

VEHICLE HIRE SYSTEM (VHS)

F28SD

INTRODUCTION TO SOFTWARE ENGINEERING

COURSEWORK1

DATE OF SUBMISSION – 11/03/2024

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T1 - ASSUMPTIONS

1. The touch system interface can have a virtual assistance for helping customers to rent easily.
 2. Each VHS touch interface is interlinked between each other in such a way that people can rent from different locations.
 3. Discounts can be provided based on the credit card the customer has.
 4. A seasonal price can be there for each vehicle type based on seasons.
 5. The system allows the addition of extra drivers under the main driver's name for a rented vehicle.
 7. The touch interface provides information on the availability of vehicles based on the specified start and end dates during the booking process.
 8. In case a rental request is declined due to a license mismatch or other reasons, both the MyDVL and VALIDATEMYCC services inform the customer about the declined request.
 9. During the booking process via the touch interface, VHS verifies the validity of provided details such as a mobile number, email address, etc.
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EXPECTATIONS

1. To initiate a vehicle rental, customers must possess a valid driving license.
 2. A successful vehicle rental requires customers to present a valid credit card with a valid expiry date.
 3. Customers are expected to return rental vehicles with a full tank of petrol.
 4. Customers should have seamless access to the VHS touch screen interface without any hindrance.
 5. To rent a vehicle, customers must provide accurate details, including a valid driving license and credit card information.
 6. The rental process is considered successful only if the rented vehicle undergoes inspection by garage technicians. Inspections are crucial for finalizing the rental.
 7. The touch screen interface provides a textual explanation of the availability status of vehicles, including whether they are available for rent or under service.
 8. . Customers are subject to a minimum age requirement; individuals below this age cannot rent a vehicle.
 9. VALIDATEMYDVL, and VALIDATEMYCC must approve the customer's provided details to enable them to rent a vehicle successfully.
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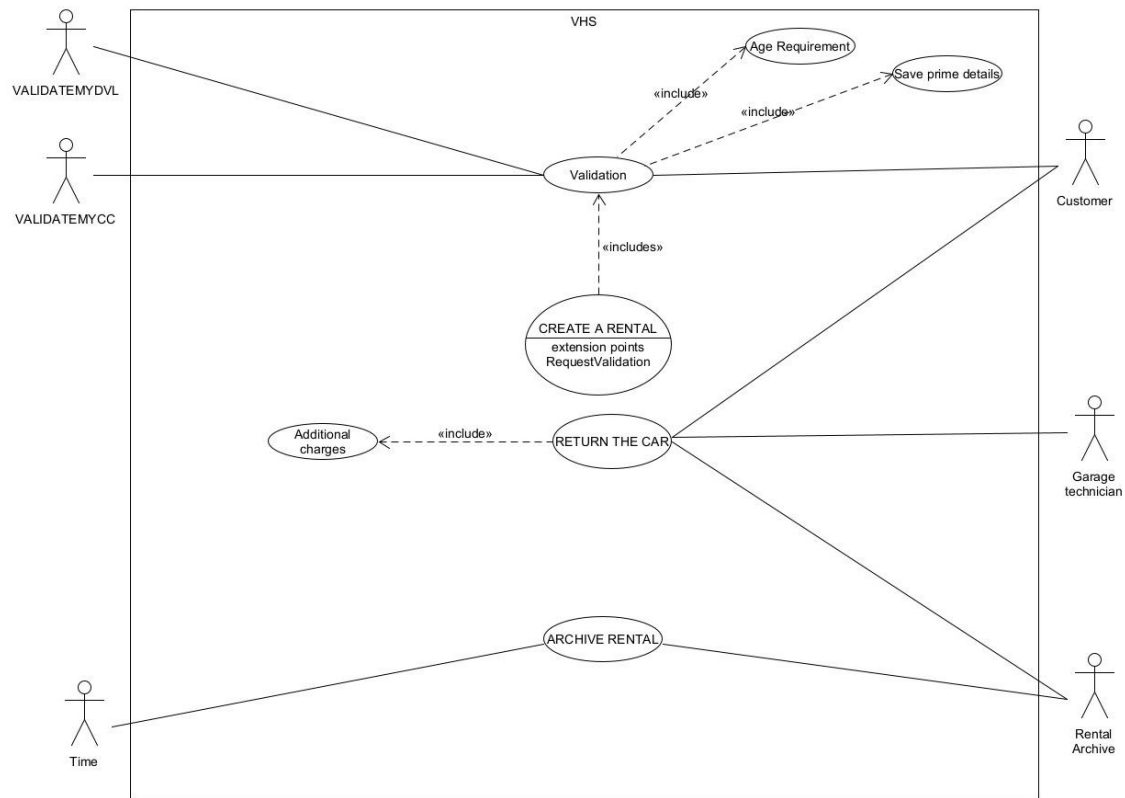
T2 - FUNCTIONAL REQUIREMENTS

