Vehicle Hire System

Coursework 1

Intro to Software Engineering (F28SD)

11/03/2024

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D1: Assumptions and Expectation

Privacy and Data Security

Assumption:
The remit states that sensitive data, such as; card details, personal information, addresses, driver licenses etc., will be stored by the system.
Expectation:

Both internal and external systems will strictly adhere to GDPR and other relevant regulations regarding data protection. Encryption methods will be implemented for both data transfer and storage to ensure the security and confidentiality of sensitive information.

External System Reliability

Assumption:
The remit describes interactions with VALIDATEMYDVL, VALIDATEMYCC and RENTALARCHIVE external services, but doesn't specify anything about availability/reliability of these systems.
Expectation:

In cases where these external systems experience downtime or unavailability, VHS will implement retry mechanisms for transactions. System Administrators will be responsible for monitoring external system reliability and intervening as necessary to maintain data integrity and system functionality.

User Support

Assumption:
The remit doesn't specify how users would acquire assistance and handle errors.
Expectation:

User interfaces will be designed to be intuitive and user-friendly, providing clear instructions for usage. Additionally, users will have access to support staff who are knowledgeable about the system and can provide assistance promptly whenever needed. Error handling mechanisms will be implemented to guide users through any issues they encounter during system operation.

Maintenance and Updates

Assumption:
The remit doesn't specify how the system will be maintained/updated.

Expectation:

System Administrators will be responsible for conducting regular maintenance activities, including bug fixes, security patches, and updates to ensure the system's optimal performance and alignment with company requirements and updated regulations. Regular updates will be implemented to enhance system functionality and address any emerging needs or regulatory changes.

D2: Requirements

Functional

FR1: The VHS shall authenticate users before allowing access to the system.

FR2: The VHS shall allow customers to register by providing personal info and driving license details.

FR3: The VHS shall validate that customers are old enough and have a valid driving license for the category of vehicle they intend to hire.

FR4: The VHS shall validate the customer credit card with VALIDATEMYCC service.

FR5: The VHS shall validate the driver license with VALIDATEMYDVLA service.

FR6: The VHS shall maintain a record of vehicles at the system's corresponding site.

FR7: The VHS shall maintain rental records with references to corresponding vehicle and customer.

FR8: The VHS shall delete internal records once records are archived.

FR9: The VHS shall allow garage technicians to update vehicles mileage data.

FR10: The VHS should allow customers to opt-in what details to be saved by the system.

FR11: The VHS must charge customers for missing fuel and vehicle damage.

Non-Functional

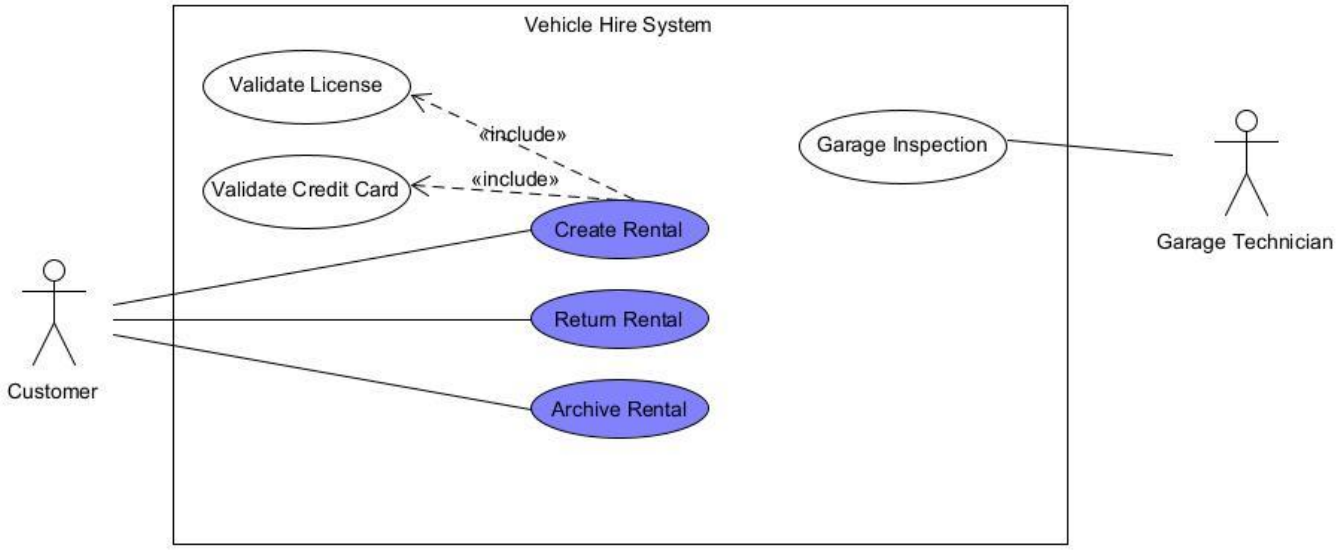
NR1: The VHS must ensure the security of personal information and payment details.

