

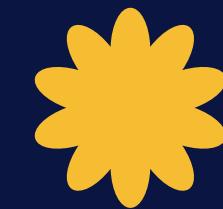
# CAR PARKING MANAGEMENT SYSTEM

Ahmed bin Asim  
Jawad Ahmad Khan  
Fahd Ahmed Farooqi



# MAIN IDEA AND SCOPE





# Functional Requirements

1. Managing Parking (Entry & Exit)
2. Getting Parking Notifications/Updates
3. Collecting User Feedback
4. Handling Lost Receipt
5. Fining for Violations
6. Collecting Fines/Payments
7. Reserving Parking Space
8. Cancelling Parking Space
9. Extending Parking Space
10. Viewing Parking History
11. Requesting Car Wash Service

# Functional Requirements

Use Case: Registering for Parking Management System (1)	Writer: Jawad Ahmed
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: Teacher, Student, Admin	
<b>Stakeholders and Interests:</b> Teachers and Students: Wishes to register for the Parking Management System Admin: Approves the teachers/students	
Pre-conditions: Teacher and Admin must be <u>full-time</u> employees and have been issued their cards	
Post-Conditions: Teacher and Admin's data has been saved in the Database and <u>have</u> been assigned a parking spot	
<b>Main Success Scenario</b>  A) Teacher & Students requests to sign up for the parking management system.	B) System requests for information of the user and verifies it with the interlinked university system to verify the teacher. C) System gives various options to the Teacher to choose a parking spot based on the seniority of the teacher

# Functional Requirements

D) Teacher chooses from the possible parking spots, while students are assigned an overall block	E) System saves the user's data and keeps track of the available parking spots, sending a confirmation email to the user.
<b>Extensions</b>	<p>B) 1.1) If teacher isn't available in the database, an email is sent to the admin</p> <p>C) 1.1) If a teacher has a high seniority position, he is given a parking spot in top tier, closer to elevator</p> <p>D) 1.1) If no parking spot is available, the teacher is given alternative options</p> <p>D) 1.2) Teacher chooses whether they wish to still register for parking management system, otherwise exit</p>
<b>Use Case: Entering Parking (2)</b>	Writer: Jawad Ahmed
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: Student, Teacher, Guest, Visitor	
Stakeholders and Interests: User: Wishes to park the car Admin: Wishes to keep track of the parking	
Pre-conditions: User is in a car and not on foot. There is only 1 person in the car. The parking system is operational	
Post-Conditions: User enters the parking spot. A picture of the user's number plate is taken	
<b>Main Success Scenario</b>	
A) The user drives towards the parking entry gate.	
B) As the user approaches, the parking system requests the user to present their receipt or parking card.	
C) The user holds their receipt or parking card up to the scanner.	<p>D) The parking system scans and verifies the receipt/card</p> <p>E) The system captures a picture of the user's number plate, and saves it in his record</p> <p>F) The system offers the <u>user</u> to choose from a parking spot</p> <p>H) The parking spot is reserved, and the gate opens</p> <p>I) The system sends an email to the user, and opens the gate</p>
<b>Extensions</b>	<p>E) 1.1) The system detects that the receipt or card is invalid (e.g., expired, not recognized).</p> <p>E) 1.2) The user is requested to move to the general parking.</p> <p>E) 2.1) The system fails to properly scan the user's receipt, and calls the admin personnel from his office, who manually checks the receipt.</p> <p>F) 1.1) The parking area is <u>full</u> and the system gives an error message to the user, to proceed to the general parking</p>
<b>Use Case: Exiting Parking (3)</b>	Writer: Jawad Ahmed
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: Student, Teacher, Guest, Visitor	
Stakeholders and Interests: User: Wishes to leave the parking space Admin: Wishes to keep track of the parking	

# Functional Requirements

<p><b>Pre-conditions:</b> User has a valid receipt/card. User entry has been recorded</p> <p><b>Post-Conditions:</b> User is allowed to exit the parking area. System logs the exit time and updates the user's parking record</p>	
<p><b>Main Success Scenario</b></p> <p>A) The user drives towards the parking exit gate.</p> <p>C) The user holds their receipt or parking card up to the scanner.</p> <p>F) User leaves the parking space</p>	<p>B) As the user approaches, the parking system requests the user to present their receipt or parking card.</p> <p>D) The parking system scans and verifies the receipt/card, cross checking with the time of entry.</p> <p>E) System informs <u>user</u> of any fines incurred during their stay at the parking</p> <p>G) The system updates the <u>free-up</u> parking space</p>
<p><b>Extensions</b></p>	<p>D) 1.1) System fails to verify the receipt/card and informs the admin</p> <p>D) 2.1) If a user has overstayed, a fine is added to the user's bill.</p>
<hr/> <p><b>Use Case:</b> Getting Parking Notifications/Updates (4)    <b>Writer:</b> Jawad Ahmed</p> <p><b>Scope:</b> Parking Management System</p> <p><b>Level:</b> User-Goal</p> <p><b>Primary Actors:</b> Admin, Student, Teacher</p> <p><b>Stakeholders and Interests:</b> Admin: Sends notifications related to parking and updates Users: Is kept updated if a specific parking spot is closed</p> <p><b>Pre-conditions:</b> User is registered with the system and not a visitor / guest</p>	

<p><b>Post-Conditions:</b> Email notifications are sent to all registered users about the updates</p>	
<p><b>Main Success Scenario</b></p> <p>A) User drives to the parking space</p> <p>C) User leaves the parking space</p>	<p>B) System sends an automatic email to the user</p> <p>D) System sends an automatic email to the user</p> <p>E) System sends all updates and important news to all registered users</p>
<p><b>Extensions</b></p> <p>B) 1.1) User does not receive emails and can contact admin directly to resolve any issues</p>	<p>E) 1.1) For non-registered users, notifications would be available outside the parking space</p>
<hr/> <p><b>Use Case:</b> Collecting User Feedback (05)    <b>Writer:</b> Ahmed Bin Asim</p> <p><b>Scope:</b> Parking Management System</p> <p><b>Level:</b> User-Goal</p> <p><b>Primary Actors:</b> Visitor, Student, Teacher</p> <p><b>Stakeholders and Interests:</b> Admin: Interested in receiving feedback on improving the system. User: Wants to provide feedback easily after using the parking system.</p> <p><b>Pre-conditions:</b> User must have used the parking system.</p> <p><b>Post-Conditions:</b> Feedback is stored for analysis.</p>	
<p><b>Main Success Scenario</b></p>	<p>A) System asks users for mandatory feedback form to improve services</p> <p>B) Submits feedback through a</p>

# Functional Requirements

simple form.	C) Stores feedback for later review by the admin.
Extensions	<p>C) 1.1) If feedback submission fails, the user is notified and prompted to try again later.</p> <p>C) 1.2) Logs any feedback submission issues and notifies admins if persistent.</p>
<hr/>	
Use Case: Handling Lost Receipt (08)	Writer: Ahmed Bin Asim
Scope: Parking Management System	
Level: <u>User-Goal</u>	
Primary Actors: Visitor, Admin	
Stakeholders and Interests: User: Wants a resolution to the lost receipt issue quickly. Parking Staff: Interested in resolving issues while ensuring payment.	
Pre-conditions: User must have lost their parking receipt.	
Post-Conditions: User pays the fine and exits the parking area.	
Main Success Scenario	<p>A) Reports lost receipt to the system/staff and <u>follows</u> instructions to pay a fine.</p> <p>B) System asks for confirmation email</p> <p>C) Verifies the user's parking session. Opens the gate after payment</p>
Extensions	<p>A) 1.1) Unable to pay the fine immediately. The system logs the issue and allows deferred payment options.</p> <p>A) 2.1) Notifies the admin if multiple lost receipt incidents are reported.</p>

Use Case: Fining for Violations (07)	Writer: Ahmed Bin Asim
Scope: Parking Management System	
Level: <u>User-Goal</u>	
Primary Actors: Visitor, Student, Admin, Teacher	
Stakeholders and Interests: Admin: Interested in applying rules fairly and enforcing fines for violations. User: Wants clear information on any fines imposed	
Pre-conditions: User violates parking rules (e.g., overstaying).	
Post-Conditions: Fine is imposed and collected.	
Main Success Scenario	<p>A) Detects violation (e.g., overstaying) and notifies the user of the fine.</p> <p>B) The fine is added to the user's account and can be paid later or before leaving the parking area.</p>
Extensions	<p>A) 1.1) If a user disputes the fine, the system records the dispute for admin review.</p> <p>B) 1.1) Allows payment of fines through various methods (online, at the terminal).</p>
<hr/>	
Use Case: Collecting Fines/Payments (08)	Writer: Ahmed Bin Asim
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: Visitor, Student, Teacher, Admin	

# Functional Requirements

<p><b>Stakeholders and Interests:</b>            Admin: Interested in receiving payments for fines or services.            User: Wants a seamless and transparent payment process.</p>	
<p><b>Pre-conditions:</b> User is required to pay a fine or parking fee.</p>	
<p><b>Post-Conditions:</b> Payment is processed and recorded.</p>	
<b>Main Success Scenario</b> A) Initiates payment via the system.	B) Processes the payment and updates the user account with payment confirmation.
<b>Extensions</b>	B) 1.1) Payment fails; the system offers alternative payment methods or retries.  B) 1.2) Send confirmation of successful or failed payment via email or SMS.

<b>Use Case: Reserving Parking Space (09)</b>	<b>Writer:</b> Fahd Ahmad
<b>Scope:</b> Parking Management System	
<b>Level:</b> User-Goal	
<b>Primary Actors:</b> Teacher, Admin, Student	
<b>Stakeholders and Interests:</b> User: Wants to reserve a parking spot in advance. Admin: Interested in managing reserved spots efficiently.	
<b>Pre-conditions:</b> Users must have access to reservation functionality.	
<b>Post-Conditions:</b> <u>Parking</u> space is reserved for the user.	
<b>Main Success Scenario</b> A) Requests reservation for a specific date/time.	B) Confirms availability and reserves <u>the space</u> for the user and generates a slip

	C) Updates the system.
	B) 1.1) Unable to reserve; the system provides alternate available slots.
	C) 1.1) Sends reservation confirmation via email or SMS.

<b>Use Case: Canceling Parking Space (10)</b>	<b>Writer:</b> Fahd Ahmad
<b>Scope:</b> Parking Management System	
<b>Level:</b> User-Goal	
<b>Primary Actors:</b> Teacher, Admin, Student	
<b>Stakeholders and Interests:</b> User: Wants to cancel a parking reservation. Admin: Wants to free up the spot for others in case of cancellation.	<b>Main Success Scenario</b> A) Requests an extension of parking time.
<b>Pre-conditions:</b> User has an active reservation	
<b>Post-Conditions:</b> Reservation is canceled, and the spot is made available for others.	
<b>Extensions</b>	B) Cancels the reservation and frees the parking spot.  C) 1.1) Admin gets an urgent order to free up parking space.  C) 1.2) Parking space freed up and reservation canceled  B) 1.1) Late cancellation incurs a fee; the system notifies the user.  B) 1.2) Logs the cancellation and refunds the fee (if applicable).

# Functional Requirements

Use Case: Extending Parking Space (11)	Writer: Fahd Ahmad
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: <u>Student</u> , Teacher, Admin	
<b>Stakeholders and Interests:</b> User: Wants to extend the parking time without moving the vehicle. Admin: Interested in ensuring correct billing for extended parking times.	
Pre-conditions: User has an active parking session.	
Post-Conditions: Parking session is extended, and the user is notified accordingly.	
Main Success Scenario	
A) Requests an extension of parking time.	B) User is given a choice of various extensions of time slot
C) User chooses the available extension slots	D) Time slot is <u>extended</u> and the user is notified
Extensions	B) 1.1) Parking slot is further booked ahead, and cannot be booked further  B) 1.2) User has a choice to book another parking spot separately and in case they are not available, they can ask the PMS to move the car on their own
Use Case: Viewing Parking History (12)	Writer: Fahd Ahmad
Scope: Parking Management System	
Level: User-Goal	
<b>Primary Actors:</b> Student, Teacher  <b>Stakeholders and Interests:</b> User: Wants to review past parking sessions for tracking purposes. Admin: Interested in providing detailed parking history.	
Pre-conditions: User has <u>parked</u> in the past and the system has recorded the data.	
Post-Conditions: History is displayed to the user.	
Main Success Scenario	
A) Requests parking history through the system	B) Retrieves and displays past parking sessions with date, time, and fees.
Extensions	A) 1.1) Requests detailed history in a downloadable format.  A) 1.2) Send parking history as a PDF or CSV.
Use Case: Requesting Car Wash Service (13)	Writer: Fahd Ahmad
Scope: Parking Management System	
Level: User-Goal	
Primary Actors: Guest, Teacher, Car Washer	
<b>Stakeholders and Interests:</b> User: Wants to request a car wash service while parked. Car Washer: Interested in offering the services to users.	
Pre-conditions: User is <u>parked</u> and the car wash service is available. User applying for car wash is either a guest visitor or a teacher	
Post-Conditions: Car wash is scheduled and completed.	
Main Success Scenario	
A) Requests <u>car wash</u> service for their	

# Functional Requirements

parked vehicle	<p>B) Schedules the service and confirms the request.</p> <p>C) Email generated and sent to the user.</p> <p>D) The system updates the bill for the car wash to the user's account</p>
Extensions	<p>B) 1.1) If the car washer is not available, request isn't <u>confirmed</u> and the user is notified</p>