Id	Description	Priority
FR1	The VHS system should delete the corresponding records once the transfer is done successfully.	M
FR2	The garage technician should inform and charge the customer if there is any damage or missing fuel.	M
FR3	If the car is out of service, then the VHS system shall mention that the car is out of service.	M
FR4	The VHS system shall have an approval from both VALIDATEMYCC and VALIDATEMYDVL for allowing the customer to rent the vehicle.	M
FR5	If the credit card is expired, then the VALIDATEMYCC system shall reject the credit card.	M
FR6	If the customer has a Category B driving license, then EASYRENTAL LTD shall allow the customer to rent a car.	M
FR7	If the required documents and details are given, then VALIDATEMYDVL system shall accept or reject them checking if the details are valid or not.	M
FR8	The VHS system should archive the rental record completed within the last 24 hrs daily when its 23:59.	M
FR9	The VHS system shall allow customers to save their credit details if they are fine with it.	S

NON FUNCTIONAL REQUIREMENTS

Id	Description	Priority
NFR1	The VHS system shall work 24/7.	M
NFR2	The VHS system should ensure a encryption for sensitive data for a secure transactions	M

T3 - USE CASE DIAGRAM



USE CASE SPECIFICATION

Use Case : Create a Rental
Id: 1
Goal: To rent a car
Primary Actor: Customer
Secondary Actor: VALIDATEMYCC , VALIDATEMYDVL
Preconditions: The customer must provide the required details (prime details , credit card details and valid driving license) to rent a vehicle.
PostConditions: The customer successfully rents a vehicle
MainFlow: 1. Customer uses the VHS touch interface. 2. Include(Validation) 3. Customer does a successful transaction for booking and renting the car. 4. Customer successfully rents a vehicle.
Alternative Flow: 1a.Customer faces hard time accessing the VHS interface. <u>-The customer gets external support.</u> <u>-Proceeds to process 2 .</u> 3a.Customers transaction fails. <u>-This must have happened because of technical glitch or network issue.</u> <u>-perform process 6 again.</u>

Use Case: Validation

Id: 2

Goal: To Validate the details given by Customer

Primary Actor: Customer

Secondary Actor: VALIDATEMYCC , VALIDATEMYDVL

Preconditions: The customer provides his details to both VALIDATEMYCC and VALIDATEMYDVL

PostConditions: The customer gets his details validated and approved for renting a vehicle

MainFlow:

1. Customer uses the VHS touch interface.
2. Customer provides the required details to VALIDATEMYCC and VALIDATEMYDVL.
3. Customer gets his credit card details approved from VALIDATEMYCC.
4. Customer gets his driving license details approved from VALIDATEMYDVL.
5. Customer can now proceed to rent a vehicle.

Alternative Flow:

1a. Customer faces hard time accessing the VHS interface.

-The customer gets external support.

-Performs process 2 again.

2a. Customer fails to send any one of the required document by mistake.

