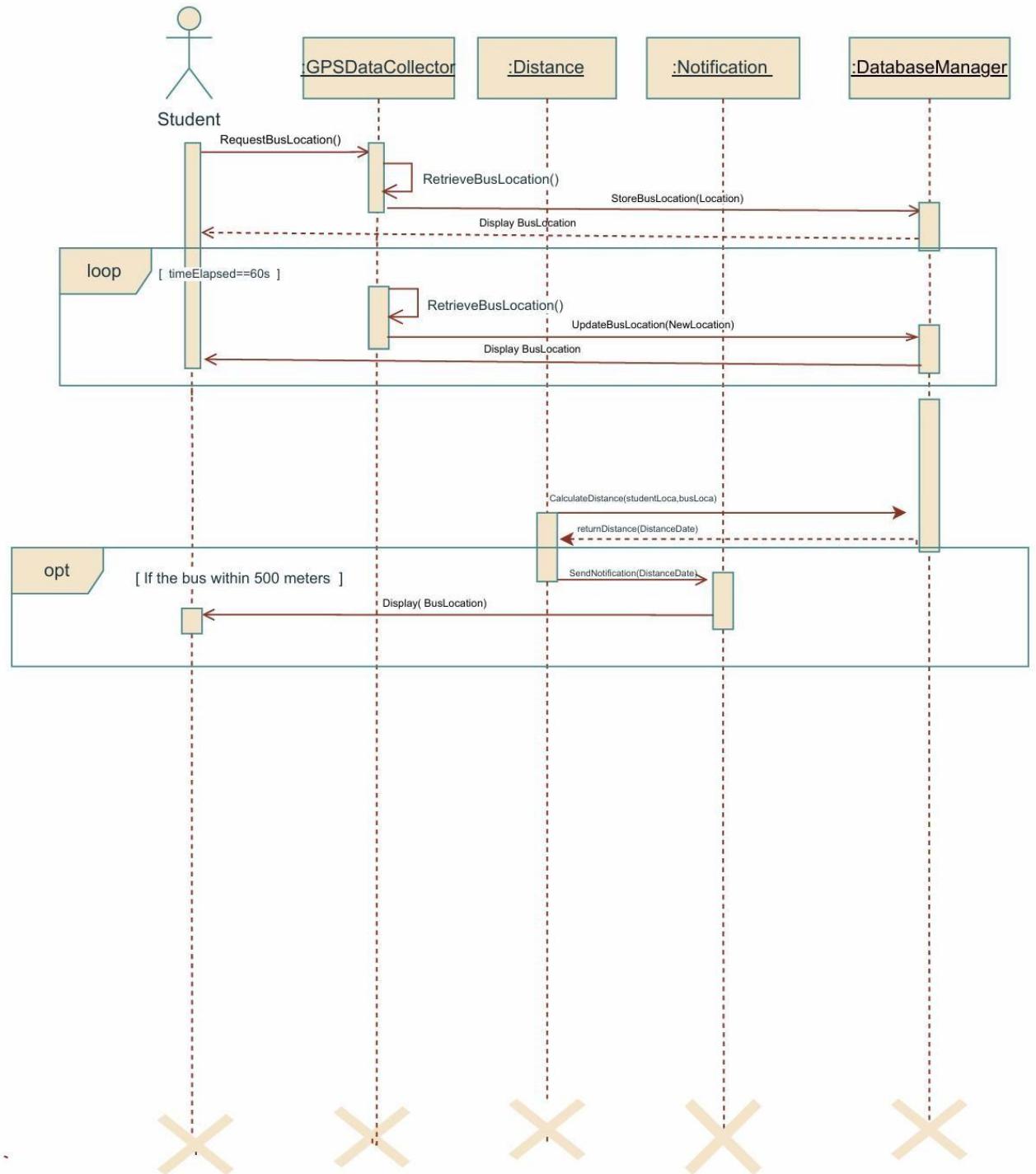


## 6. Make Payment

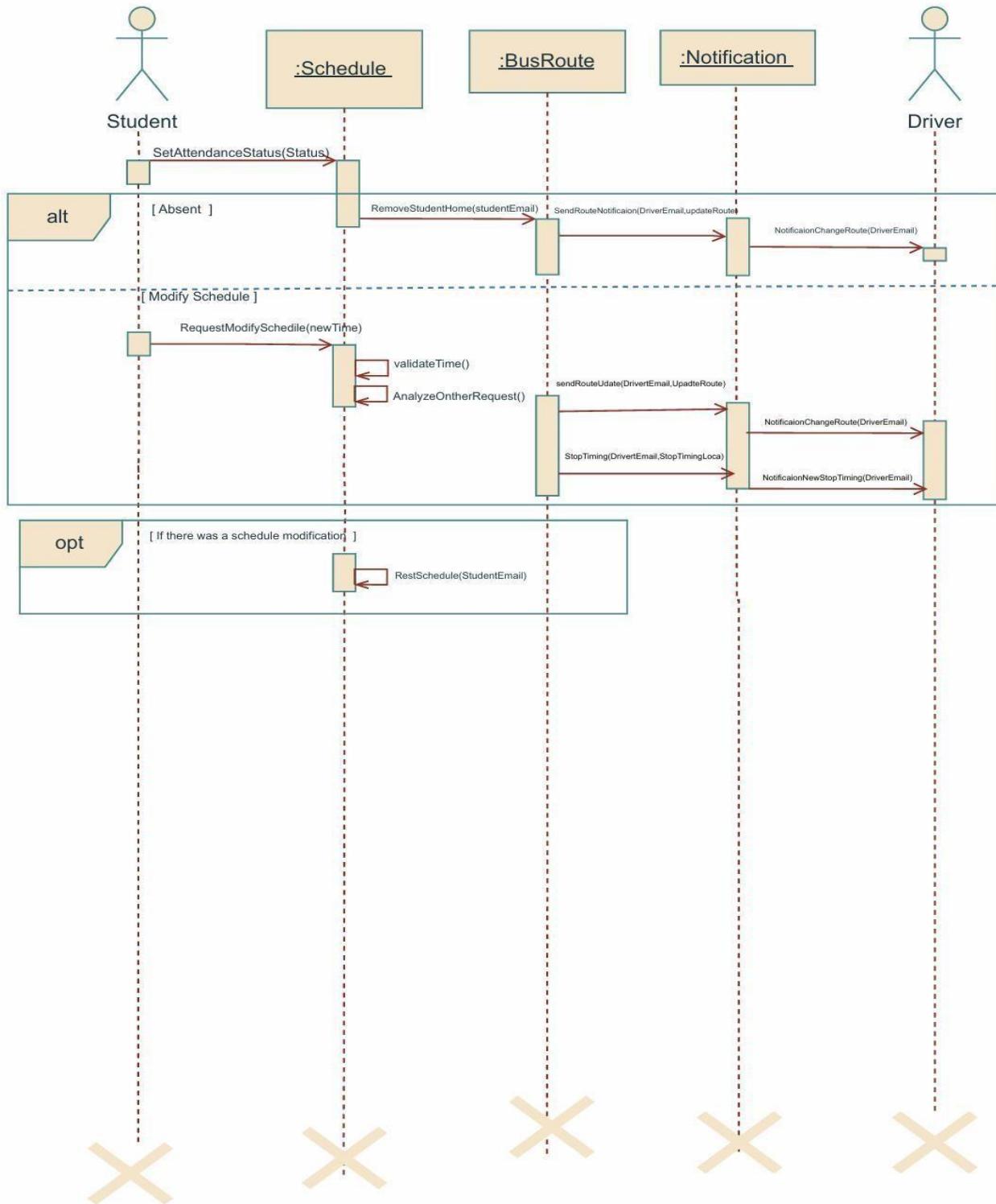


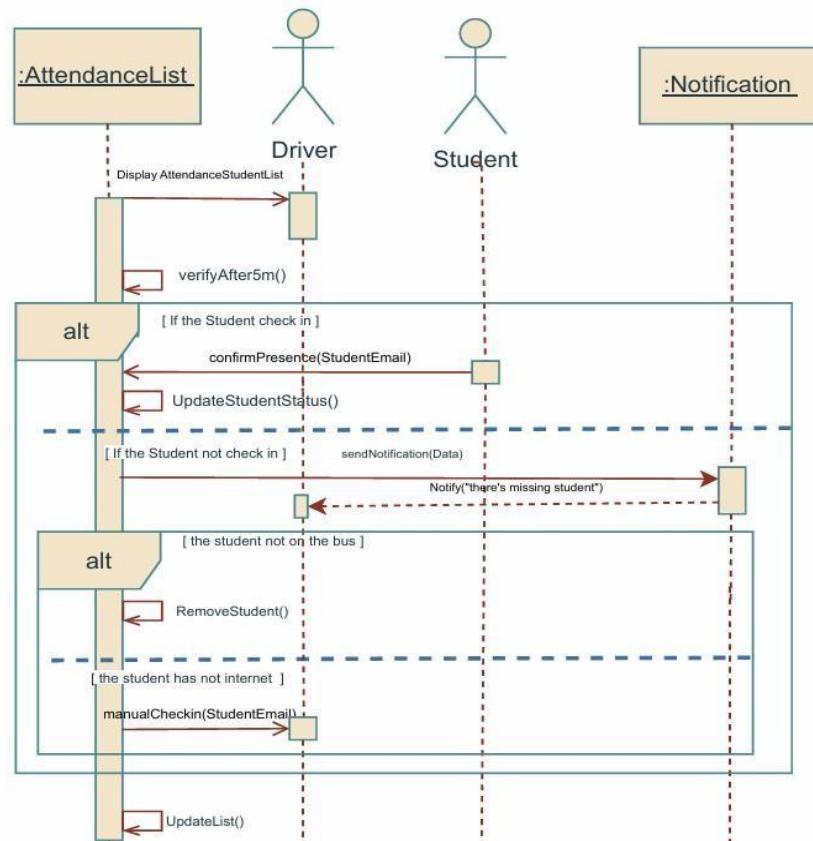


## 7. Track bus location



## 8. Modify daily schedule



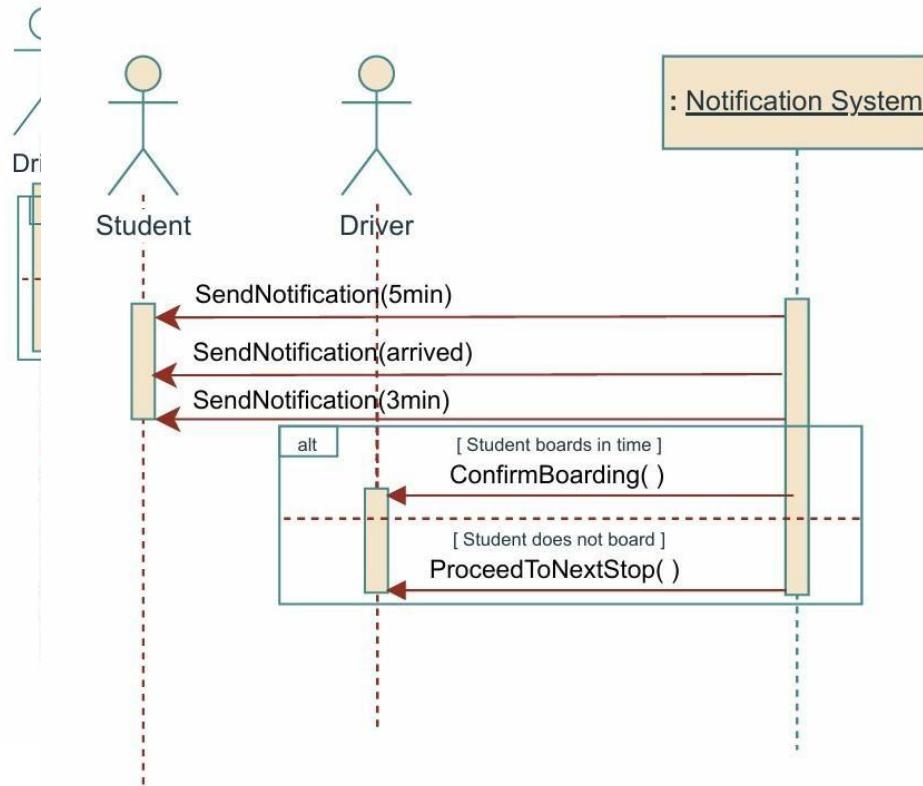