**Primary  
Actors**

## Parking Management System



Teacher



Student



Guest



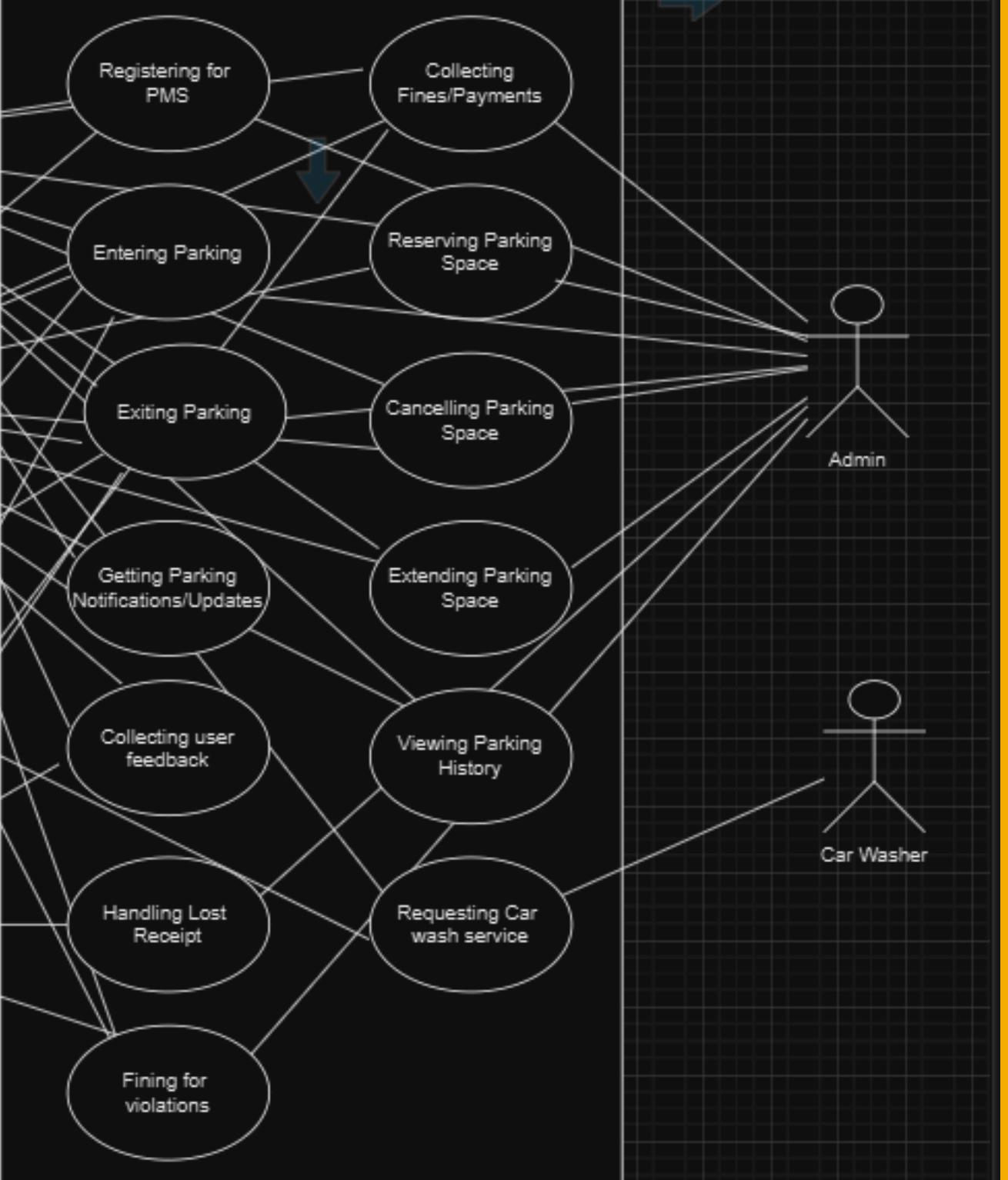
Visitor

Jawad Ahmad Khan  
Ahmed bin Asim  
Fahd Ahmad Farooqi

**Supporting  
Actors**



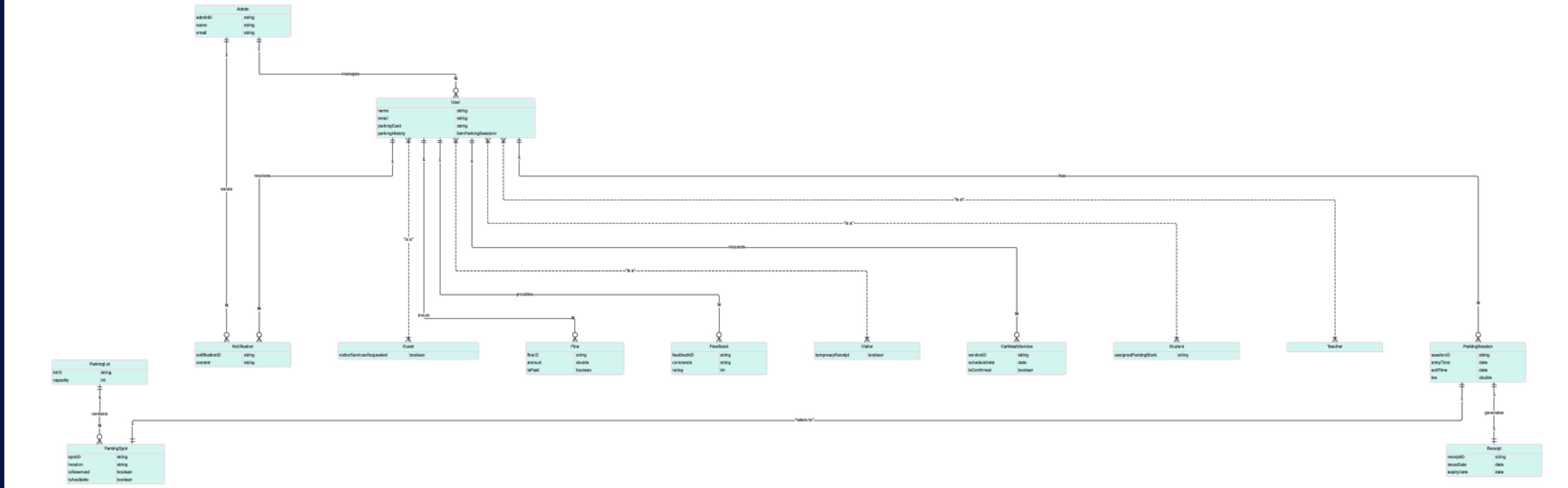
# Use Case Diagram



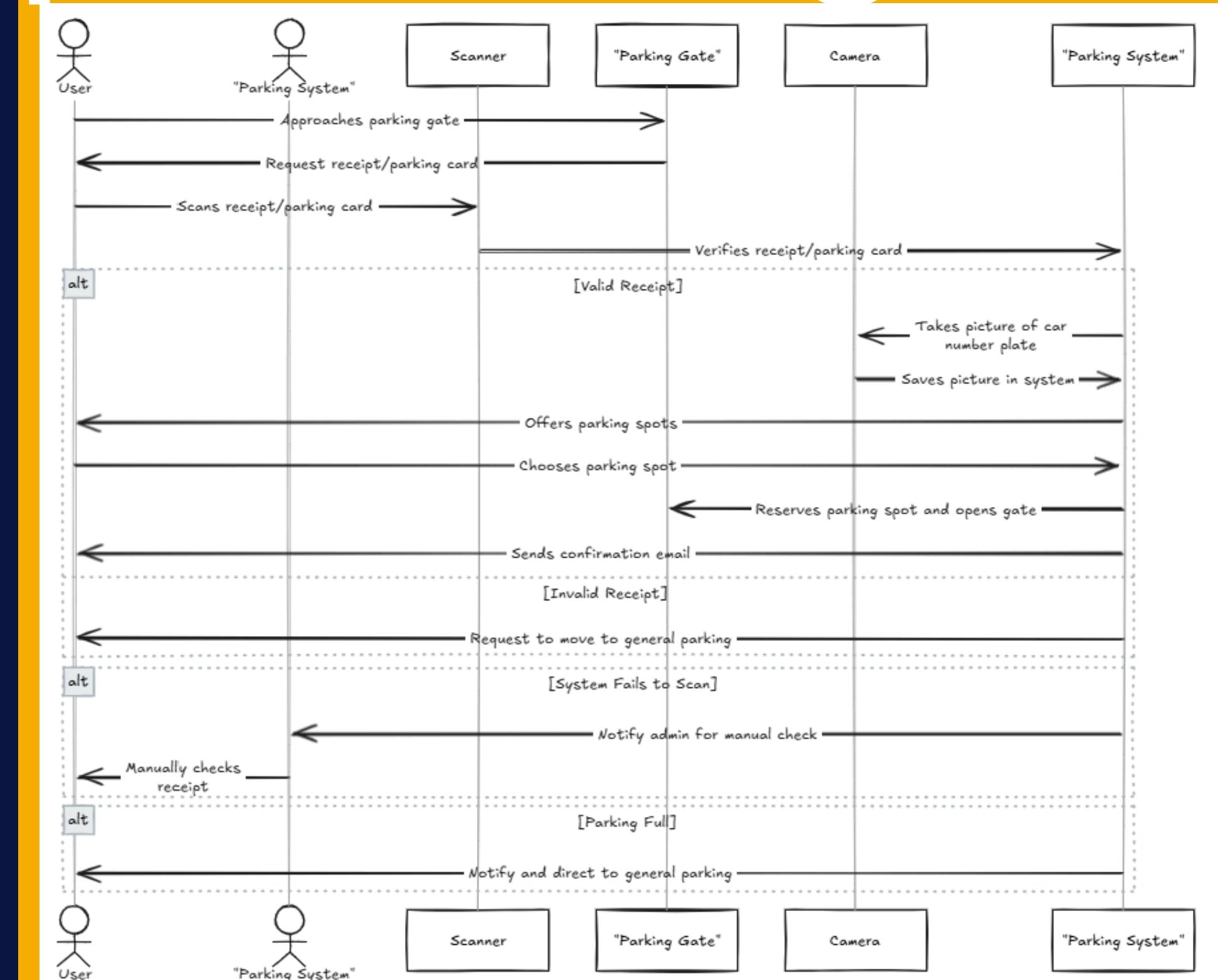
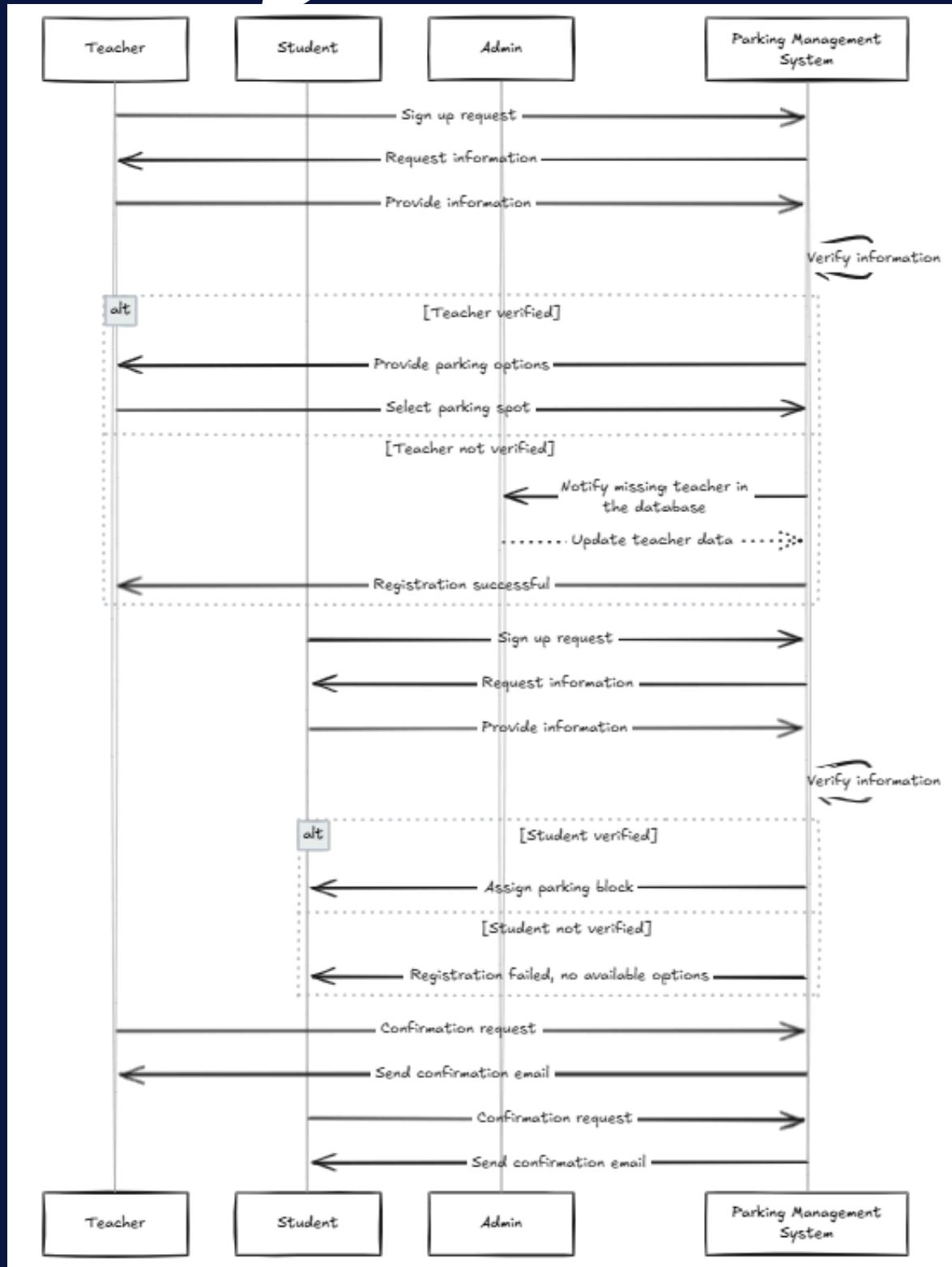
# Non Functional Requirements

- > Security Requirements
- > Safety requirements
- > Business Rules
- > Performance Requirements
- > Software Quality Attributes