-The respective external system rejects the overall request

-Sends a comment for the missing document

-Performs process 2 again.

3a. Customer's driving license gets rejected because driving license number might be an invalid one.

-The reason can be maybe the customer might have missed any number from the alphanumeric number.

-Perform process 2 again.
-then gets verified in process 3.

4a. Customer's credit card gets rejected because the given credit card number might be an invalid one.

-The reason can be maybe the customer might have missed any number from the credit card

-Perform process 2 again
-then gets verified in process 4.

Use Case: Age Requirement

Id: 3

Goal: To verify if customer meets the age requirement for renting the vehicle

Primary Actor: Customer

Secondary Actor: VALIDATEMYDVL

Preconditions: The customer provides his driving license to VALIDATEMYDVL.

PostConditions: VALIDATEMYDVL approves the driving license

MainFlow:

1. Customer uses the VHS touch interface.
2. Customer provides his age details
3. Customer provides the required details and driving license to VALIDATEMYDVL.
4. Customer gets his driving license approved from the external system VALIDATEMYDVL.

Alternative Flow:

- 1a. Customer faces hard time accessing the VHS interface.
-The customer gets external support.
-Performs process 2 again.
- 2a. Customer does not meet the minimum age requirement.
-Use case terminates.
- 3a. Customer fails to send any one of the required document by mistake.
-The respective external system rejects the overall request
-Sends a comment for the missing document
-Performs process 2 again.
- 4a. Customer's driving license gets rejected because driving license number might be an invalid one.
-The reason can be maybe the customer might have missed any number

from the alphanumeric number.
-Perform process 2 again.
-then gets verified in process 3.

Use Case : Save Prime Details

Id: 4

Goal: *The Customer saves his primary details in VHS touch interface*

Primary Actor: *Customer*

Secondary Actor: *None*

Preconditions: *Customer inputs his details in VHS touch interface.*

PostConditions: *Customer saves his details VHS touch interface.*

MainFlow:

1. Customer uses the VHS touch interface.
2. Customer provides the required details to the external systems (VALIDATEMYCC and VALIDATEMYDVL) to approve the details provided.
3. Customer completes his verification of details.
4. Customer does a successful transaction with the credit card validated
5. Customer saves his details for later use.

Alternative Flow:

1a. Customer faces hard time accessing the VHS interface.

-The customer gets external support.

-Performs process 2 again.

2a. Customer fails to send any one of the required document by mistake.

-The respective external system rejects the overall request

-Sends a comment for the missing document

-Performs process 2 again.

3a. Either of the external systems rejects their request for renting the vehicle

-This is because of the required document is invalid or missing.

-Perform process 2 again by providing the missing or valid document.

-get validate by the respected external system.
-proceed to 4.

4a. Customers transaction fails.

-This must have happened because of technical glitch or network issue.
-perform process 4 again.

5a. Customer might not want to save his prime details for later use.

-They can decide to not save their prime details.

5b. Customer might not want to save his or her card details for later use.

-The credit card details will be kept until the vehicle is returned and inspected.

-Once all procedures are done and if it's a successful rental, the card details are removed.

Use Case: Return Rental

Id:5

Goal: The rented vehicle must be returned by the customer.

Primary Actor: Customer

Secondary Actor: Garage Technician , Rental Archive

Preconditions: Vehicle must be returned back.

PostConditions: Vehicle must be inspected.

MainFlow:

- 1.The customer returns the vehicle.**
- 2. The vehicle is inspected by the garage technician with the help of VHS touch interface.**
- 3. The vehicle is returned with a full tank.**
- 4. The vehicle does not have any damages.**
- 5. The up-to-date mileage will be noted by the garage technician and details will be sent to rental archive.**
- 6. The rental is done successfully.**

Alternative Flow:

**1a.If the vehicle is not returned on the end date said by the customer.
-the more number of days rented will be counted.**

-the price will be noted down.