10. comm



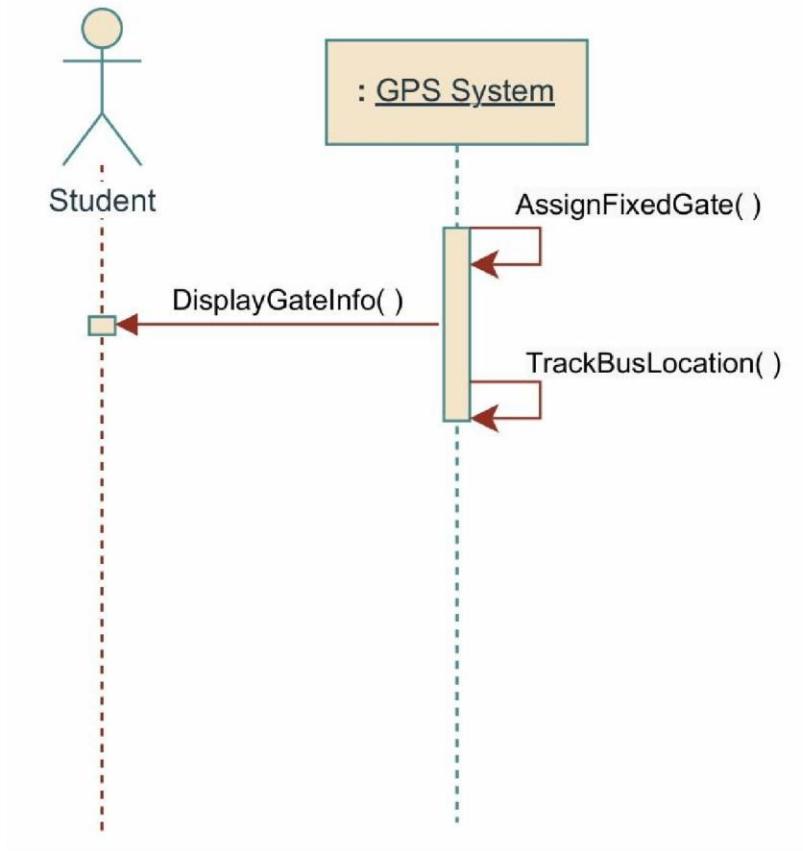


## 11. notification

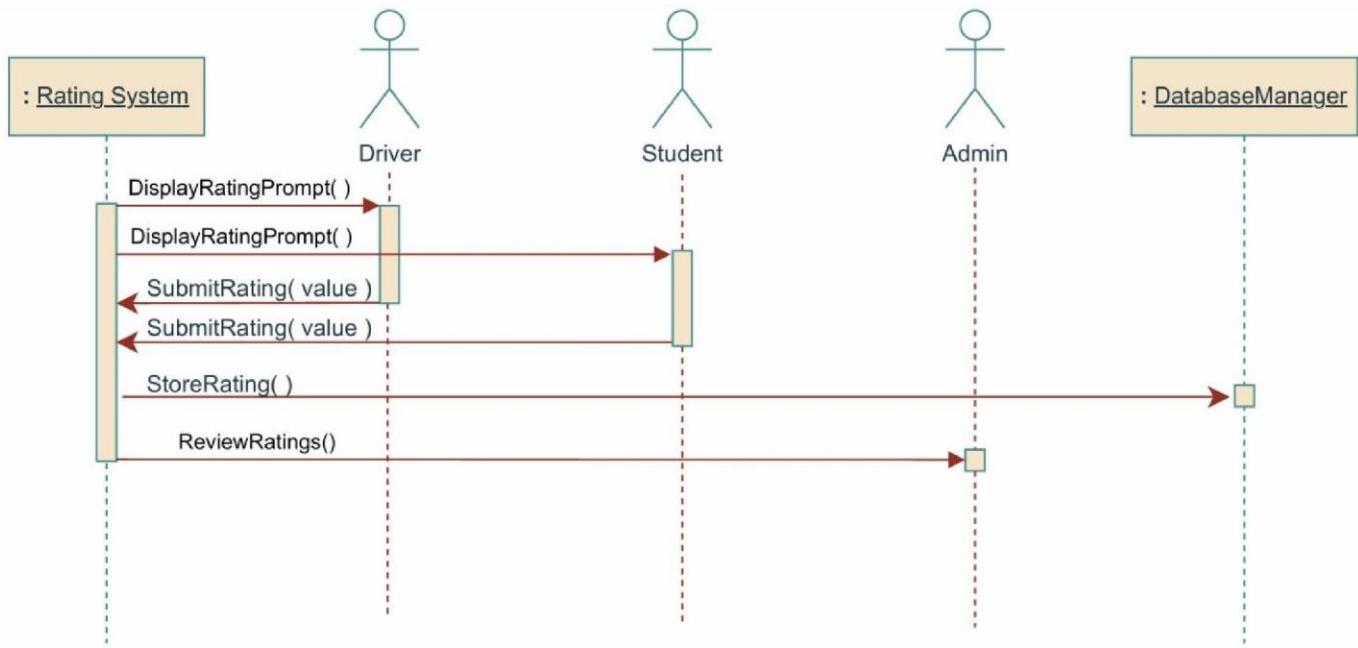




## 12.Gate location

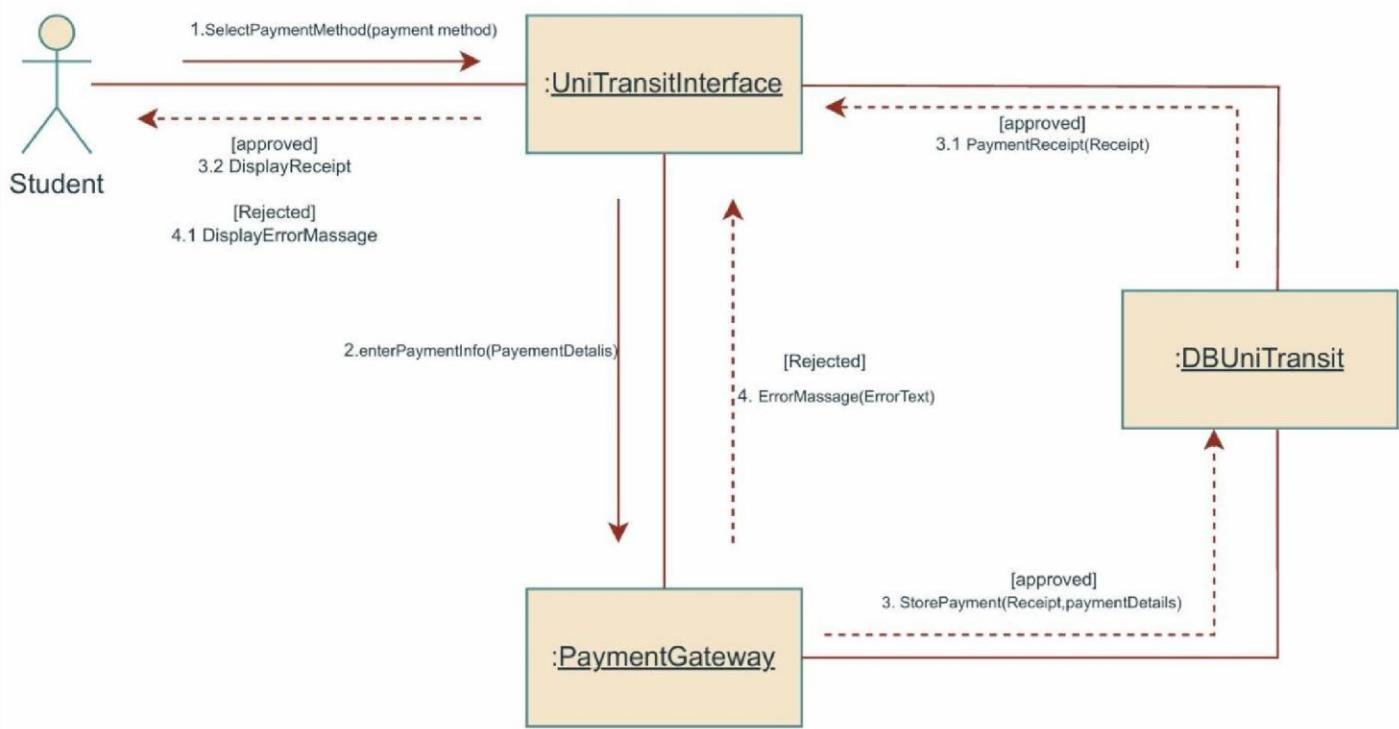