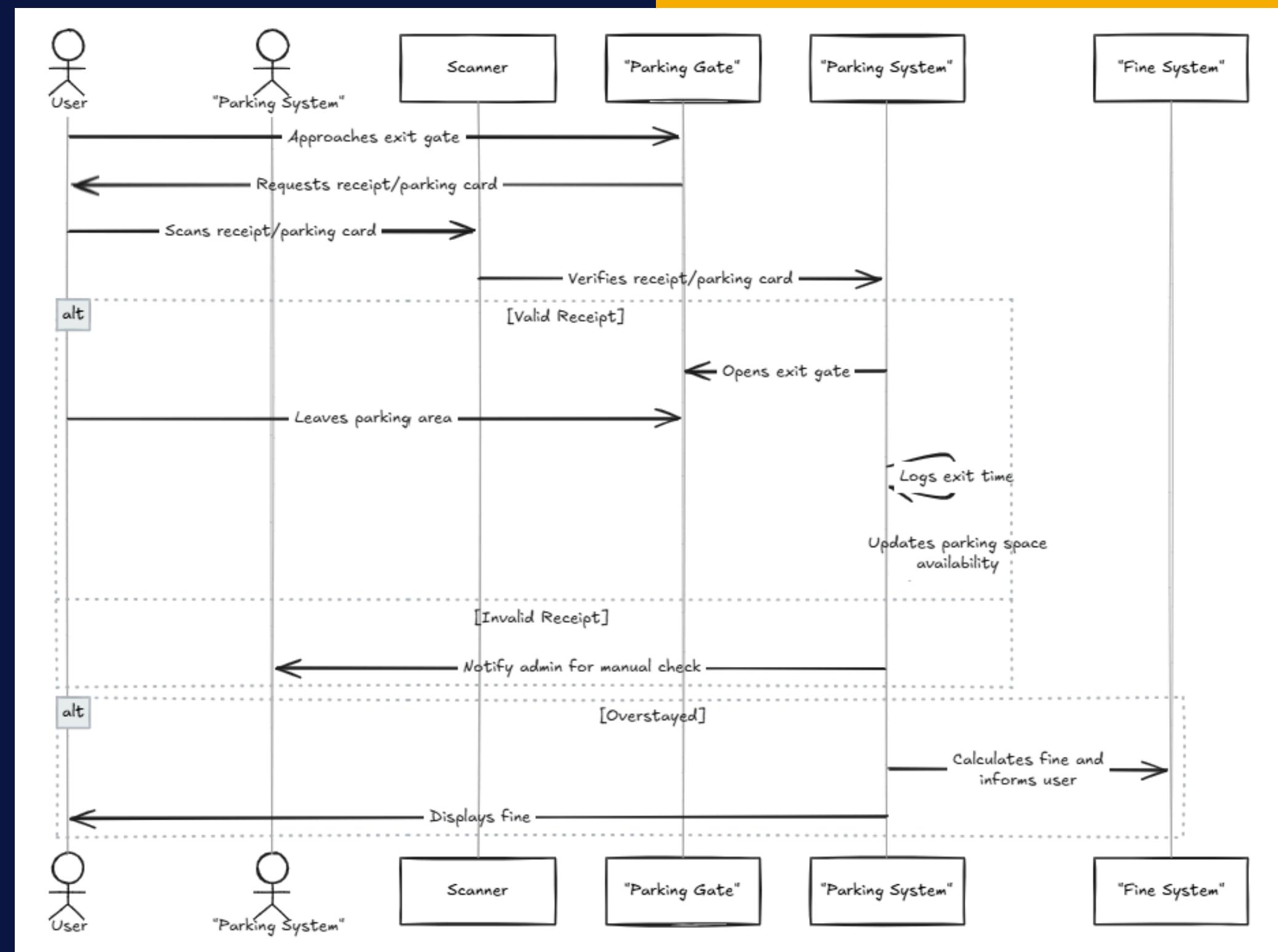
# Domain Model



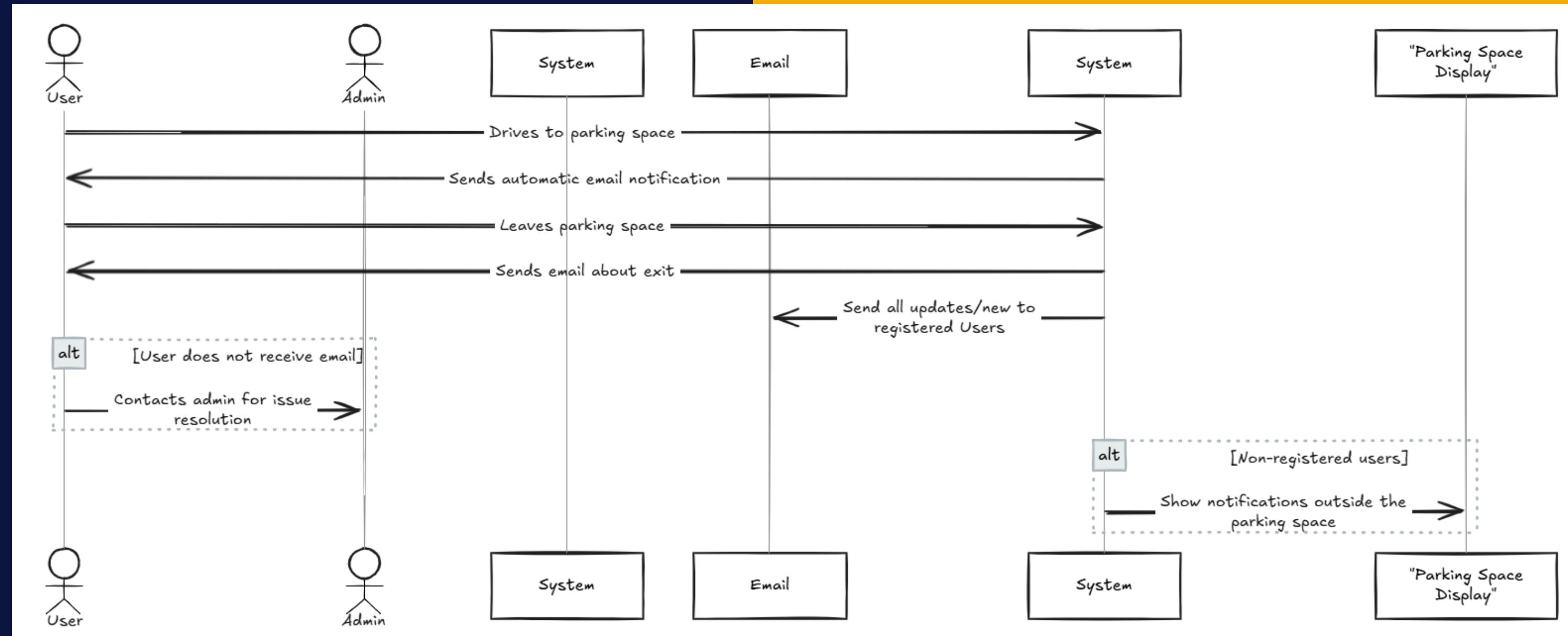
# System Sequence Diagrams



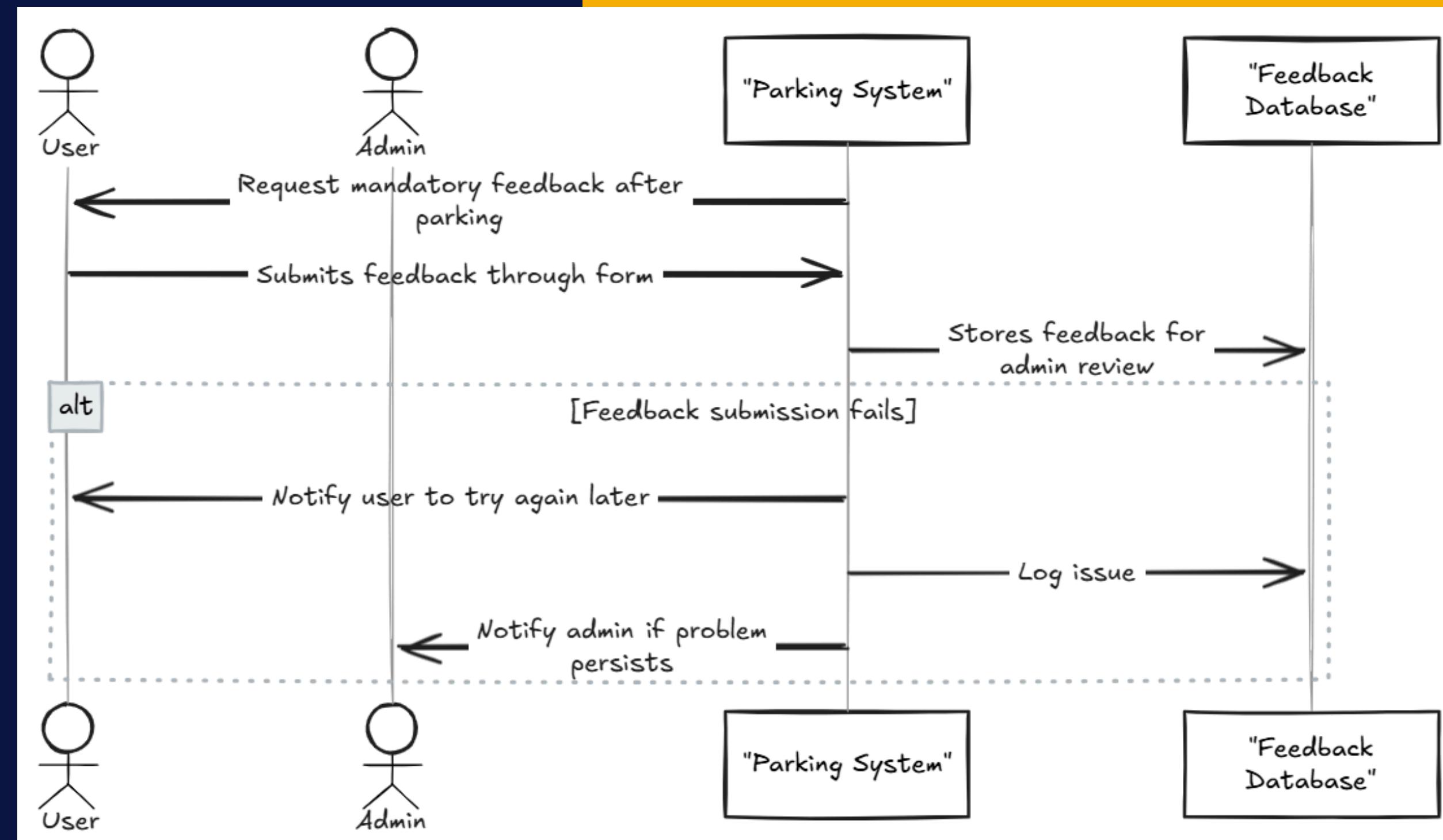
# System Sequence Diagrams



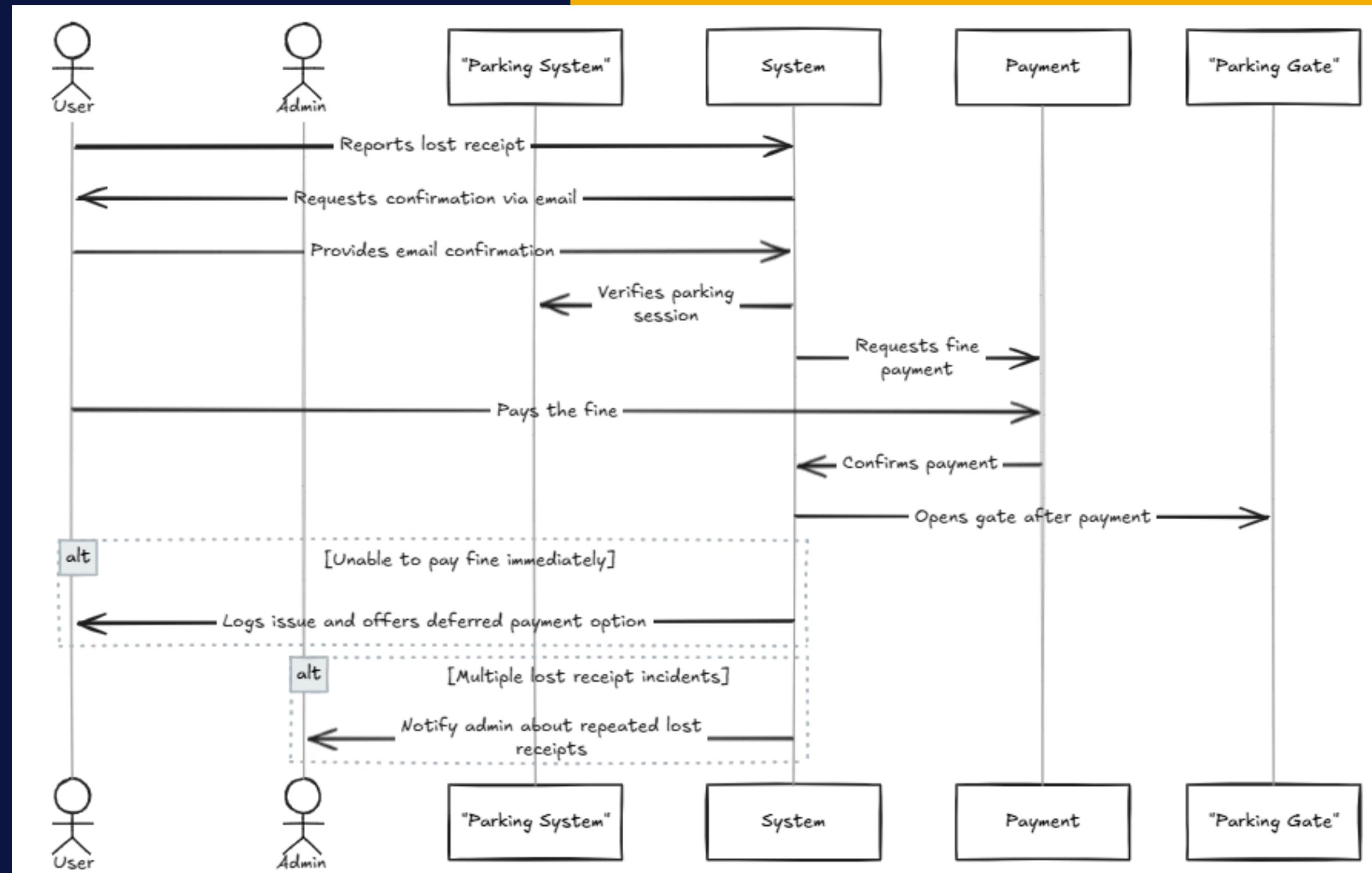
# System Sequence Diagrams



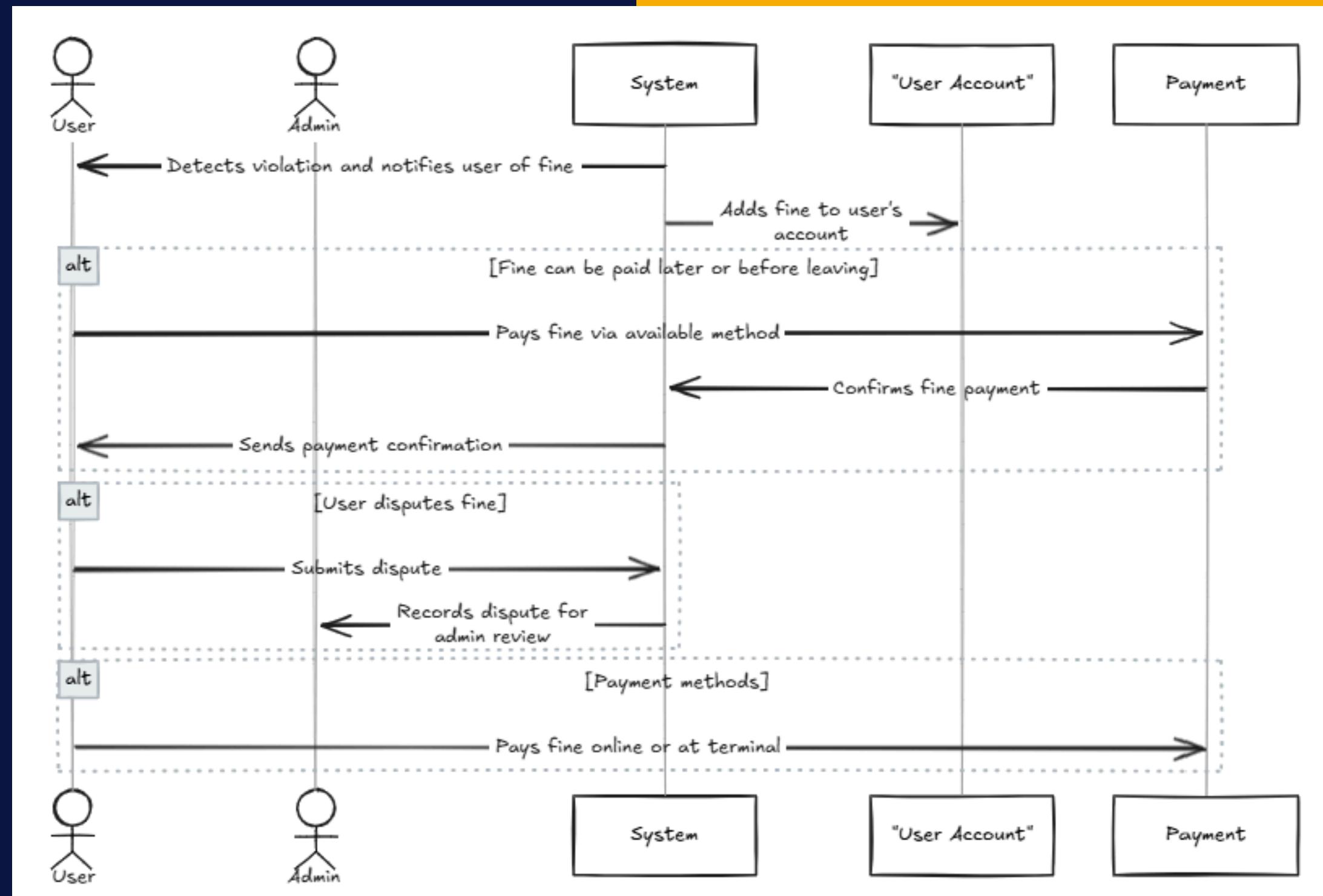