NR2: The VHS must handle concurrent requests to ensure it is functional during peak/busy times.

NR3: The VHS should have an intuitive user interface for users.

NR4: The VHS must comply with GDPR and other relevant regulations and laws.

D3: Use Case Diagram



D4: Use Case Specification

Base Use Case: Create Rental

ID: 1
Goal: To initiate the process of renting a vehicle from the system.
Primary Actor: Customer
Preconditions: The customer is logged into the system.
Postconditions: If successful, a rental record and customer record is created.
Main Flow:

- The customer selects the option to rent a vehicle.
- The system displays available vehicles.
- The customer selects a vehicle.
- The system prompts the customer for a driving license and credit card details.
- The customer provides driving license and credit card details.
- The system validates the driving license using VALIDATEMYDVL and the credit card using VALIDATEMYCC.
- If validation passes, a rental record is created.

Alternative Flows:

- 1a) If driving license validation fails, the system informs the customer and cancels the rental process.
- 1b) If credit card validation fails and the customer opted to store credit card details, the system prompts for another payment method or cancels the rental process.

- 1c) If the customer opts not to provide credit card details for future rentals, a rental record is created without storing credit card information.

Base Use Case: Return Rental

ID: 2
Goal: To finalize the rental process when the customer returns the vehicle.
Primary Actor: Customer
Secondary Actor: Garage Technician
Preconditions: The customer has rented a vehicle.
Postconditions: The rental process for the returned vehicle is completed.
Main Flow:

- The customer returns the rented vehicle to the rental site.
- The garage technician selects the option to process vehicle return.
- The system prompts the technician to input current mileage and inspect the vehicle for missing fuel and damages.
- The technician updates the rental record with inspection details.

Alternative Flows:

- 2a) If vehicle inspection reveals missing fuel, the system charges the customer's credit card accordingly.
- 2b) If vehicle inspection reveals damages, the system charges the customer's credit card for repair costs.

Base Use Case: Archive Rental

ID: 3
Goal: To archive completed rental records to an external system for storage.
Primary Actor: System
Preconditions: It is 23:59
Postconditions: Completed rental records are stored externally, and internal rental records are deleted.
Main Flow:

- The system initiates the archiving process daily at 23:59.
- The system retrieves rental records completed within the last 24 hours.
- The system sends relevant customer and vehicle information to RENTALARCHIVE.
- The system deletes corresponding internal rental records.

Alternative Flows:

- 3a) If data transfer to RENTALARCHIVE fails, the system retries the transfer or logs the failure for manual intervention by the system administrator.

Auxiliary Use Case: Validate License

ID: 4
Goal: To validate the driving license details provided by the customer.

Primary Actor: System
Preconditions: The customer provided a driving license in Base Case 1.
Postconditions: The rental process proceeds based on the validation result.
Main Flow:

- The system receives driving license details from the customer.
- The system sends driving license details to VALIDATEMYDVL for validation.
- VALIDATEMYDVL responds with a validation result.
- The system updates the rental process accordingly based on the validation result.

Alternative Flows:

- 4a. If VALIDATEMYDVL is unavailable, the system retries the validation or informs the system administrator of the temporary validation outage.

Auxiliary Use Case: Validate Credit Card

ID: 5
Goal: To validate the credit card details provided by the customer.
Primary Actor: System
Preconditions: The customer provided a credit card in Base Case 1.
Postconditions: The rental process proceeds based on the validation result.
Main Flow:

- The system receives credit card details from the customer.
- The system sends credit card details to VALIDATEMYCC for validation.
- VALIDATEMYCC responds with a validation result.
- The system updates the rental process accordingly based on the validation result.