## 13.Feedback



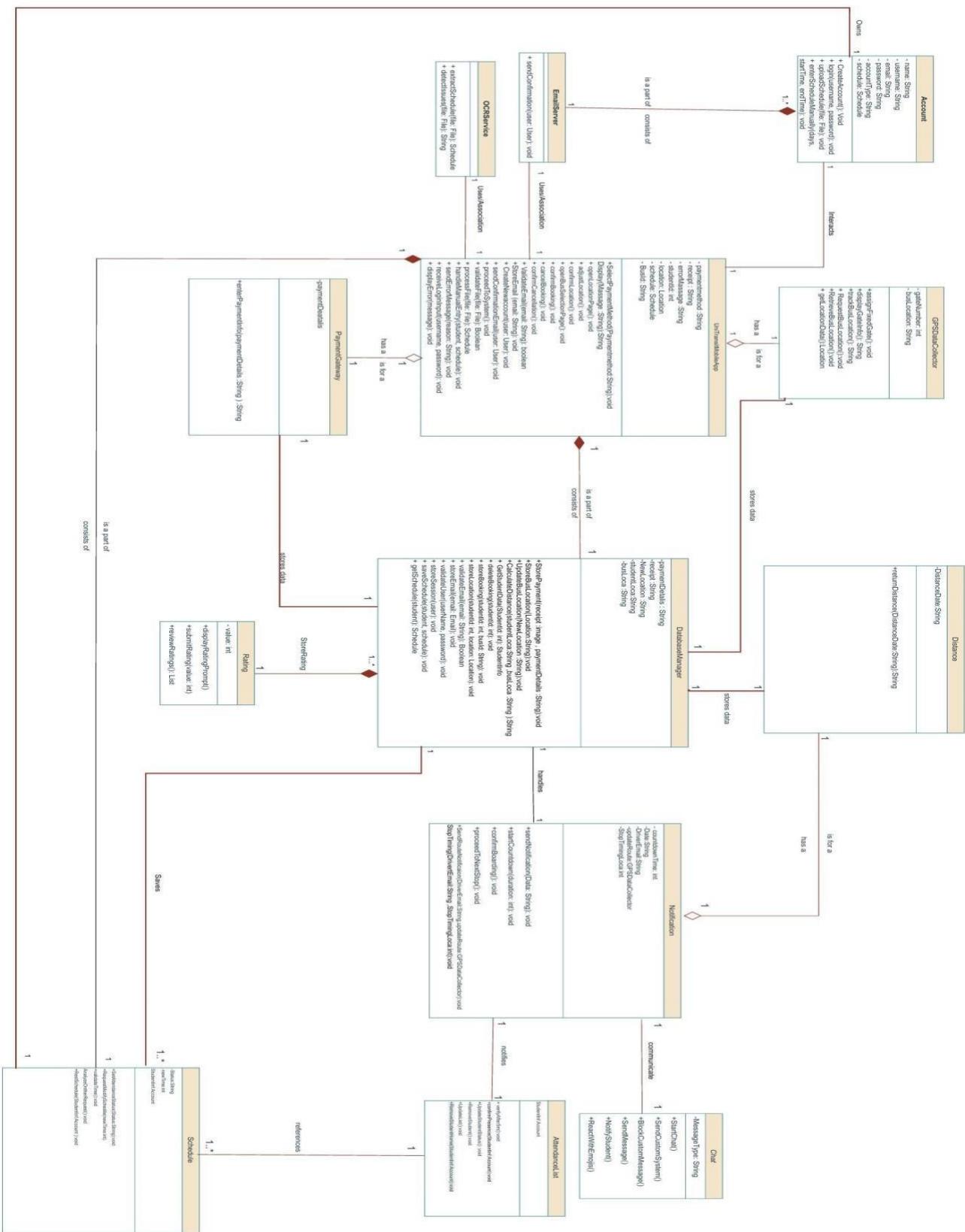
## Chapter 8

### Communication Diagram:





## Chapter 9



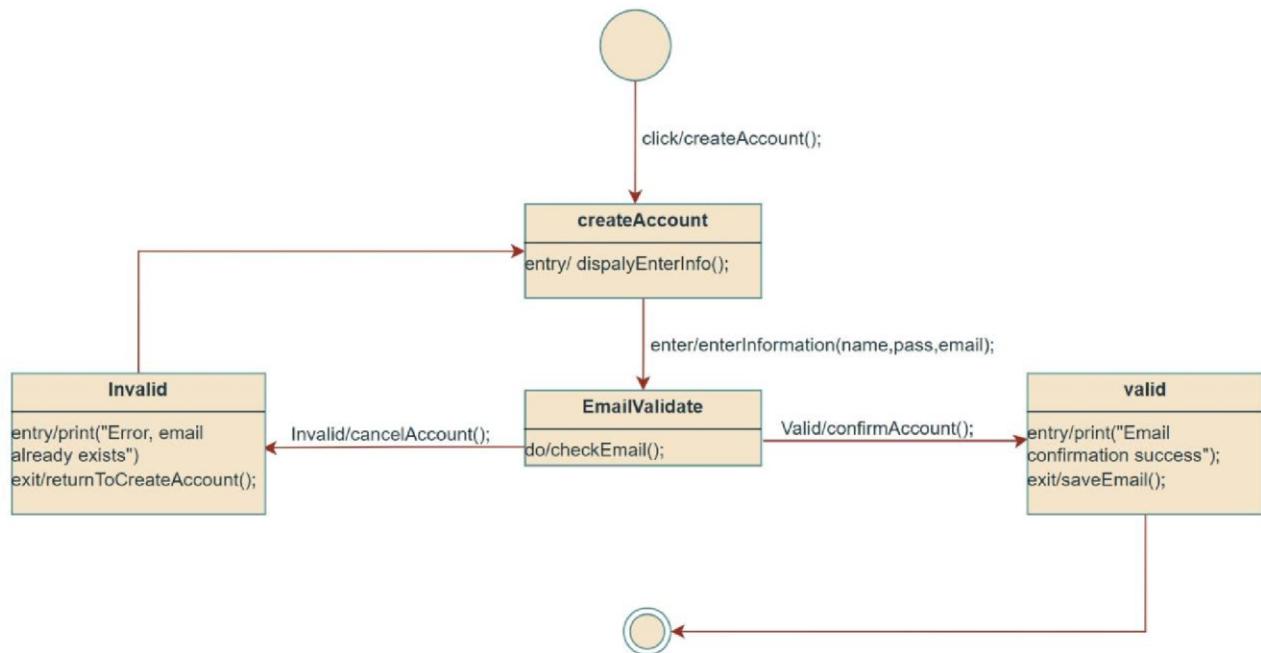
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**Class Diagram:**