# System Sequence Diagrams



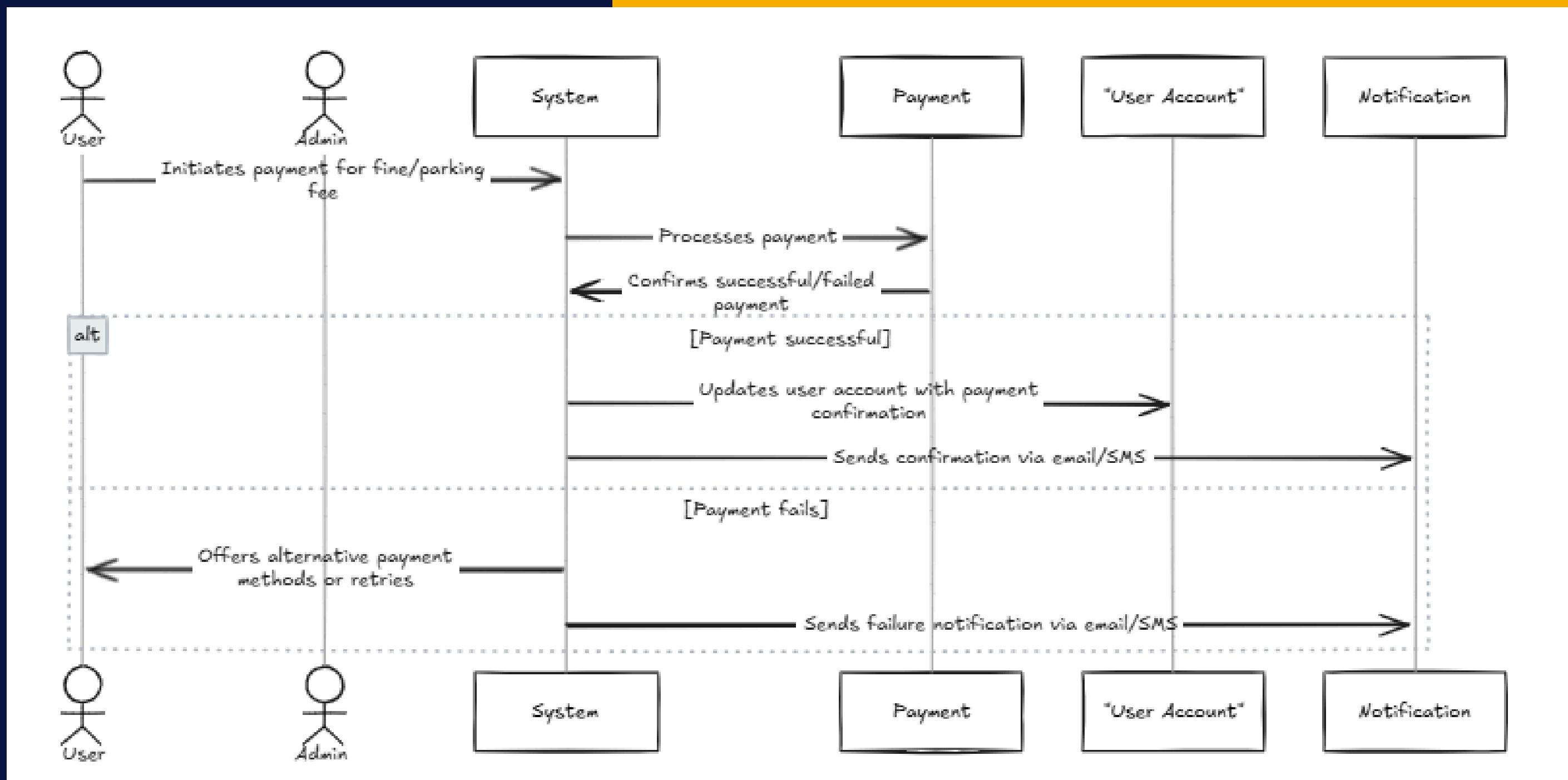
# System Sequence Diagrams



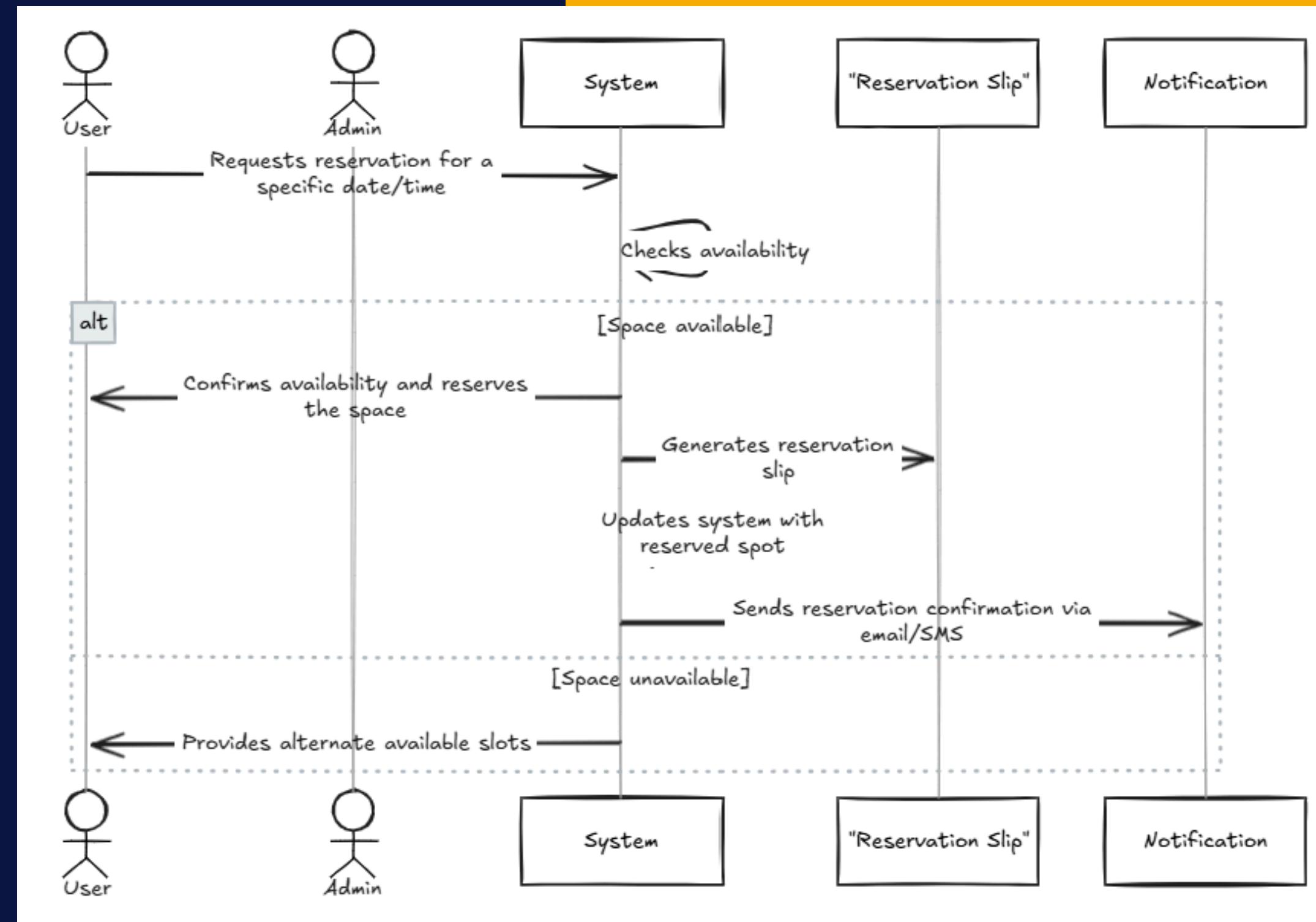
# System Sequence Diagrams



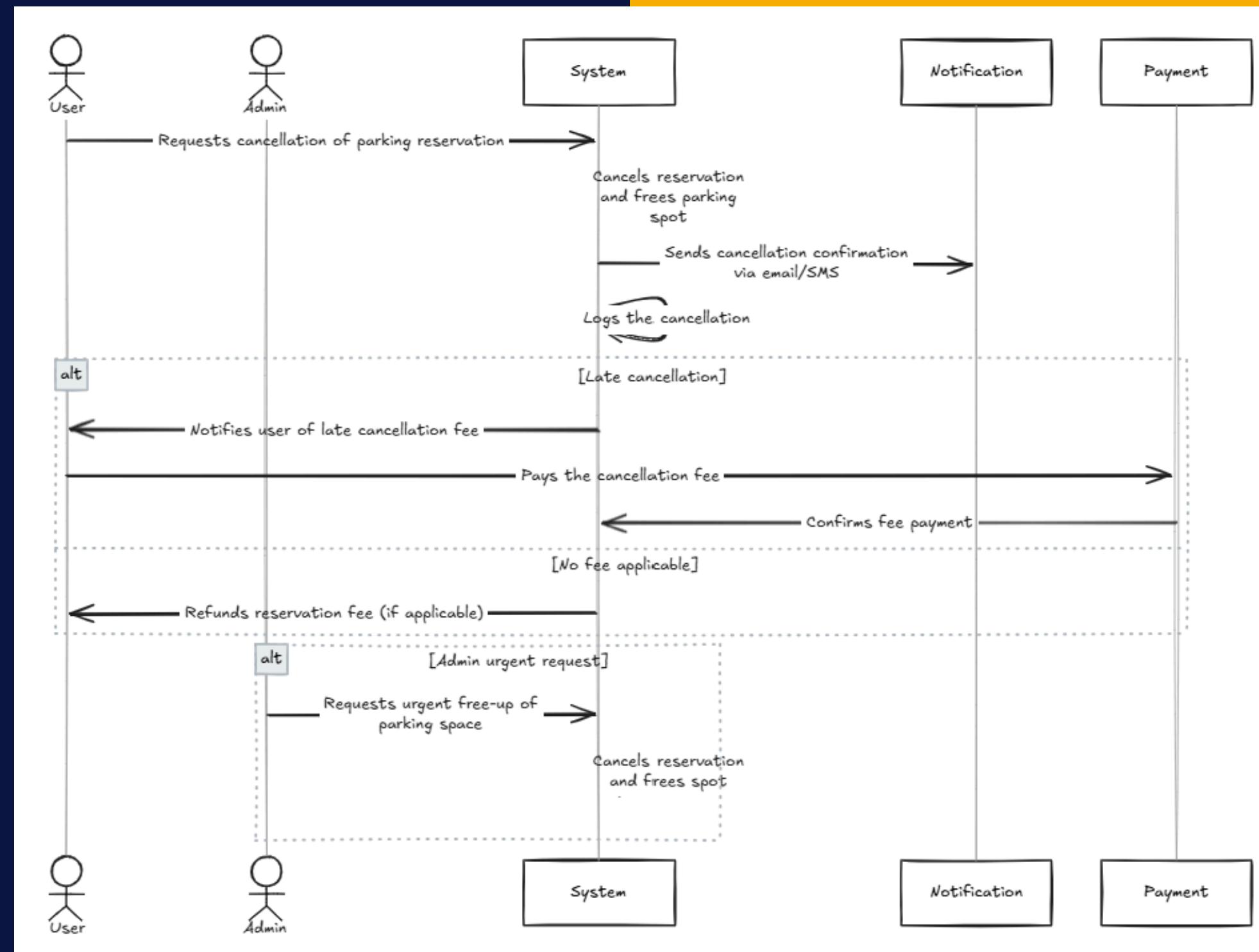
# System Sequence Diagrams



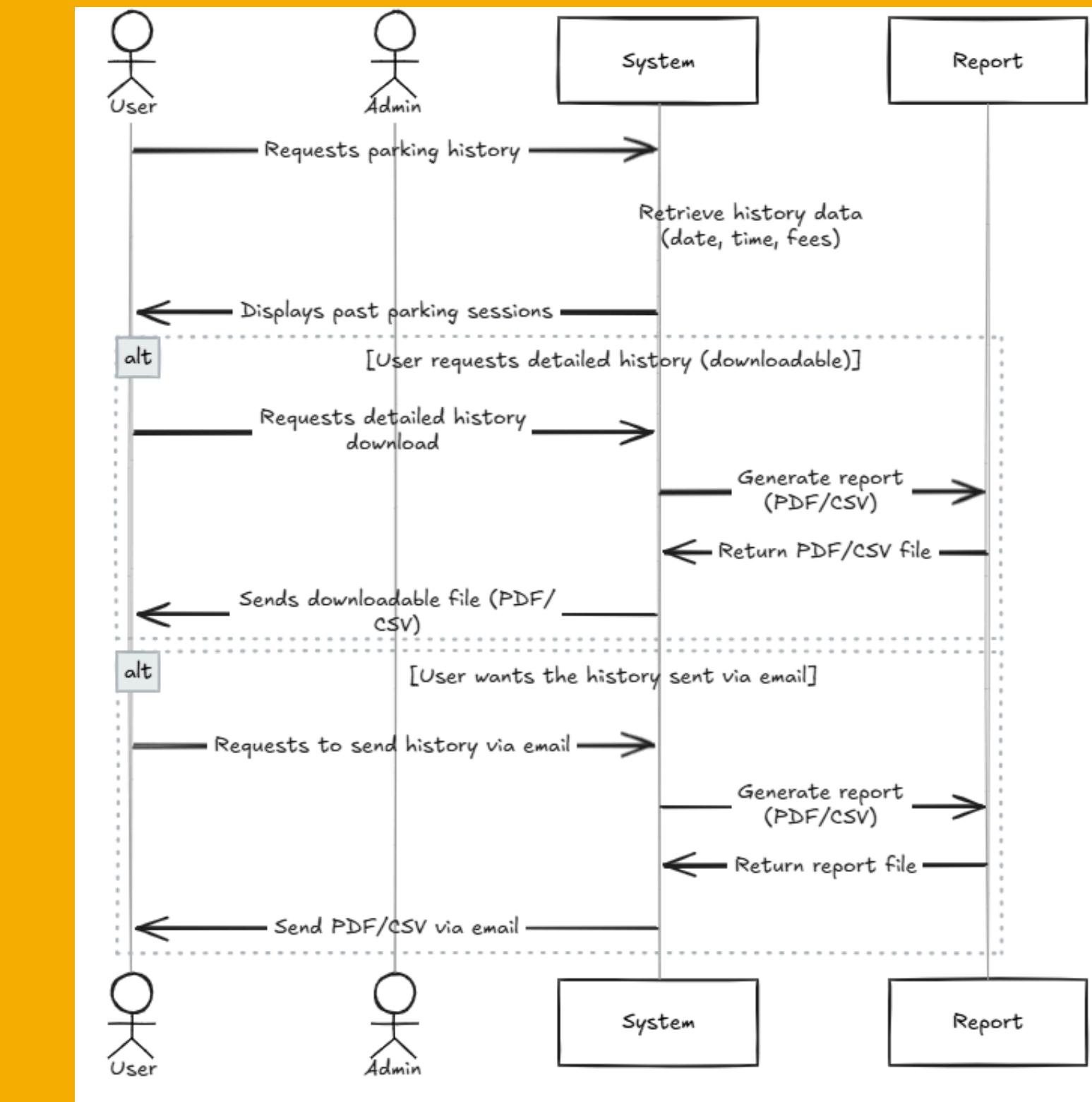
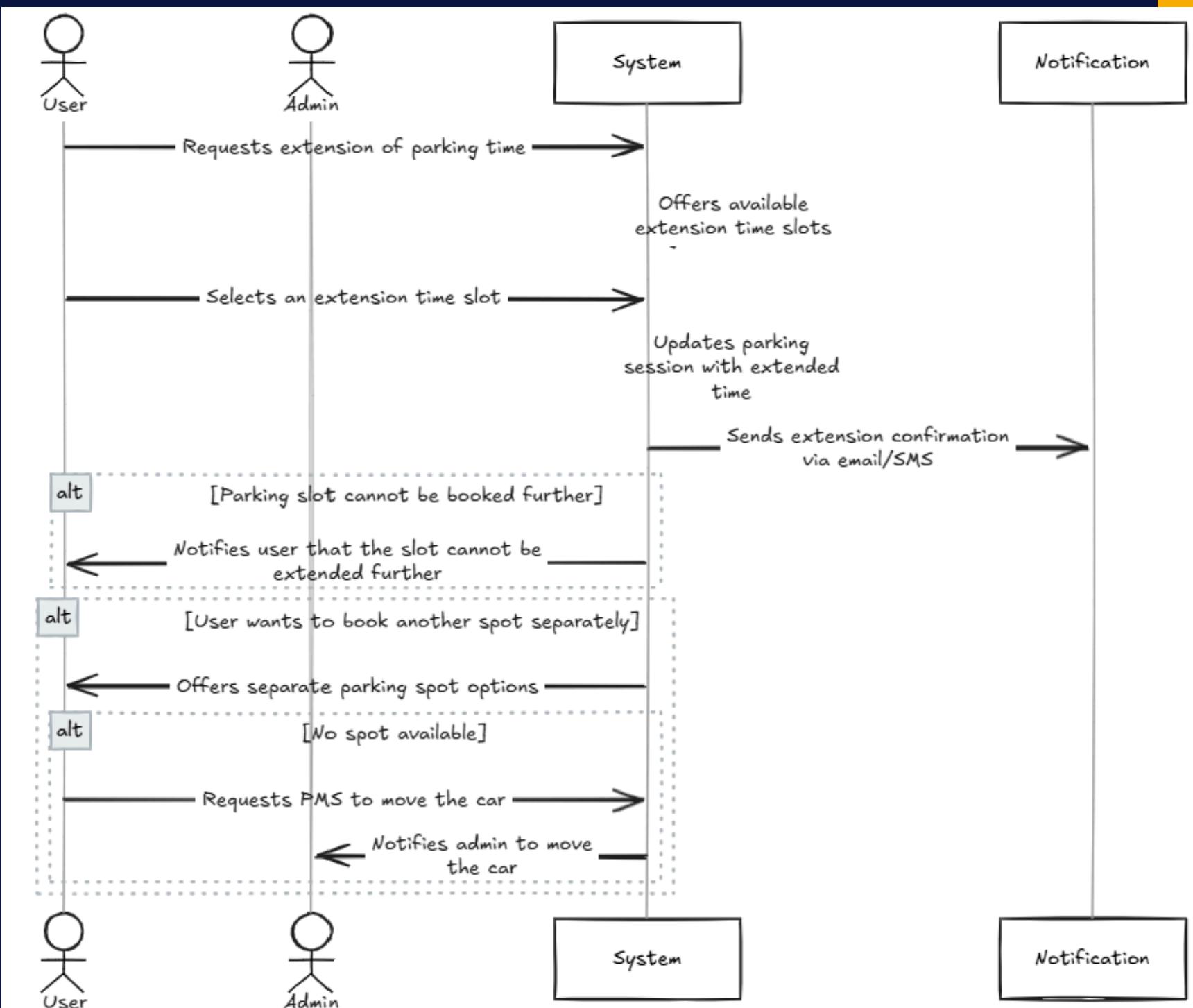
# System Sequence Diagrams