-and will be taken from the customers credit card.

3a.If vehicle is not returned with a full tank.

-The amount required for a full tank will be noted.

-And will be taken from the credit card of the customer.

4a.If the vehicle has a damage.

-It will be recorded by the garage technician.

-A corresponding repair charge will be noted.
-The charge and a textual description of the damage will be sent to
Customer.
-and will be taken from the credit card of the customer.

Use Case: Additional Charges

Id: 6

Goal: *To add additional charges if required*

Primary Actor: *Customers*

Secondary Actor: *Garage Technician*

Preconditions: *The vehicle must be returned*

PostConditions: *additional charges must be charged on customer if required.*

MainFlow:

- 1.** *The customer returns the vehicle.*
- 2.** *The vehicle is inspected by the garage technician with the help of VHS touch interface.*
- 3.** *The vehicle is not returned with a full tank.*
- 4.** *The charge for missing fuel must be noted.*
- 5.** *The vehicle has damages*
- 6.** *A textual representation of the damage and repair charge must be noted.*
- 7.** *Both must be claimed from the customers credit card as additional charges.*
- 8.** *The rental is done successfully.*

Alternative Flow:

- 1a.** *If the vehicle is not returned on the end date said by the customer.
-the more number of days rented will be counted.
-the price will be noted down.
-and will be taken from the customers credit card.*
- 3a.** *If vehicle is returned with a full tank.
-No additional charges are needed to be added.*

5a.If the vehicle is returned with no damages.
-No additional charges are needed to be added.

Use Case: Archive Rental

Id: 7

Goal: To save the rentals done

Primary Actor: Time

Secondary Actor: Rental Archive

Preconditions: Time = 23:59

PostConditions: All rentals records must be archived

MainFlow:

- 1. The rental archive collects and identifies all the records done in the last 24hrs provided by Garage technician.**
- 2. The rental archive consists of customer's name, address, vehicle registration number, and rental start date/end date.**
- 3. The time consist of when the record was saved.**
- 4. Both Time and rental archive sends the records to Archive rental.**
- 5. Correctly at 23:59, all rentals that were given by time and rental archive will be archived.**
- 6. Once datas are archived , VHS deletes the corresponding internal rental records**
- 7. Archiving rentals done.**

Alternative Flow:

4a. If rental archive and time fails to deliver records to archive rental.

-The VHS might notify the issue by logging an error.

-notifies the administration.

-tries to retransfer.

4b. If rental archive and time delivers record partially.

-The VHS might notify the issue by logging an error

-notifies the administration abt the partial transfer.

-tries to transfer the rest files again.

5a. If archiving process is delayed.

-the delay in archiving process will be notified to administrator.

-tries to archive again with a notification of when data was saved.

6a. If corresponding datas are not deleted after archiving.

-the administrator will be notified about the failure to delete corresponding data.
-tries to delete again and if not, data will be deleted manually.