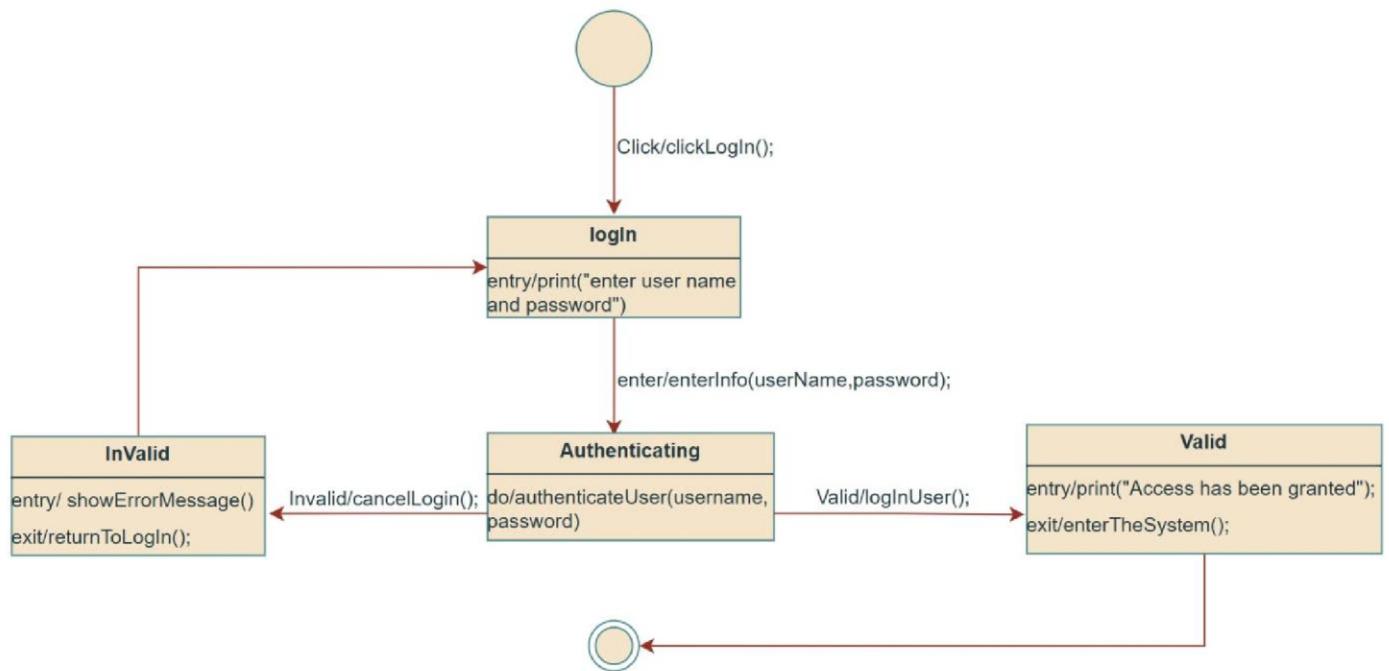
## Chapter 10

### State Diagrams:

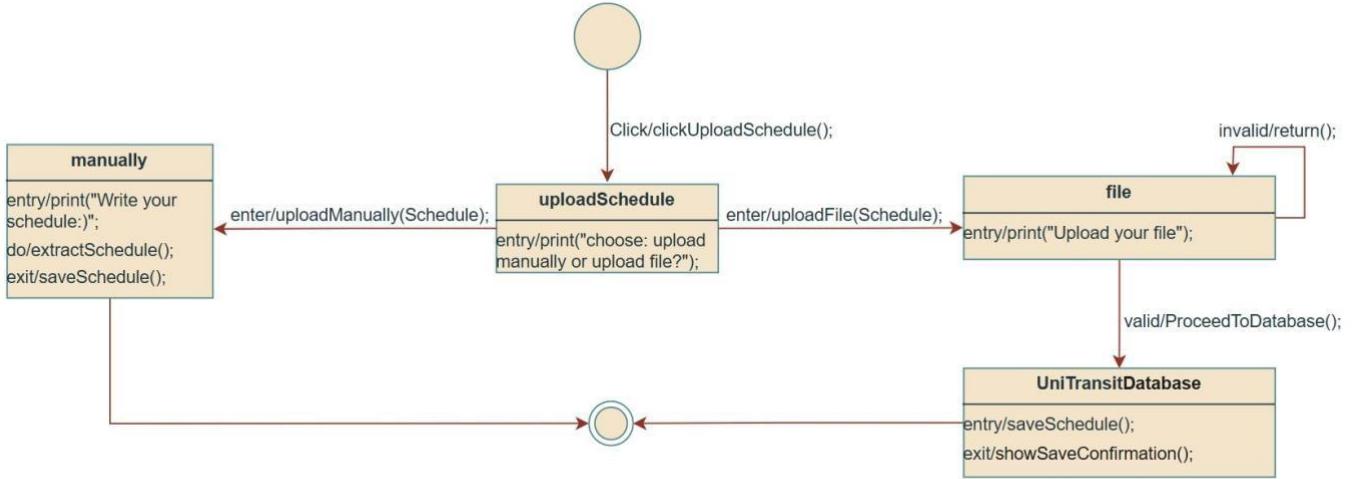
#### 1.Create new account



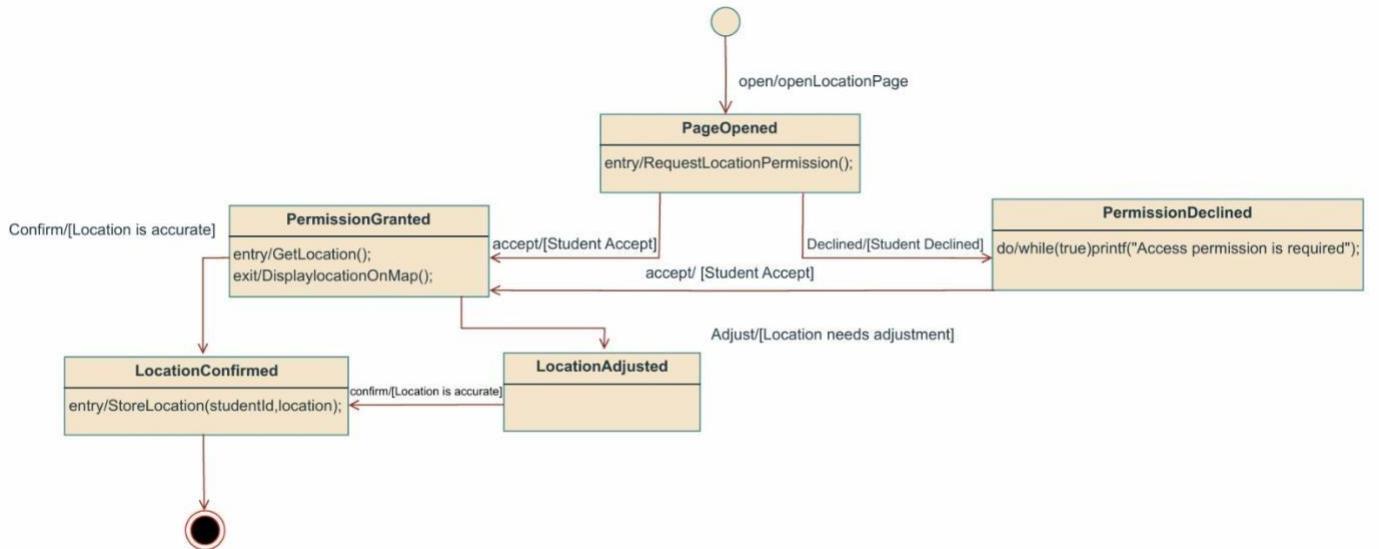
#### 2.Log in



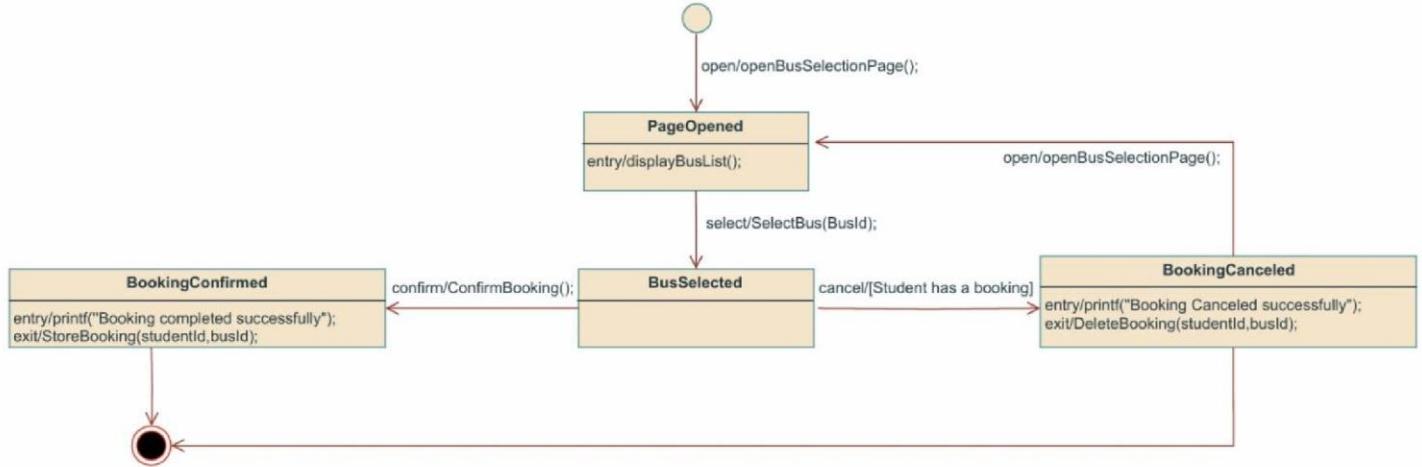
### 3.Enter schedule



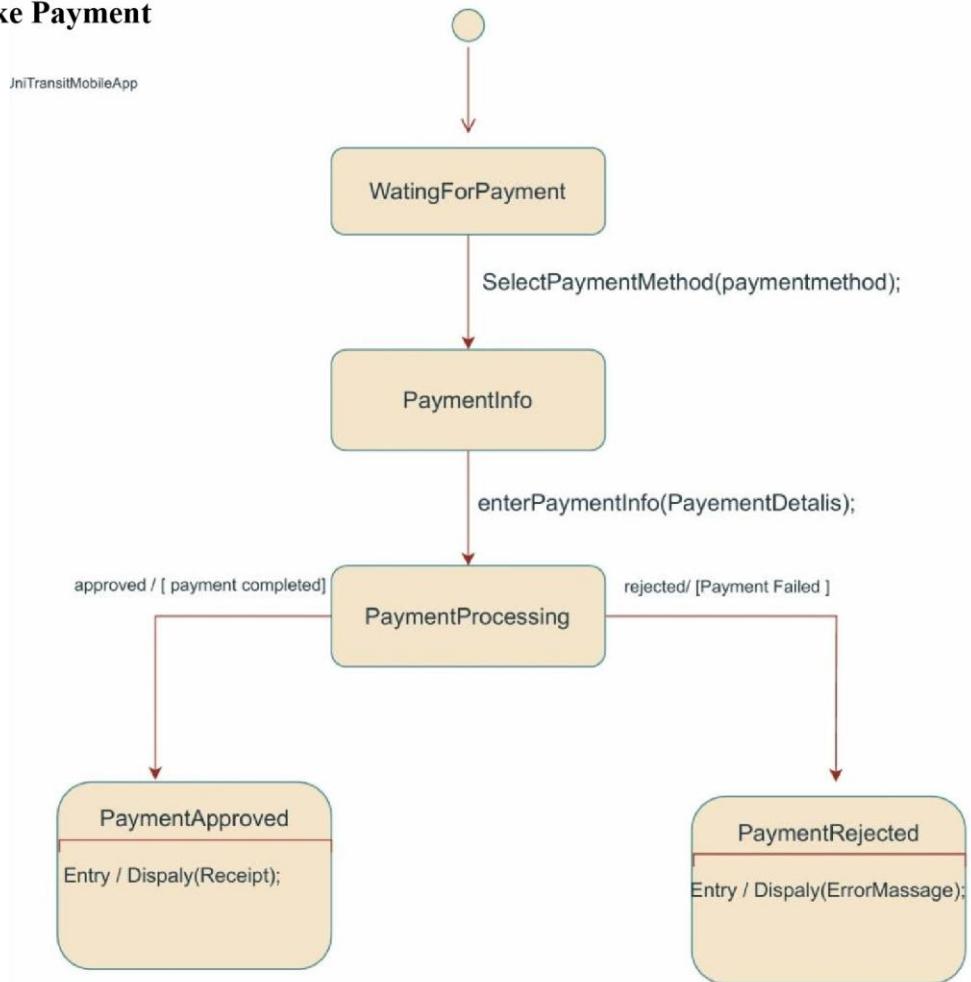
### 4.Enter geographical location



## 5.Book a bus

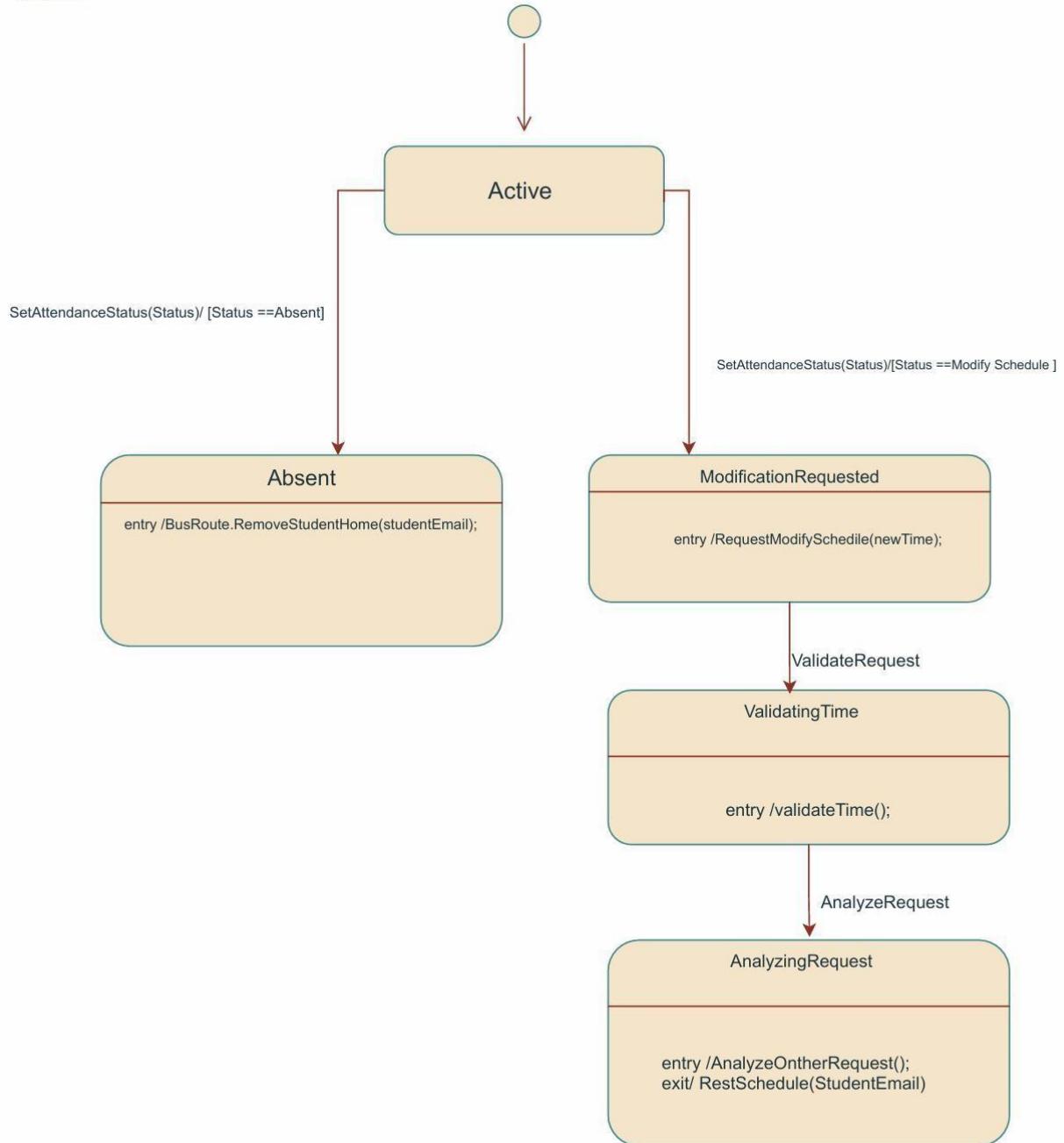


## 6.Make Payment



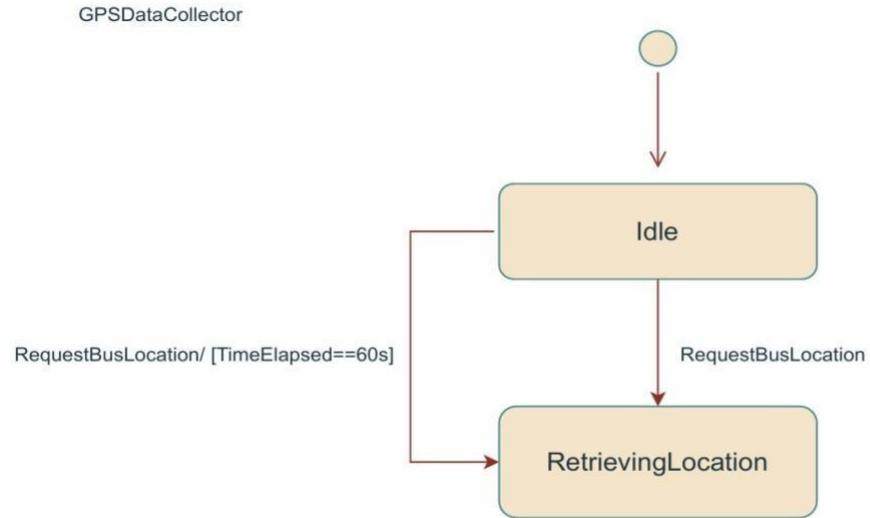