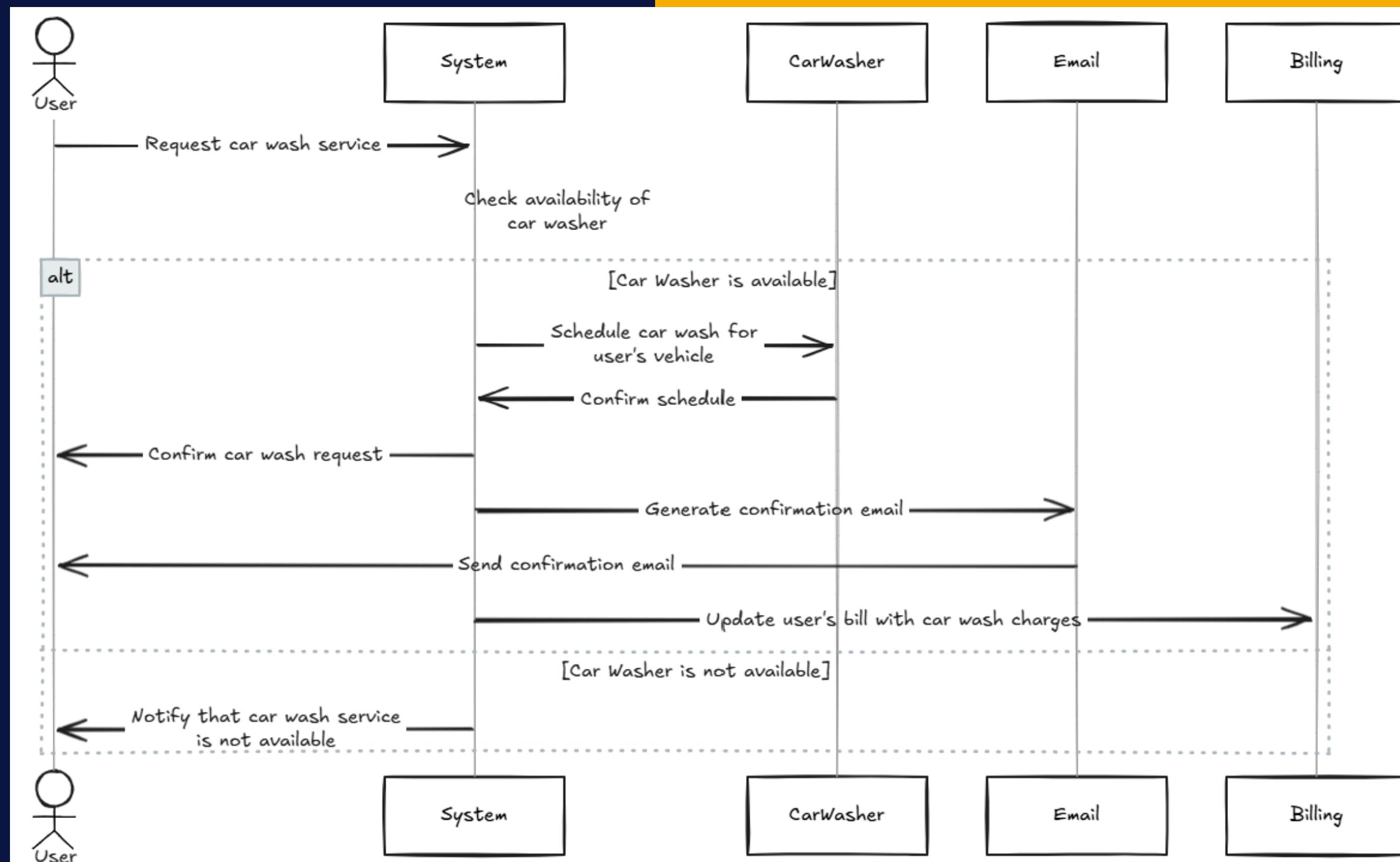
# System Sequence Diagrams



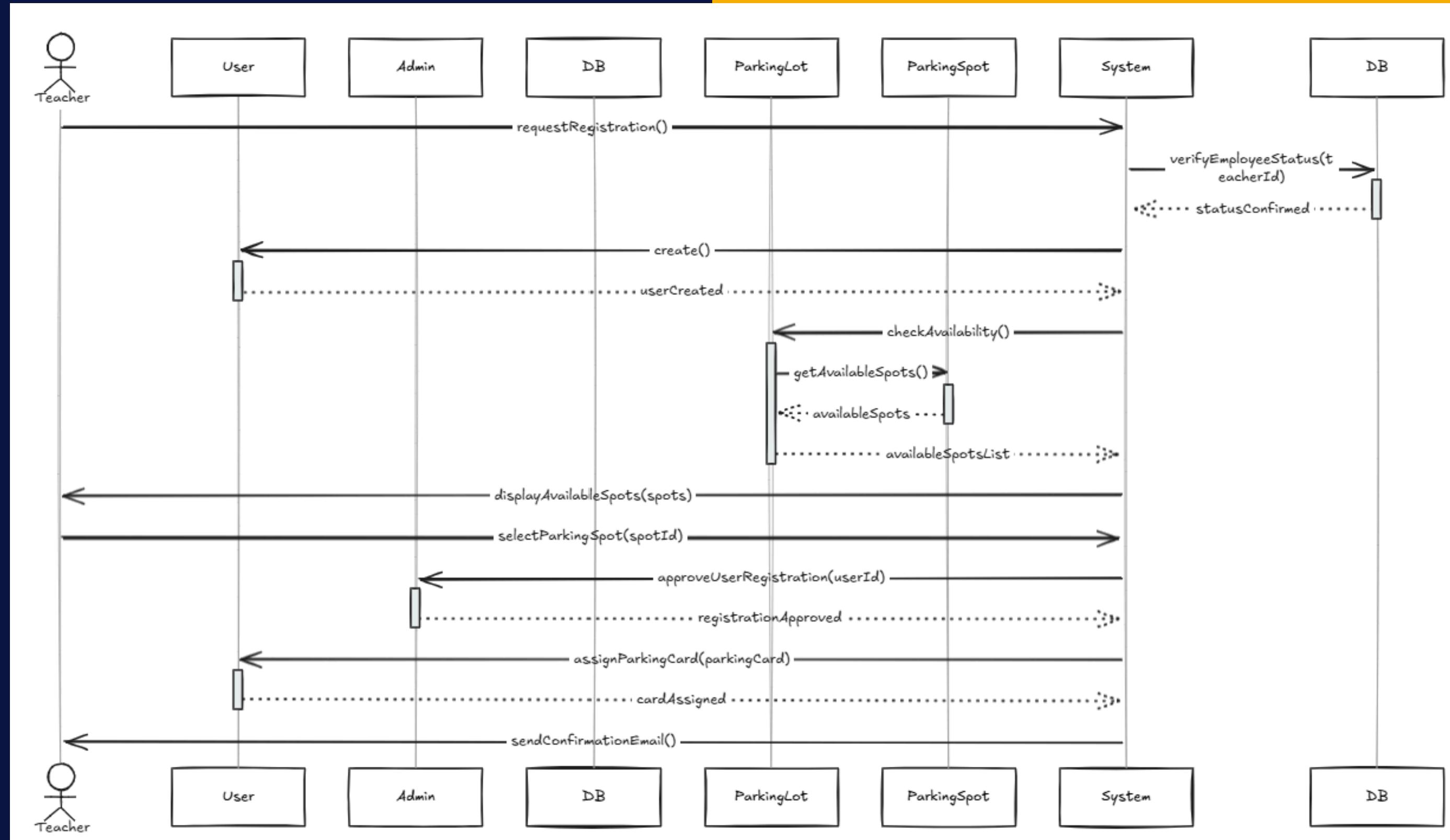
# System Sequence Diagrams



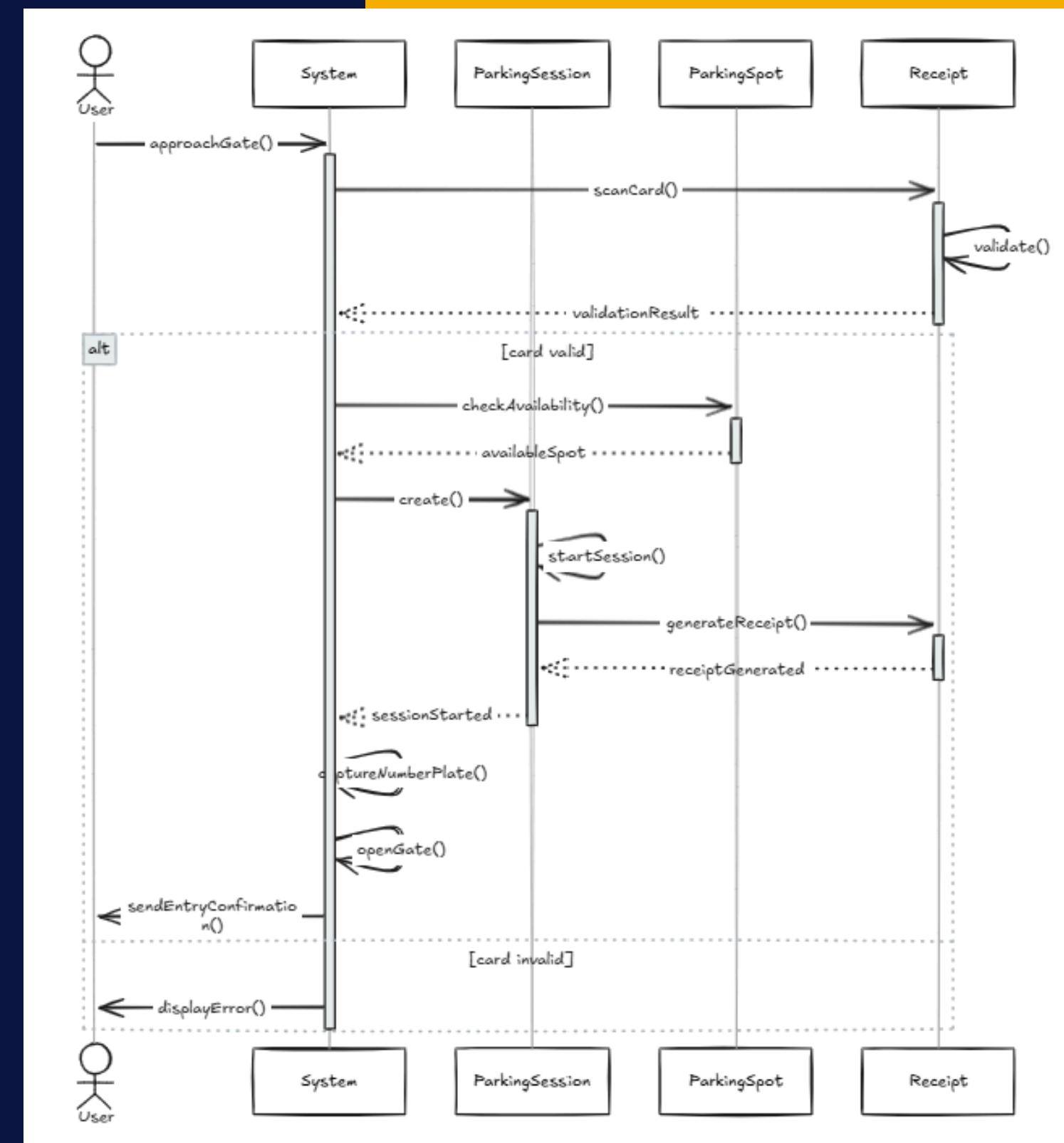
# System Sequence Diagrams



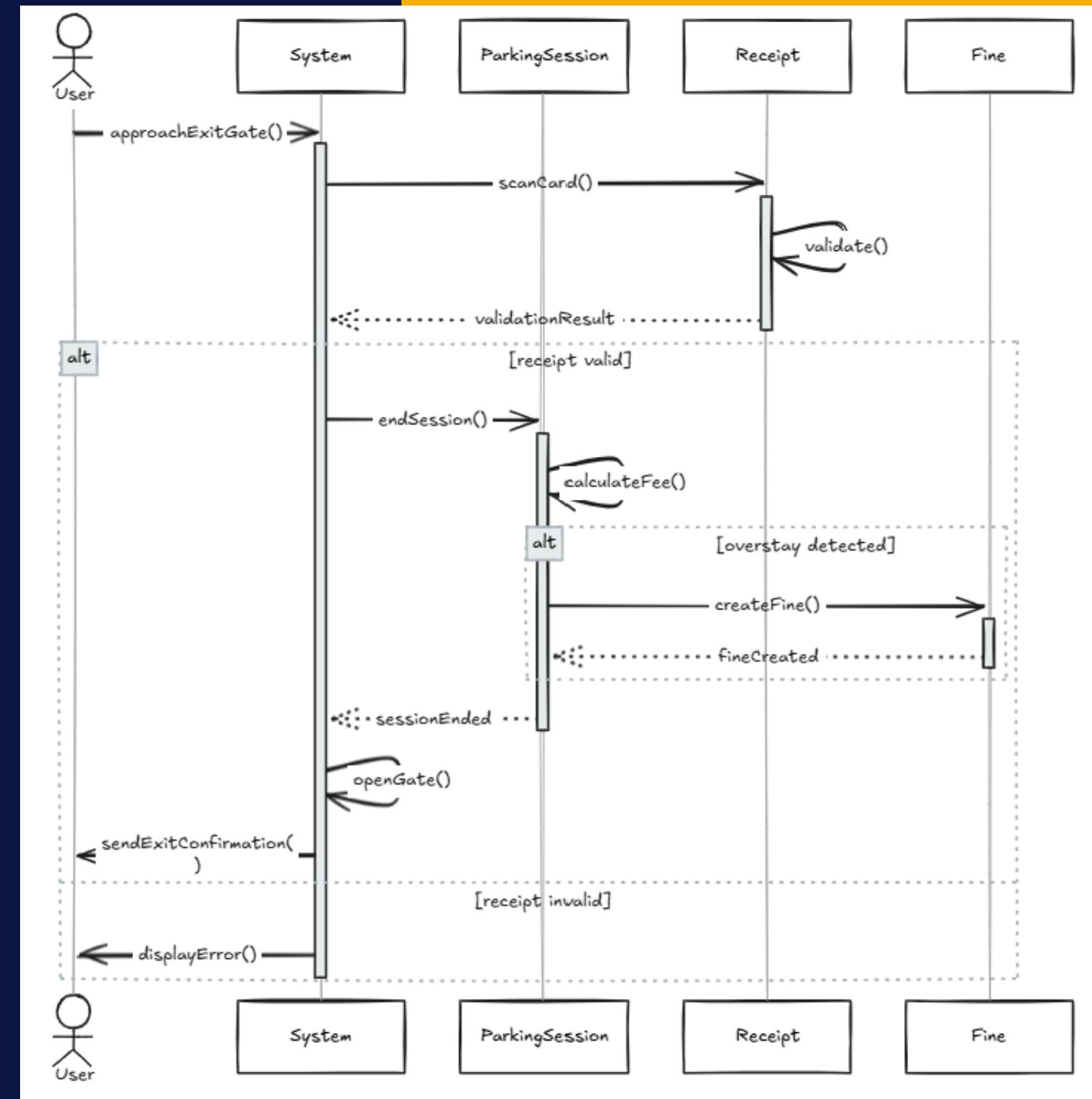
# Sequence Diagram



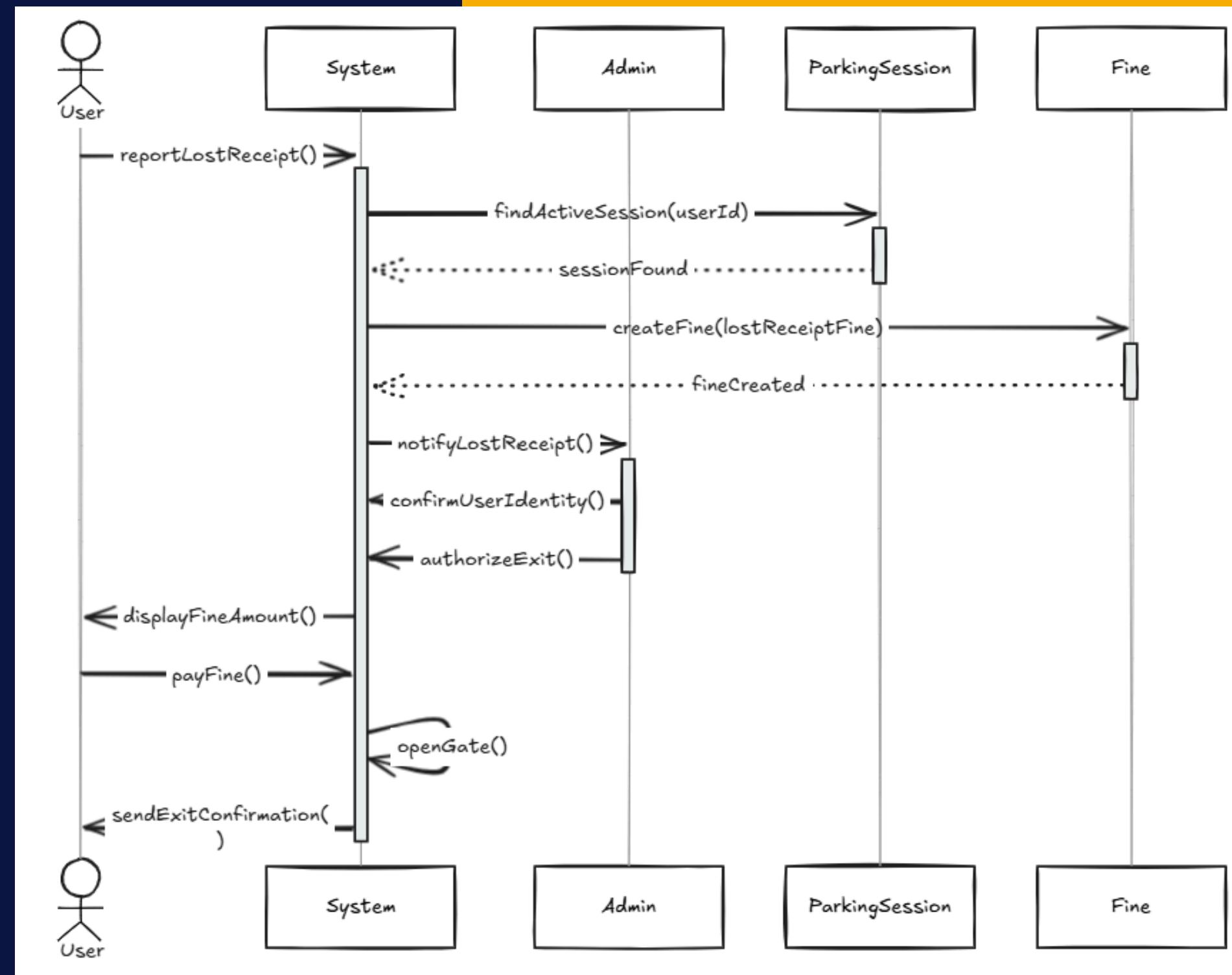
# Sequence Diagram



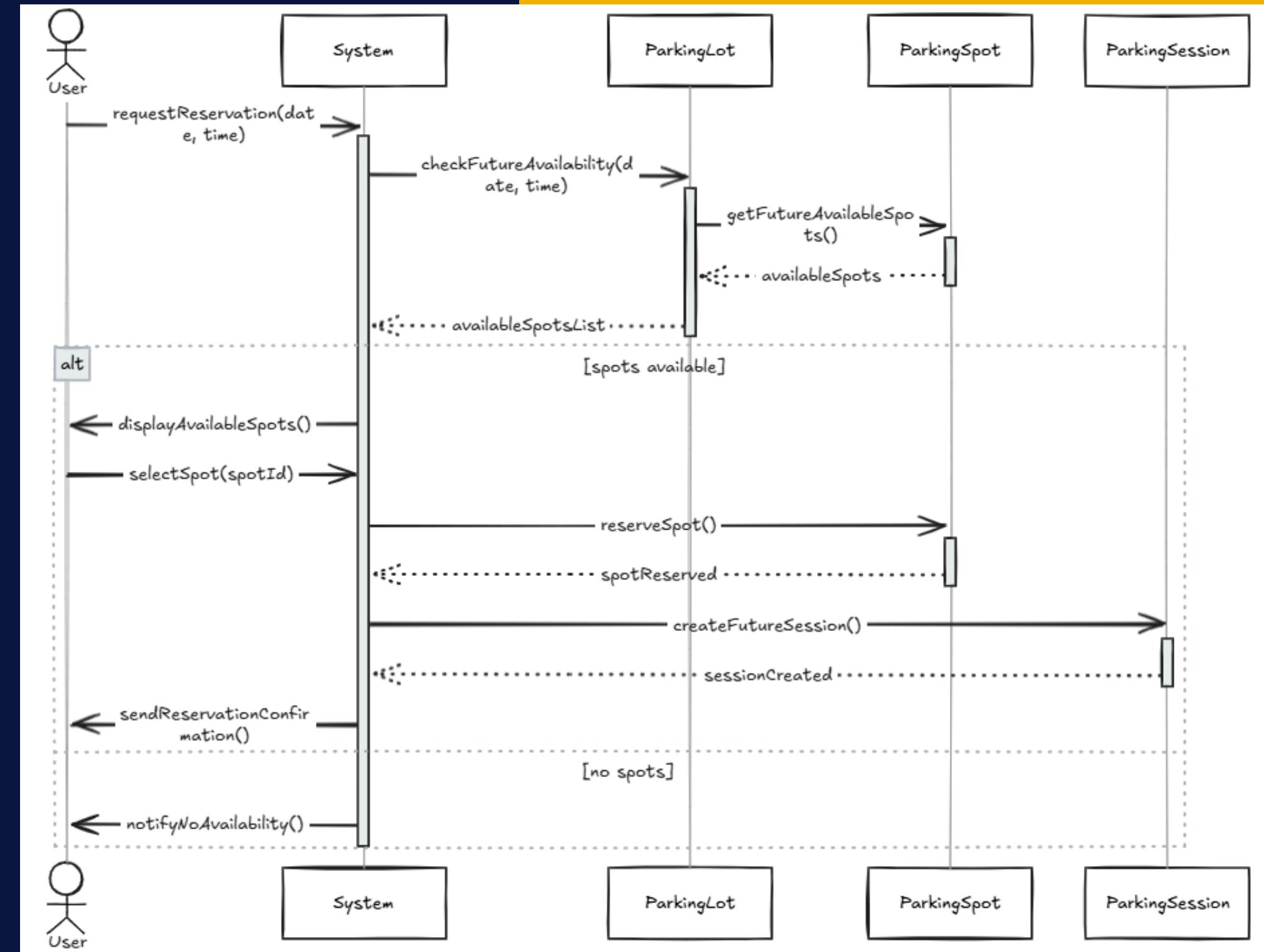
# Sequence Diagram



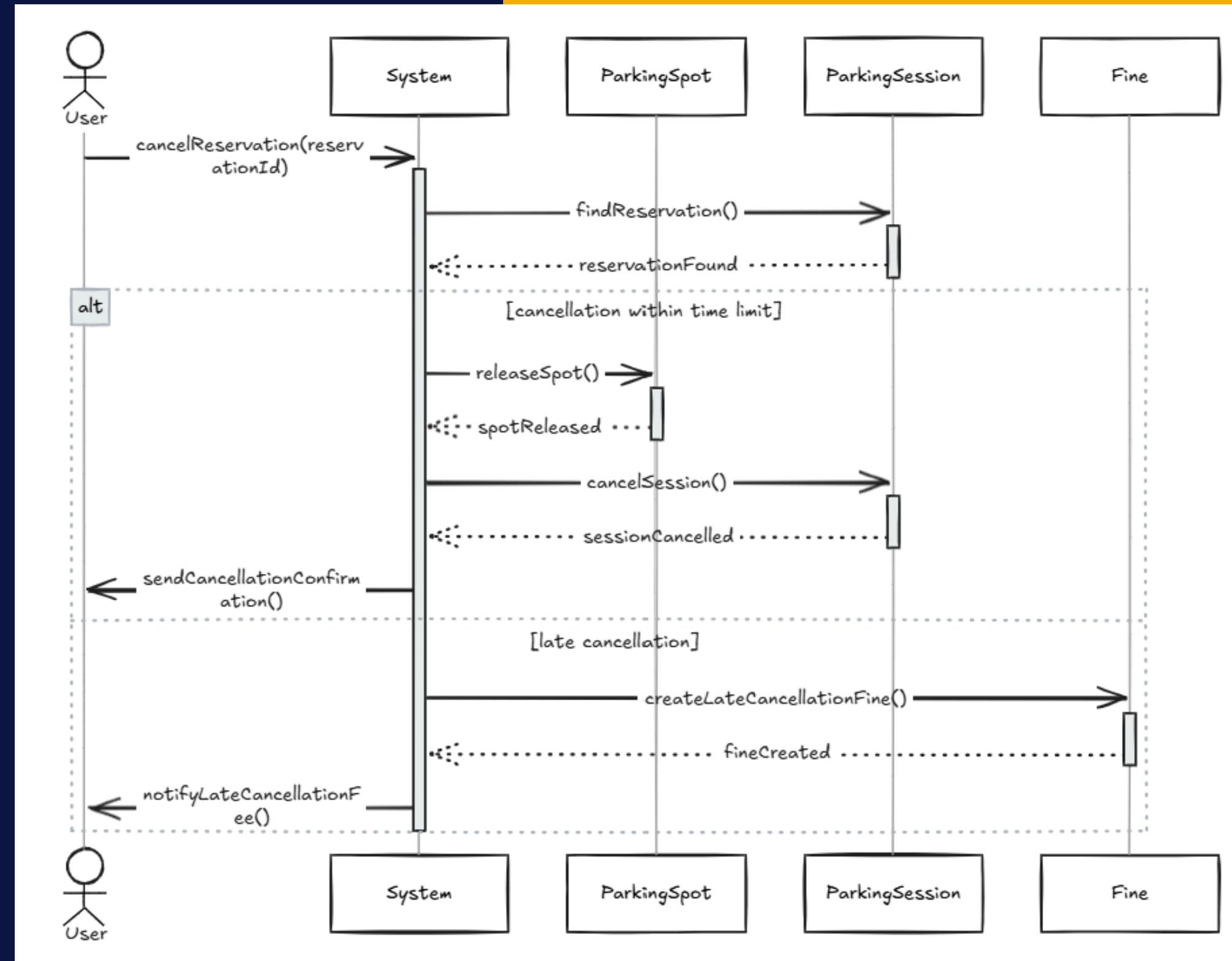
# Sequence Diagram



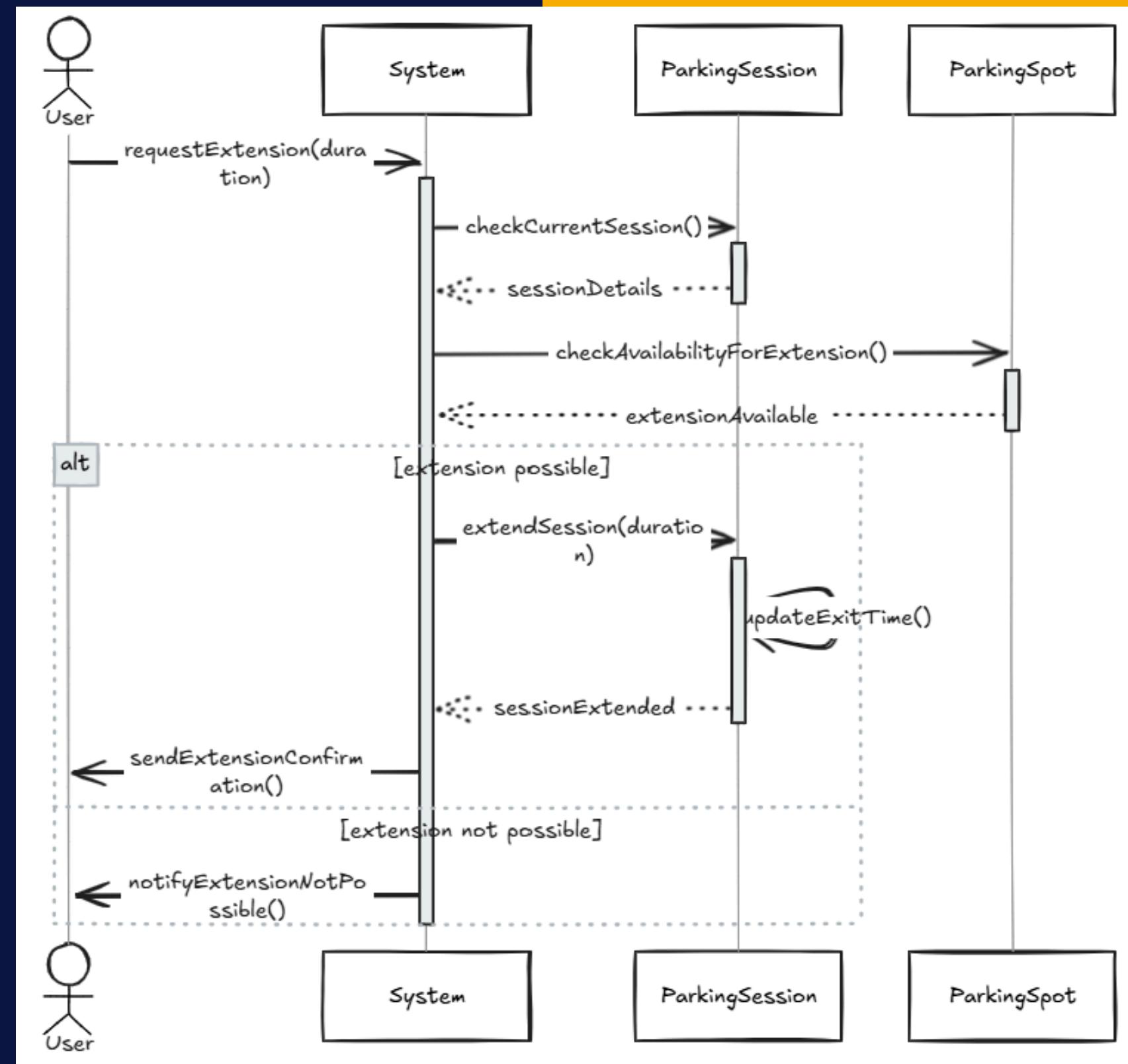
# Sequence Diagram



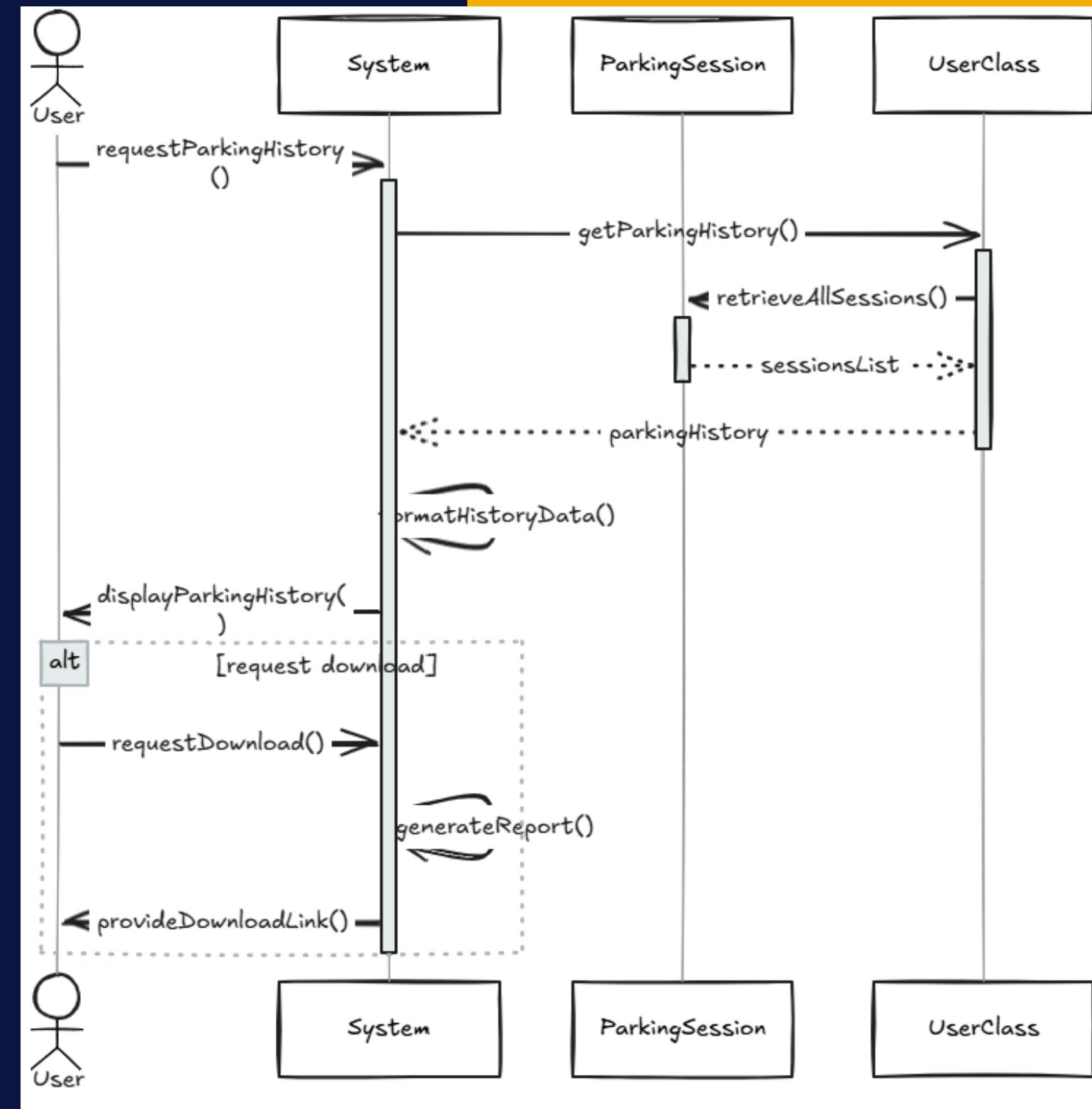
# Sequence Diagram



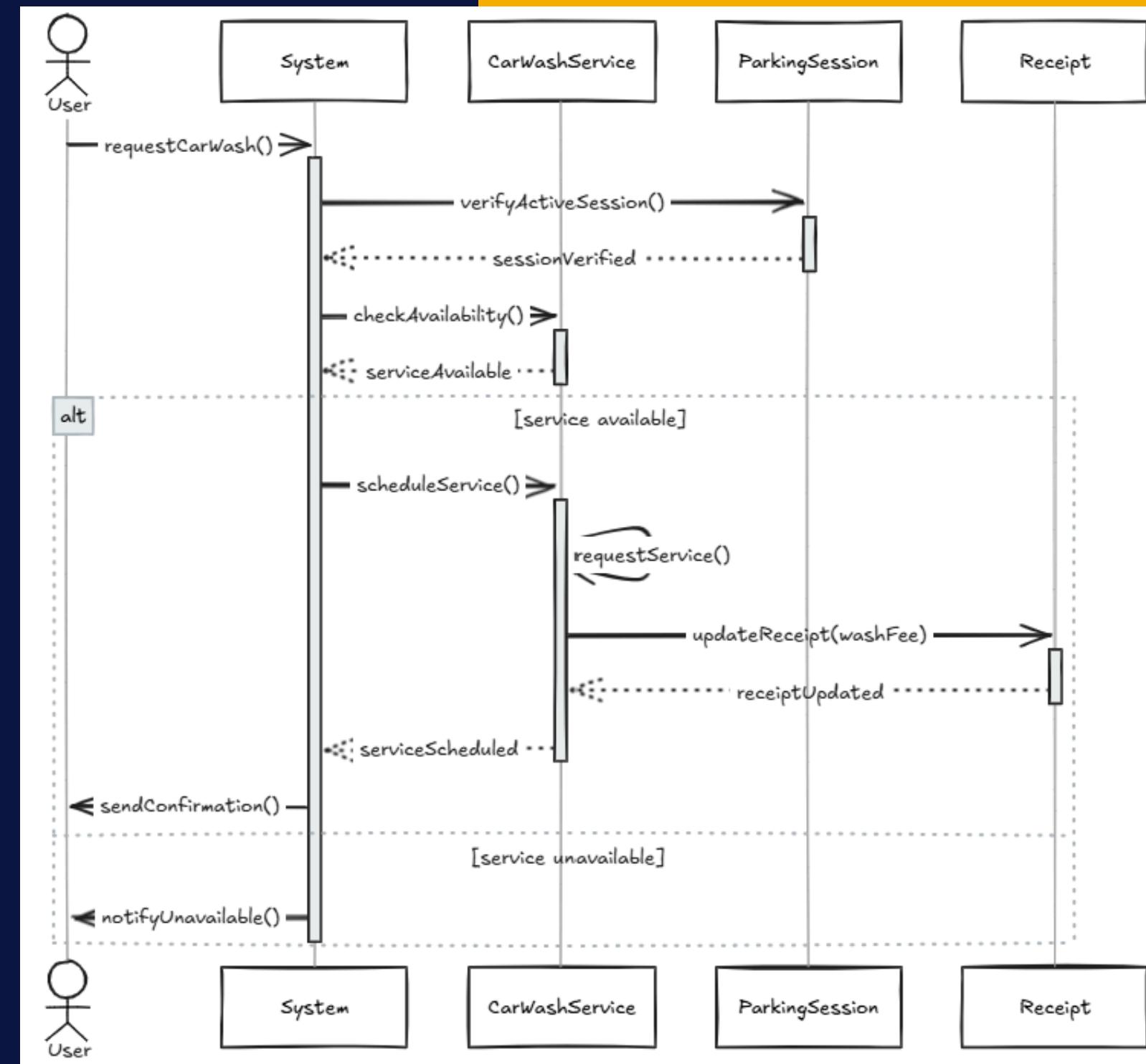
# Sequence Diagram



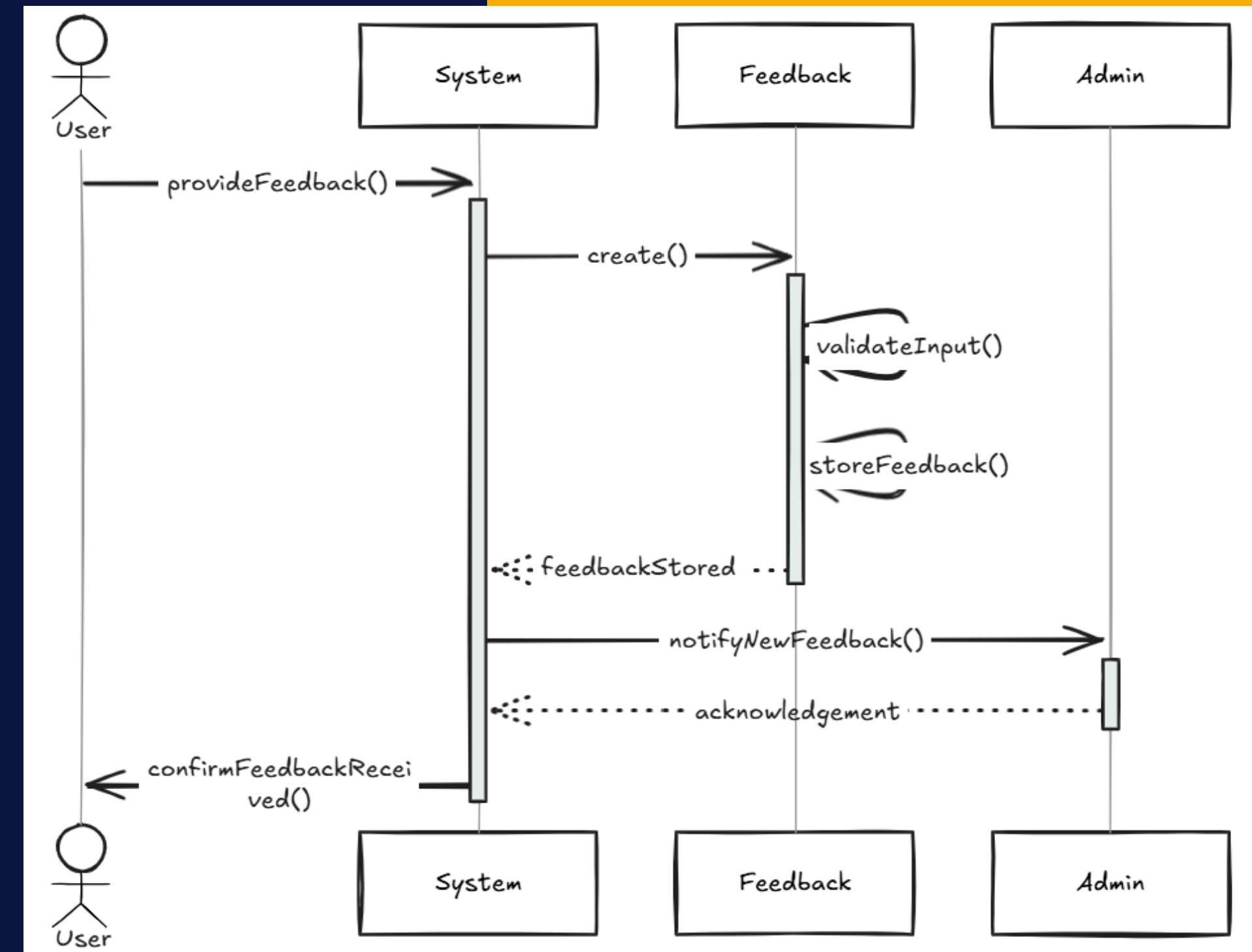