Alternative Flows:

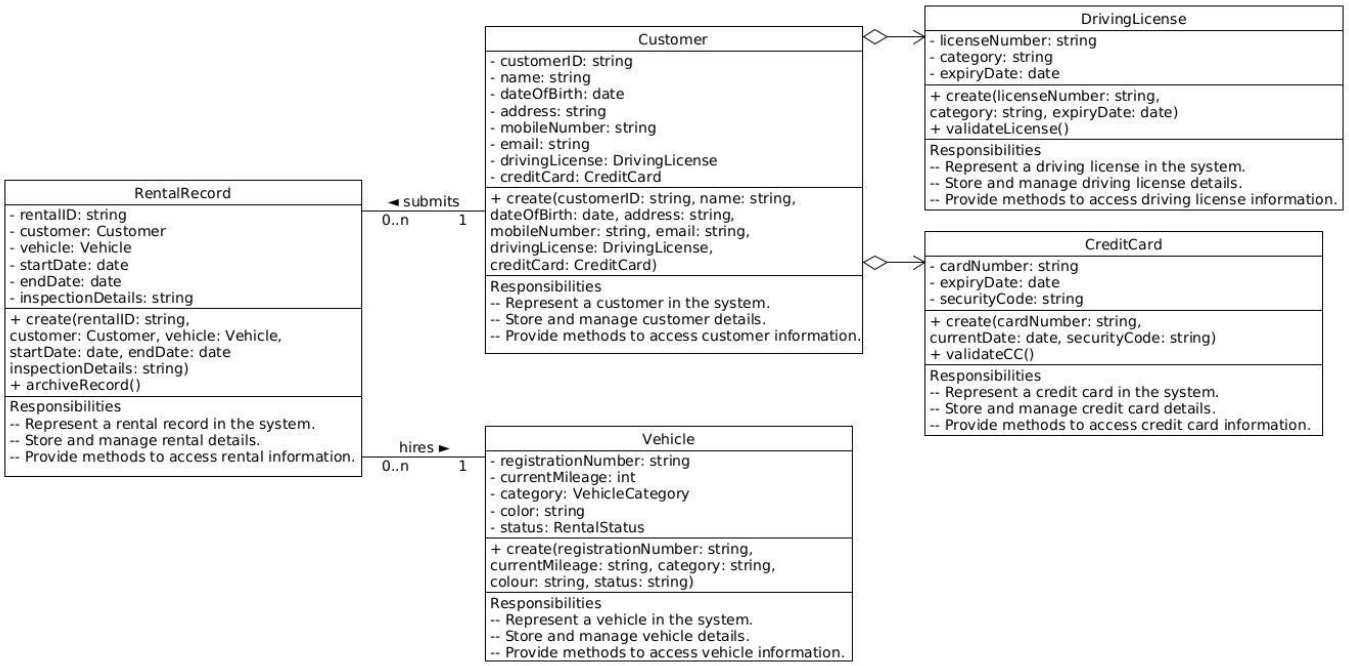
- 5a. If VALIDATEMYCC is unavailable, the system retries the validation or informs the system administrator of the temporary validation outage.

D5: Traceability Matrix

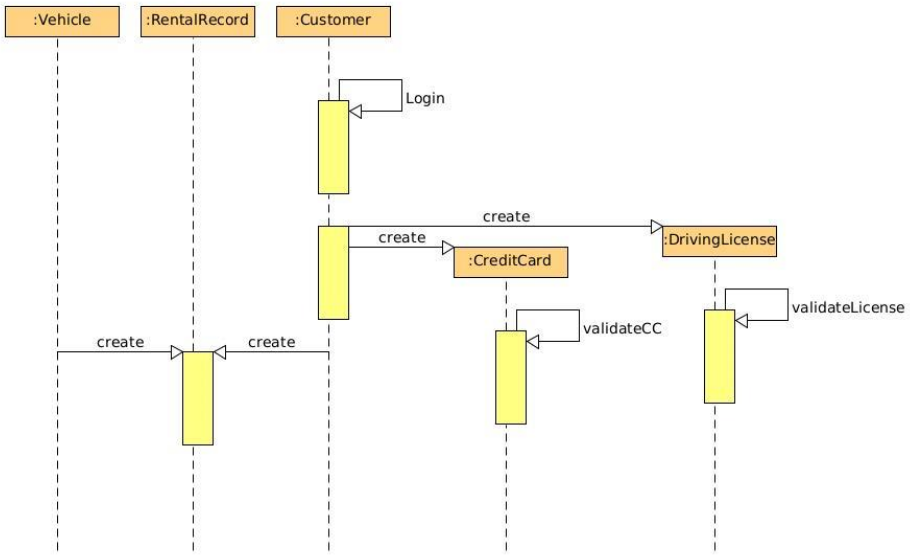
	UC1	UC2	UC3	UC4	UC5
FR1	X				
FR2	X				
FR3	X				X
FR4	X			X	
FR5	X				
FR6		X			
FR7	X				