T4-TRACEABILITY MATRIX

	<i>UC1</i>	<i>UC2</i>	<i>UC3</i>	<i>UC4</i>	<i>UC5</i>	<i>UC6</i>	<i>UC7</i>
<i>FR1</i>							X
<i>FR2</i>					X	X	
<i>FR3</i>	X						
<i>FR4</i>	X	X	X				
<i>FR5</i>	X	X					
<i>FR6</i>	X	X	X	X			
<i>FR7</i>	X	X	X				
<i>FR8</i>					X		X
<i>FR9</i>		X		X			

```

classDiagram
    class CUSTOMER {
        -idNo : int
        -Name : String
        -Cust Date
        -Address : String
        -LicenseNumber : int
        -DrivingLicense : String
        +create(idNo : int, Name : String, Cust Date, Address : String, LicenseNumber : int, EMailid : String, DrivingLicense : String)
        +getIdNo() : int
        +getName() : String
        +getCust() : Date
        +getAddress() : String
        +getLicenseNumber() : int
        +getEMailId() : String
        +getDrivingLicense() : String
        +isLicenseValid() : Boolean
        +CustomerDetails() : String
        +CustomerDetails() : String
        Rents Vehicle from VHS
    }

    class VALIDATEPROVL {
        -Name : String
        -Address : String
        -DrivingLicense : String
        +create(Name : String, Address : String, DrivingLicense : String)
        +getName() : String
        +getAddress() : String
        +getDrivingLicense() : String
        +isLicenseValid() : Boolean
        +isDrivingLicense() : Boolean
        +DrivingLicenseDetail() : String
        Validates Driving License
    }

    class VALIDATEMYCC {
        -Name : String
        -CardNumber : int
        -ExpiryNumber : int
        -SecurityCode : int