# Sequence Diagram



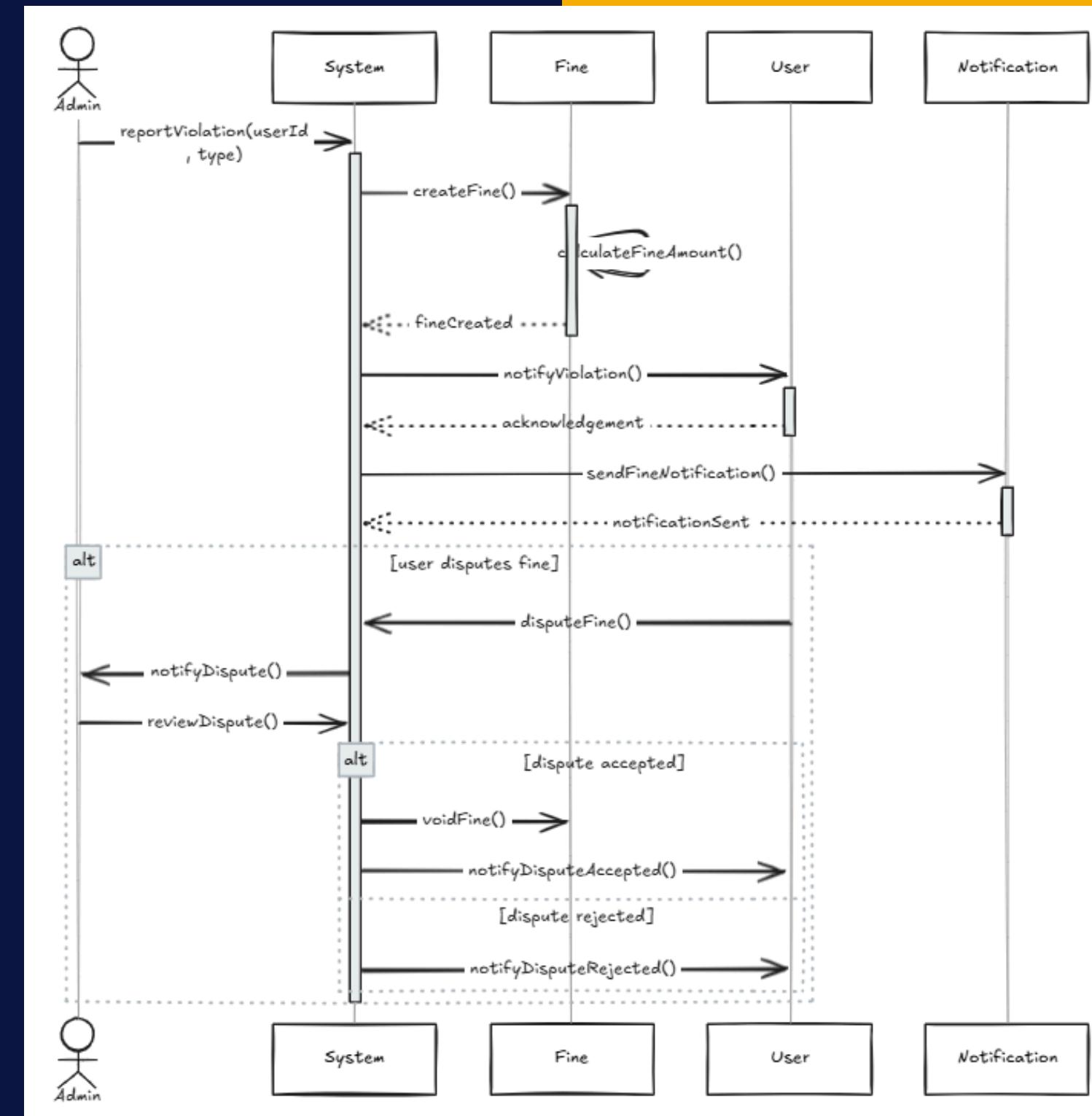
# Sequence Diagram



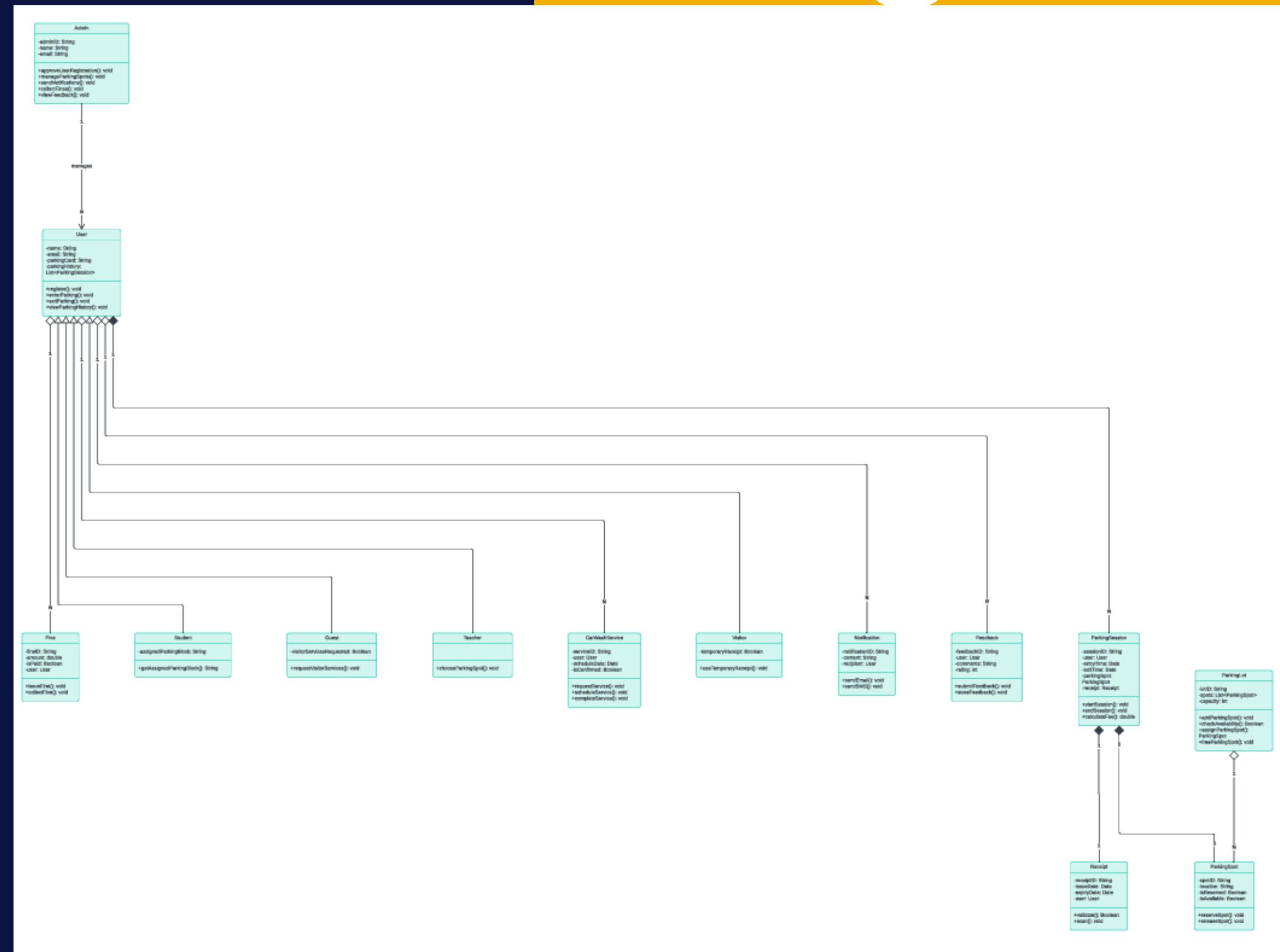
# Sequence Diagram



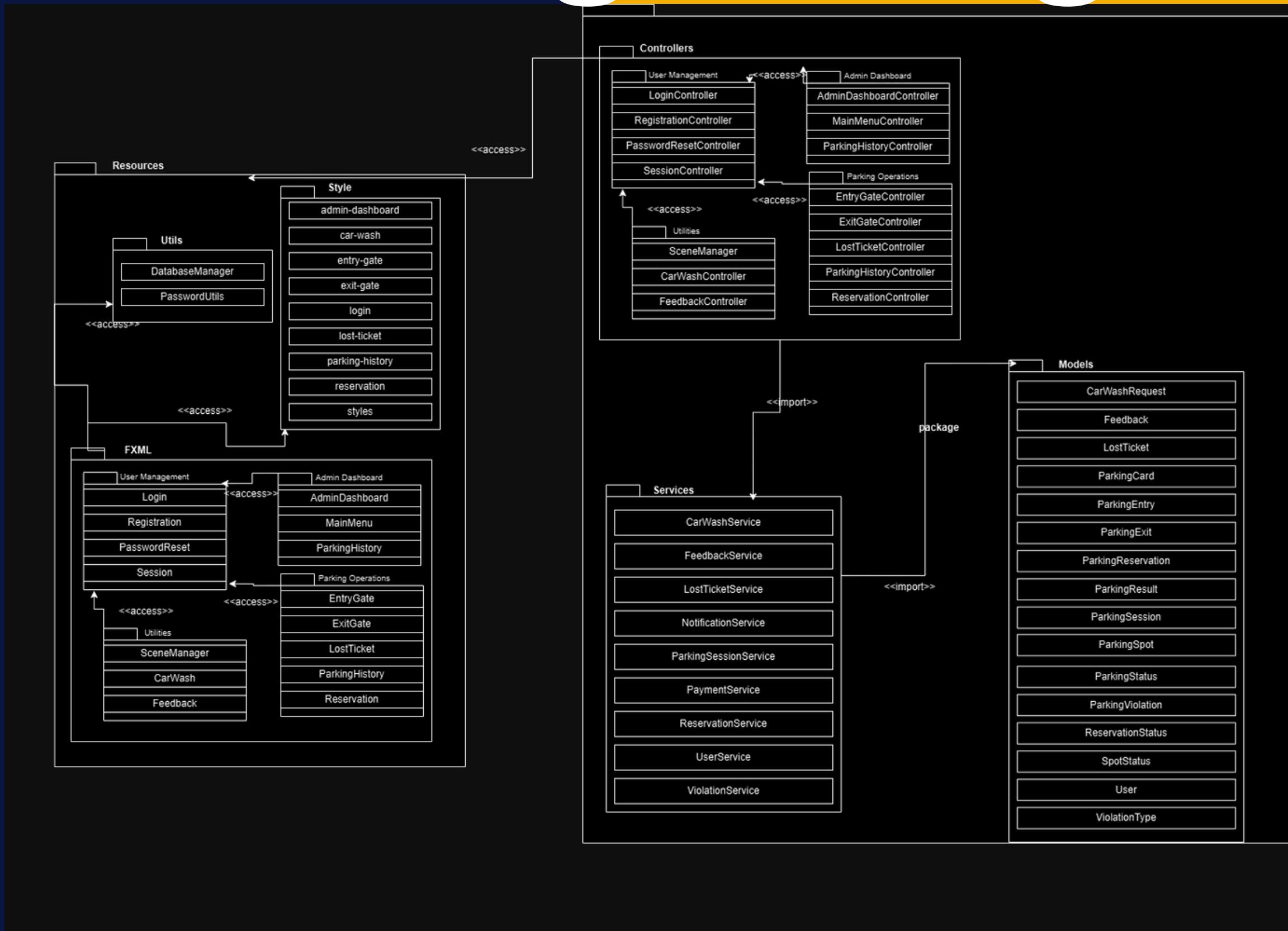
# Sequence Diagram



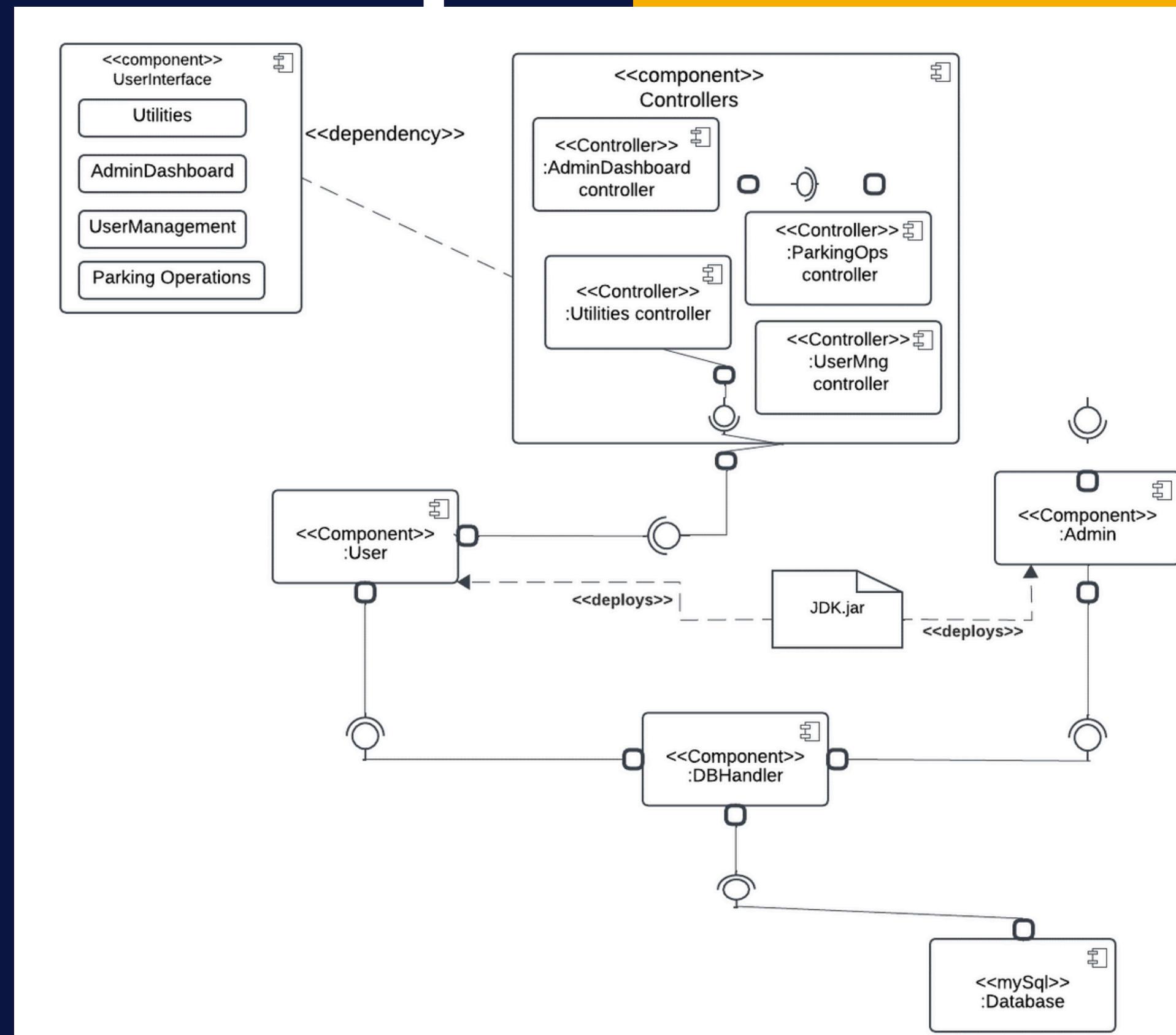
# Class Diagram



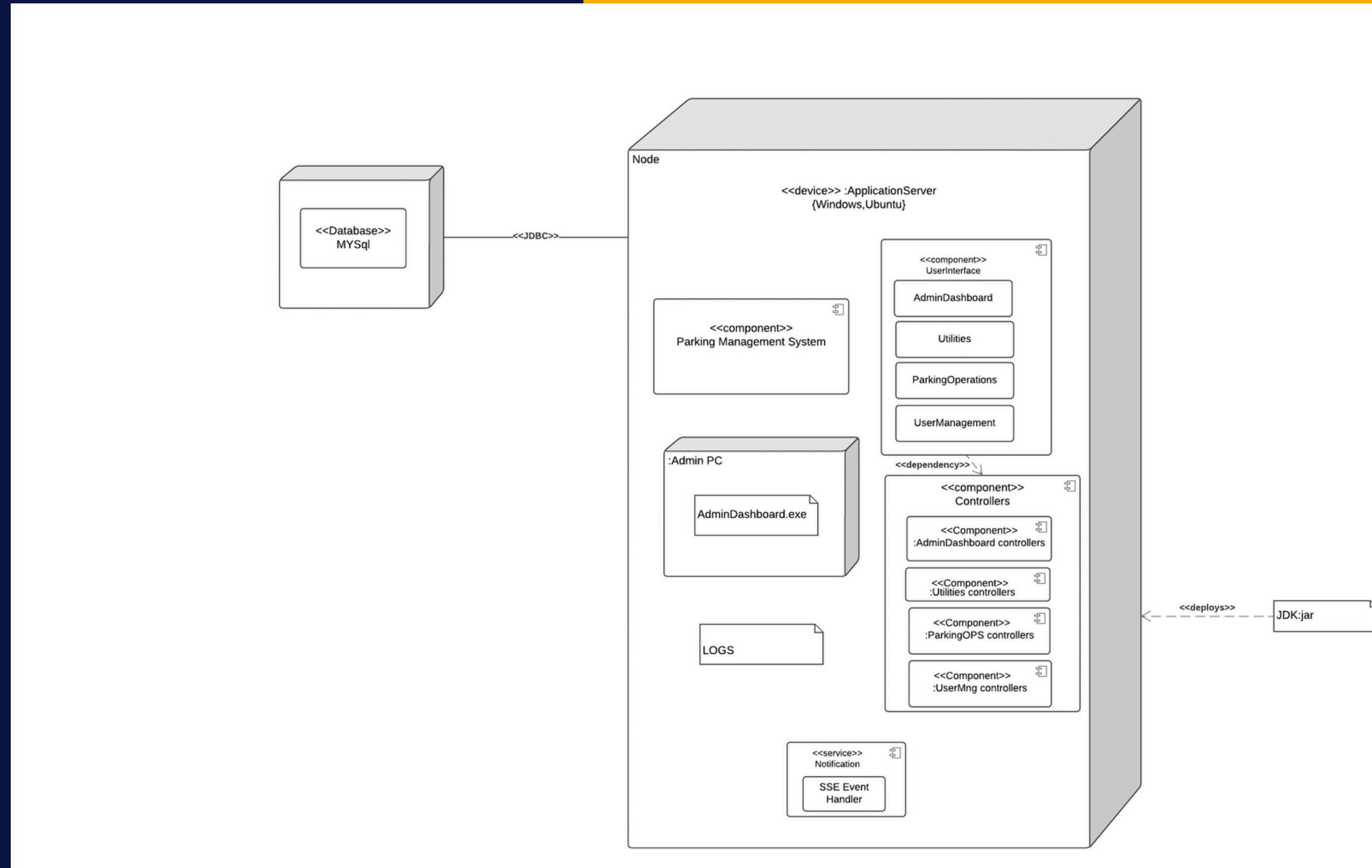
# Packages Diagram



# Component Diagram



# Deployment Diagram



[Dashboard](#) [Pending Registrations](#) [Violations](#) [Feedback](#)

Total Spots

**13**

Available Spots

**9**

Active Sessions

**3**

Total Revenue

**\$25.00**

Pending Approvals

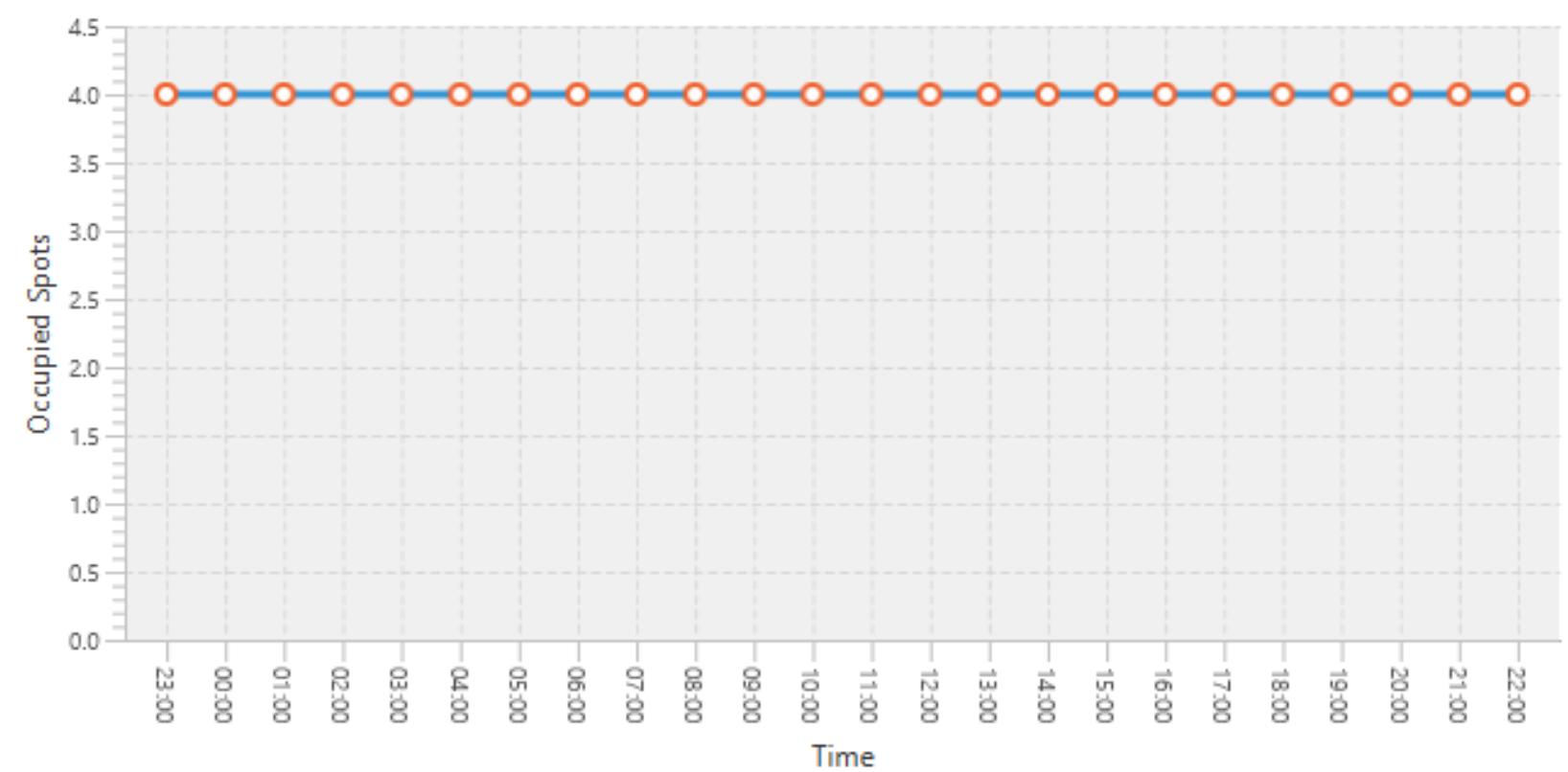
**0**

Active Violations

**0**

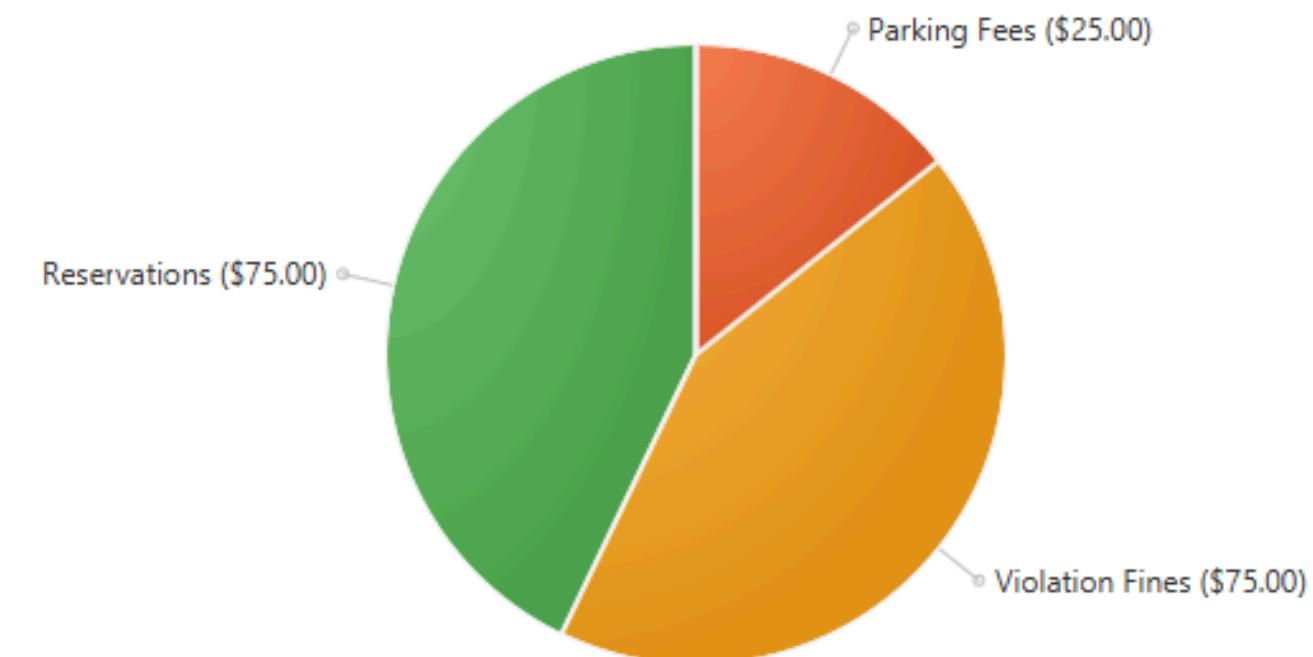