## 7.Modify daily schedule

Schedule

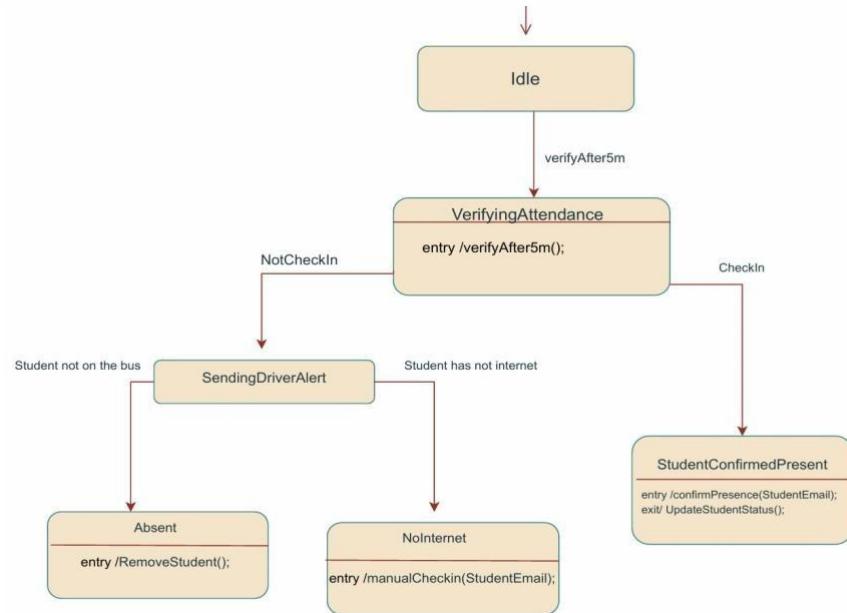


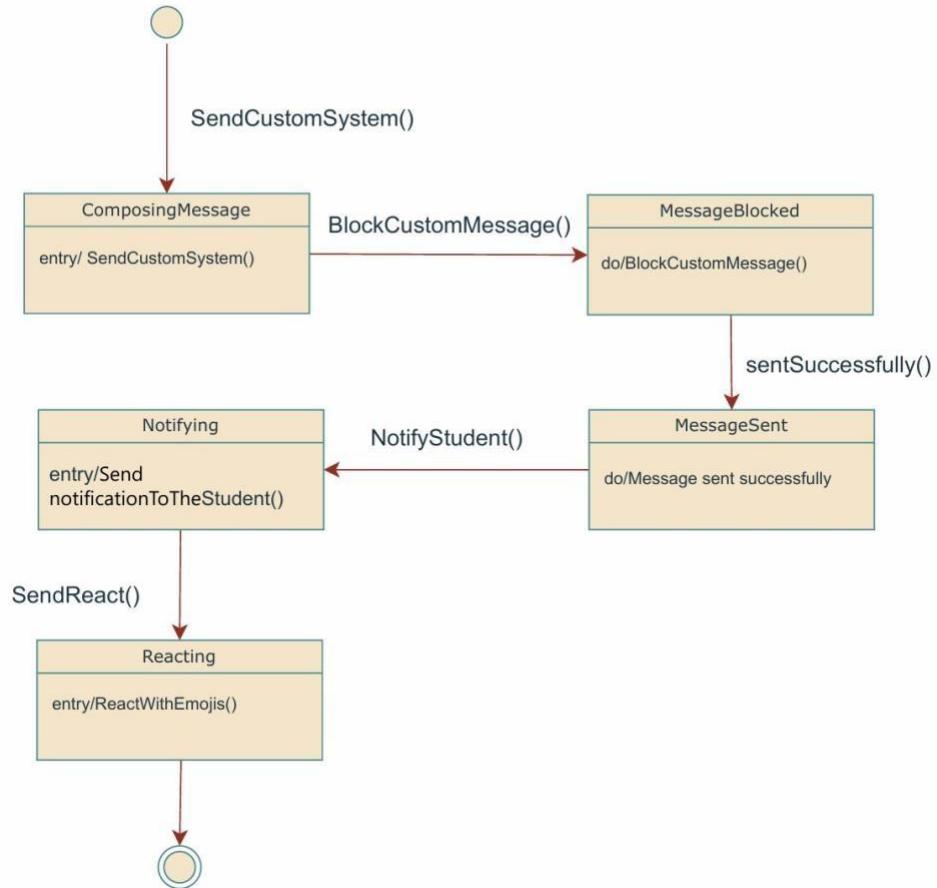


## 8.GPS



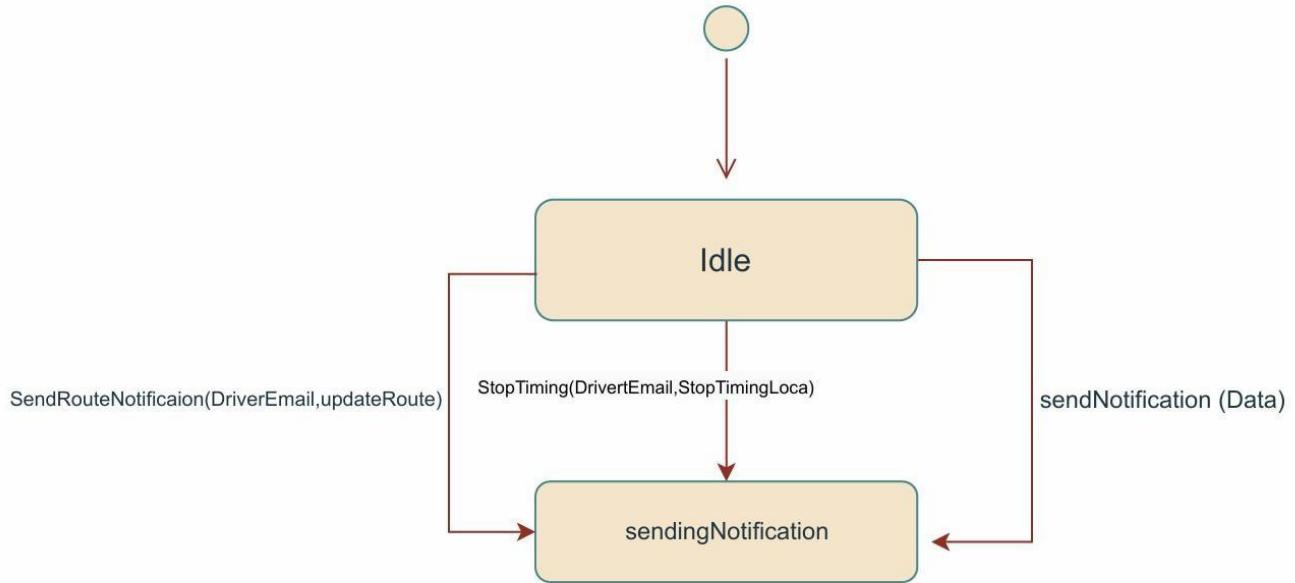
## 9.Confirm presence



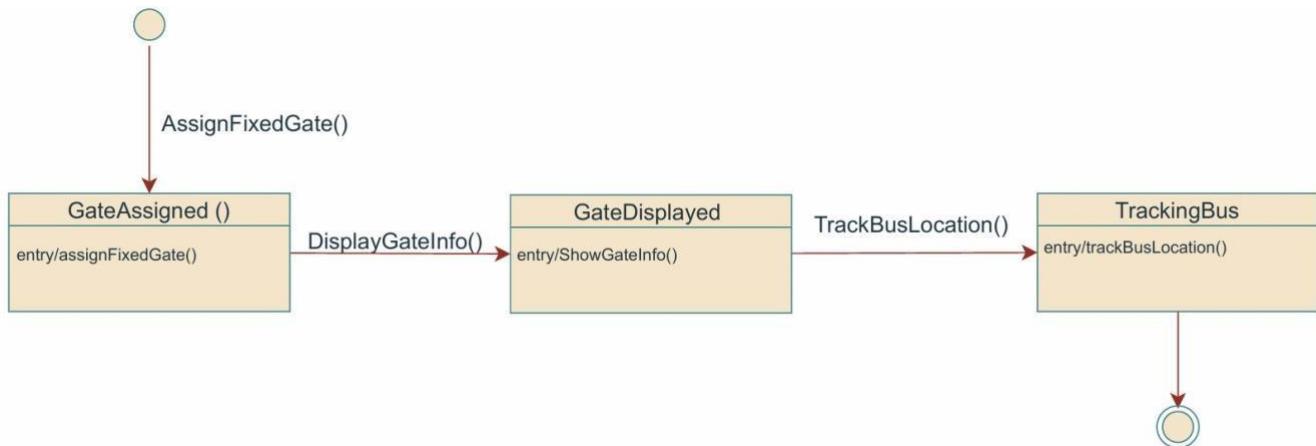


## 10. communication

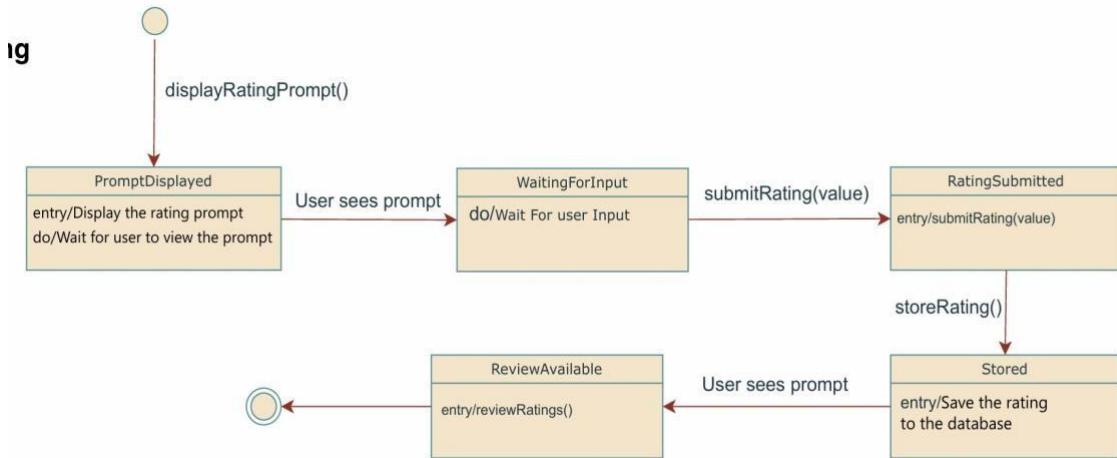
## 11. notifications



## 12.Gate location

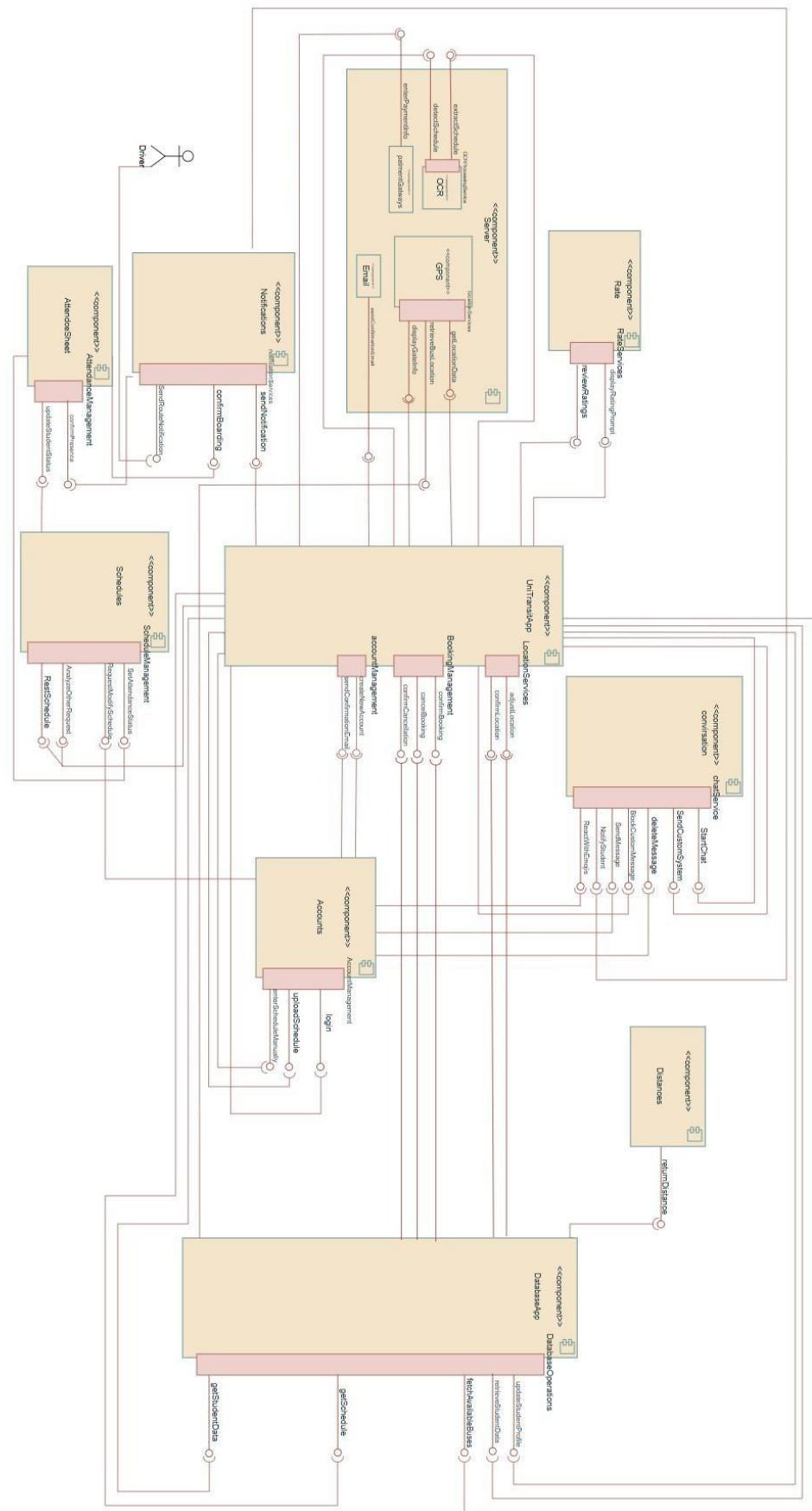


## 13.Feedback



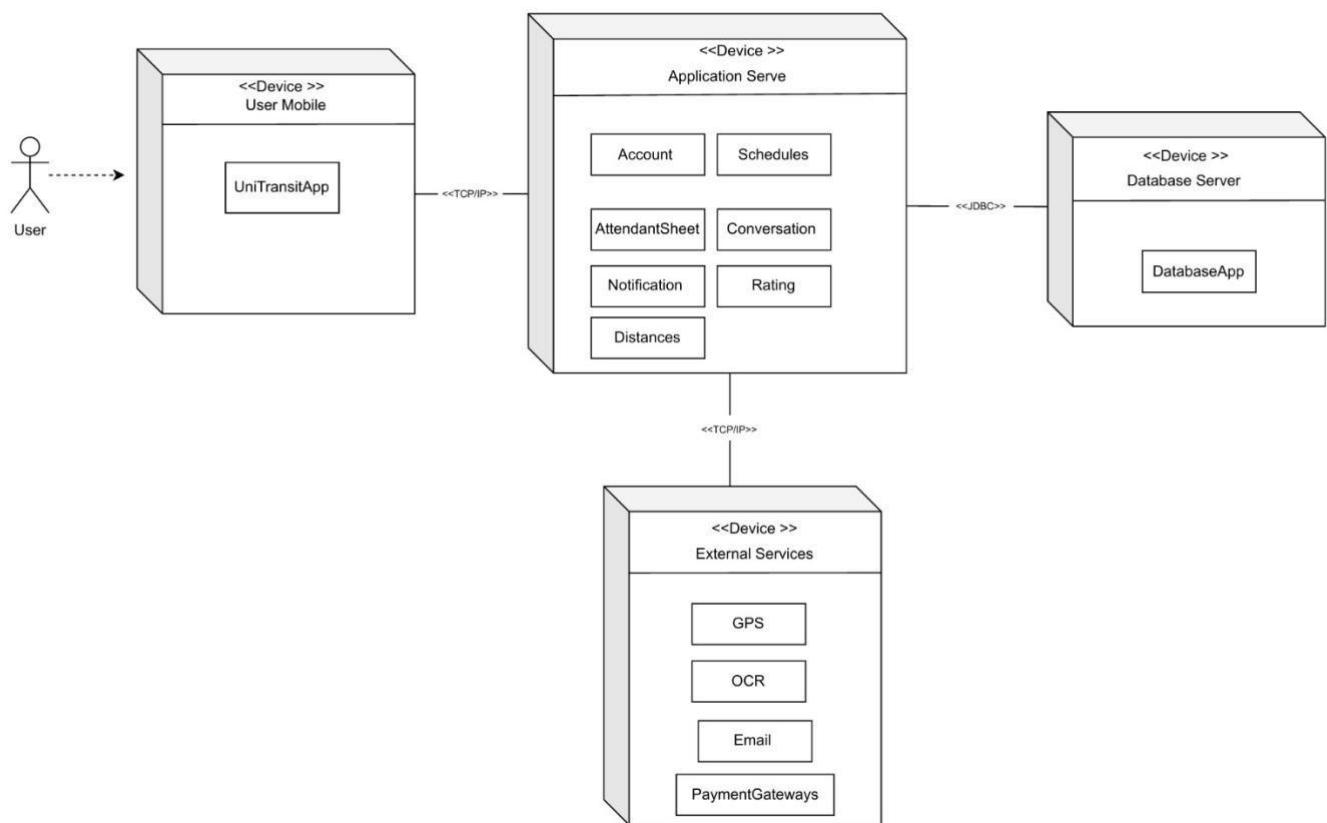