        +create(Name : String, CardNumber : int, ExpiryNumber : int, SecurityCode : int)
        +getName() : String
        +getCardNumber() : int
        +getExpiryNumber() : int
        +getSecurityCode() : int
        +isCardValid() : Boolean
        +isExpCardValid() : Boolean
        +CreditCardDetail() : String
        Validates Credit Card
    }

    class VHS {
        -Name : String
        -idNo : int
        -Start Date
        -End Date
        +create(Name : String, idNo : int, StartDate : Date, EndDate : Date)
        +getName() : String
        +getIdNo() : int
        +getStartDate() : Date
        +getEndDate() : Date
        +isRentValid() : Boolean
        +RentDetails() : String
        +RentDetails() : String
        Is the touch interface
    }

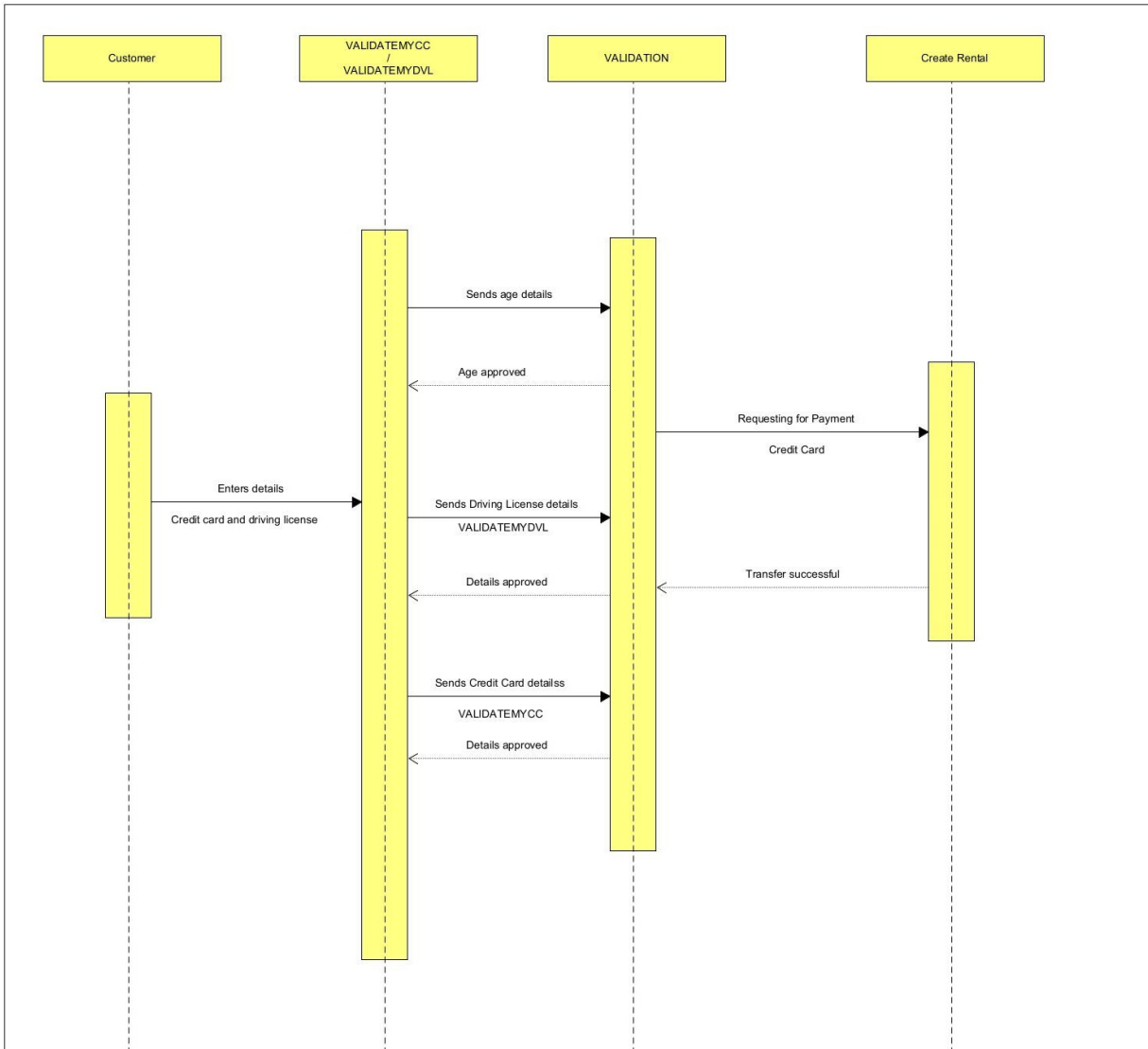
    class GARAGE TECHNICIAN {
        -Name : String
        -VehicleRegistrationNumber : int
        -idNo : Date
        -Category : String
        -Damage : Boolean
        -Missing : Boolean
        +create(Name : String, VehicleRegistrationNumber : int, EndDate : Date, idNo : Date, Category : String, Damage : Boolean, Missing : Boolean)
        +getName() : String
        +getVehicleRegistrationNumber() : int
        +getIdNo() : Date
        +getCategory() : String
        +getDamage() : Boolean
        +getMissing() : Boolean
        +isVehicleOnDisplay() : Boolean
        +DamageReport : String
        +MissingReport : String
        +MissingReport : String
        Inspects The Vehicle