## Occupancy Trend

Parking Occupancy Over Time



## Revenue Distribution

Revenue Distribution



Type here to search

10:21 PM  
11/26/2024

Parking Management System

Parking Exit

### Enter Receipt Details

Receipt Number

Validate Receipt

Back to Main Menu



Type here to search



10:23 PM  
11/26/2024

# Parking Management System

Parking History

Refresh Back to Menu

Time Period

- All Time
- All Time
- Today
- Last 7 Days
- Last 30 Days
- This Month
- Custom Range

Export to CSV

Total Charges: \$0.00

Spot	Vehicle	Duration	Status	Charges	
A1-01	12344	0 hours, 0 minutes	ACTIVE	\$0.00	

Double-click on any row to view detailed information



Type here to search



10:23 PM  
ENG  
11/26/2024

# Parking Management System

## Parking Reservation

### Available Parking Spots

Start Date/Time:   09:00

End Date/Time:   10:00

Floor:  Type:

Available  Occupied  Reserved  Maintenance

### Reservation Details

Vehicle Number:

Selected Spot:

Duration:

Total Charges:

Payment Method:

Cancellation Policy: Free cancellation up to 1 hour before reservation start time. Late cancellations may incur charges.

10:24 PM  
11/26/2024ENGWi-FiBattery

Create New Account

Username

Email

Enter your email

Phone Number

Enter your phone number

Password

Create a password

Confirm Password

Confirm your password

Register