FR8			X		
FR9		X			
FR10	X				
FR11		X			

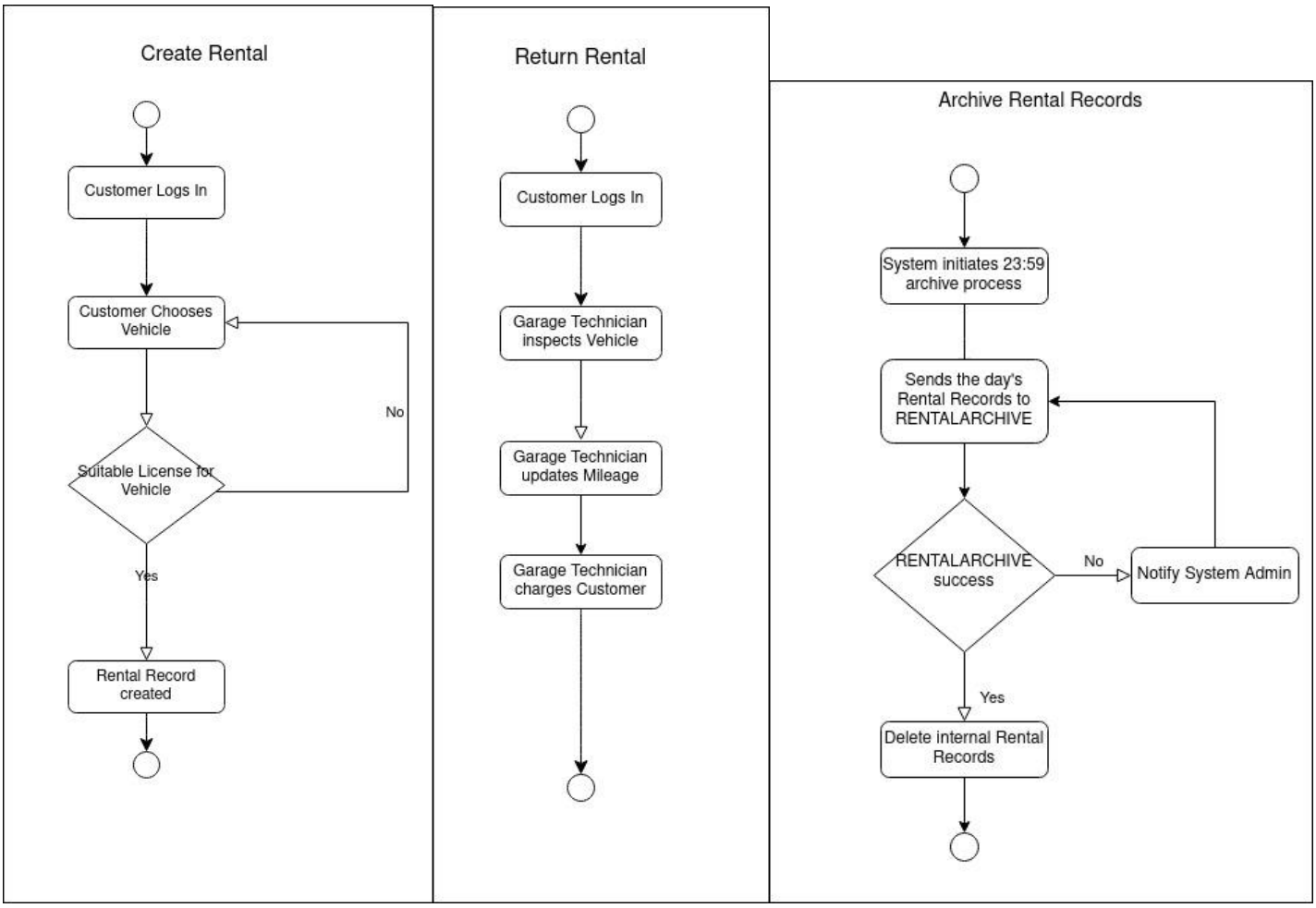
D6: Class Diagram



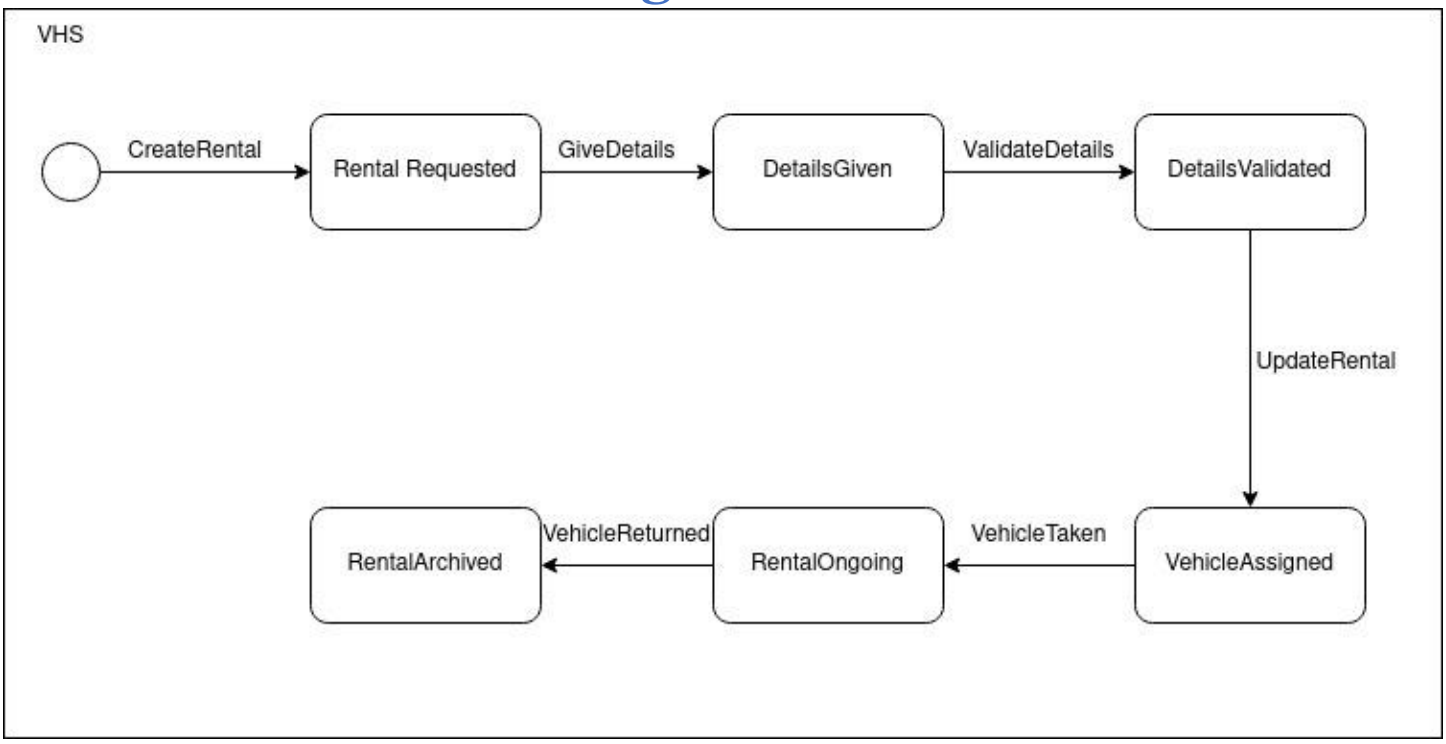
D7: Sequence Diagram



D8: Activity Diagram



D9: State Machine Diagram



D10: Scenario Test Cases

Path	Comment	Path Condition
1	Customer logs in and provides valid details	• Logs in successfully, credit card and license data are valid
2	Customer logs in and provides invalid credit card details	• Logs in successfully, credit card data is invalid
3	Customer logs in and provides invalid license details	• Logs in successfully, license data is invalid
4	Customer logs in and provides invalid credit card AND license details	• Logs in successfully, credit card and license data are invalid