# Chapter 11

### **component Diagram:**



## Chapter 12

### Deployment Diagram:





## **Individual tasks:**

### **Rana -**

Conducted a full review of the project and requirements, refined the content, redrew the Use Case Diagram, modified the Use Case Scenario, identified technical terms and abbreviations, and conducted a user interview. Participated in creating the following diagrams:

- Activity Diagram
- Sequence Diagram
- Class Diagram
- State Diagram
- Component Diagram
- Communication Diagram

### **Layan -**

Extracted relationships from the functional requirements, ensured the accuracy of the requirements, and identified technical terms and abbreviations. Participated in creating the following diagrams:

- Activity Diagram
- Sequence Diagram
- Class Diagram
- State Diagram
- Deployment Diagram

### **Duha -**

Extracted relationships from the functional requirements, redrew the Use Case Diagram, modified the Use Case Scenario, and identified technical terms and abbreviations. Participated in creating the following diagrams:

- Activity Diagram
- Sequence Diagram
- Class Diagram
- State Diagram
- Deployment Diagram
- Communication Diagram

### **Alshyhanh -**

Extracted relationships from the functional requirements, verified their accuracy, and identified technical terms, abbreviations, and ambiguous words. Participated in creating the following diagrams:

- Activity Diagram
- Sequence Diagram
- Class Diagram
- State Diagram
- Component Diagram