    }

    class RENTAL ARCHIVE {
        -Name : String
        -Address : String
        -VehicleRegistrationNumber : int
        -StartDate : Date
        -EndDate : Date
        +create(Name : String, Address : String, VehicleRegistrationNumber : int, StartDate : Date, EndDate : Date)
        +getName() : String
        +getAddress() : String
        +getVehicleRegistrationNumber() : int
        +getStartDate() : Date
        +getEndDate() : Date
        +getCard : Date
        +CreditCardDetail() : String
        +DrivingLicenseDetail() : String
        +CustomerDetails() : String
        +TimeDetails() : String
        +VehicleRecords() : String
        Archives Rental with Time
    }

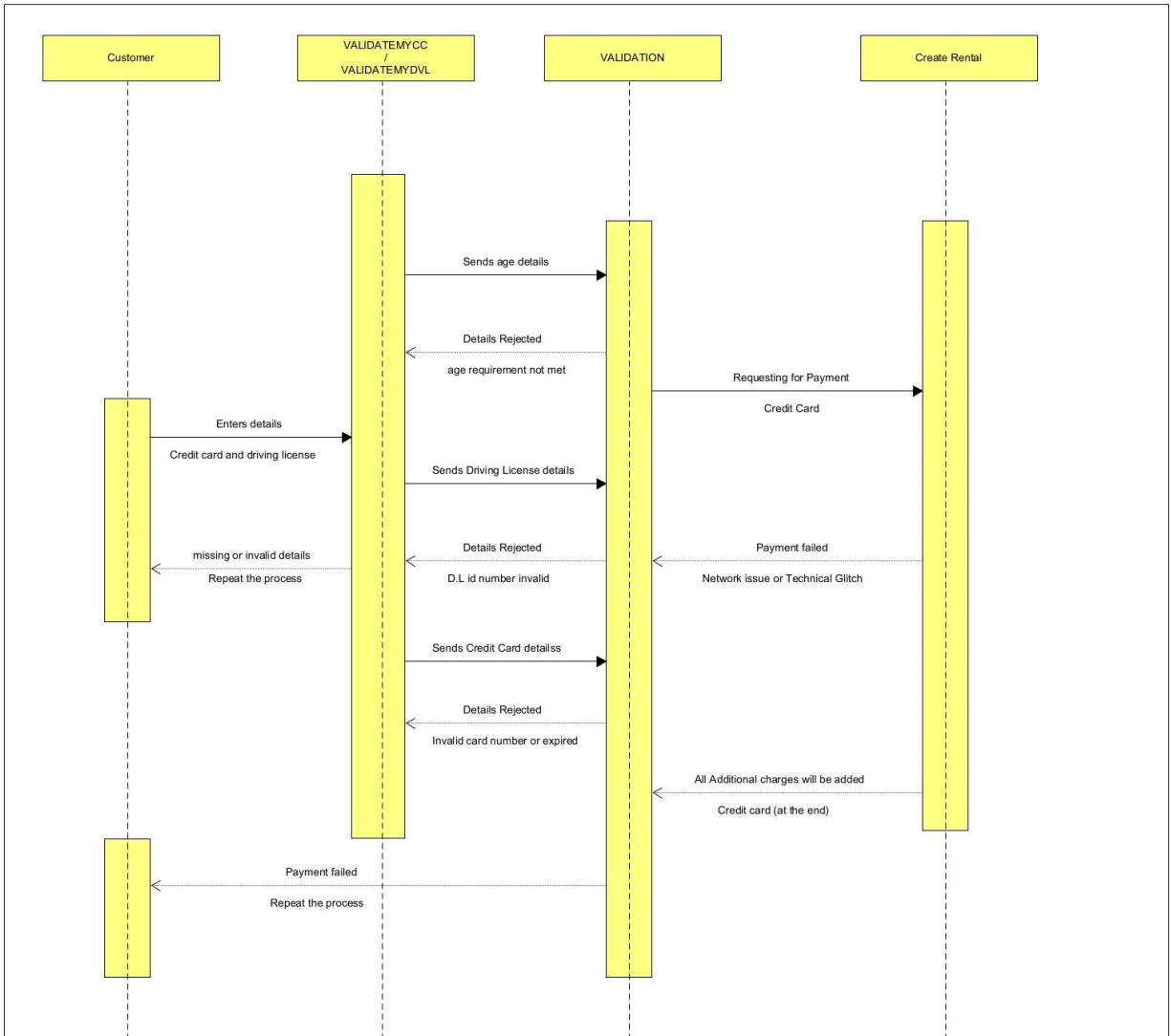
    class TIME {
        -Hour : int
        -Minute : int
        -Second : int
        +create(Hour : int, Minute : int, Second : int)
        +getHour() : int
        +getMinute() : int
        +getSecond() : int
        +TimeDetail() : String
        Records the time of each successful rental stored
    }

    CUSTOMER "1" -- "1" VALIDATEPROVL : Provides Driving License
    CUSTOMER "1" -- "1" VALIDATEMYCC : Provides Credit Card
    VALIDATEPROVL "1" -- "1" VHS : Validates
    VALIDATEMYCC "1" -- "1" VHS : Validates
    GARAGE TECHNICIAN "M..1" -- "1..M" VHS : Inspects
    CUSTOMER "1..M" -- "1..M" VHS : Is the touch interface
    CUSTOMER "1..M" -- "1..M" RENTAL ARCHIVE : Archives at 23:59
    RENTAL ARCHIVE "1..M" -- "1..M" TIME : Associated
  
```

T6-SEQUENCE DIAGRAM

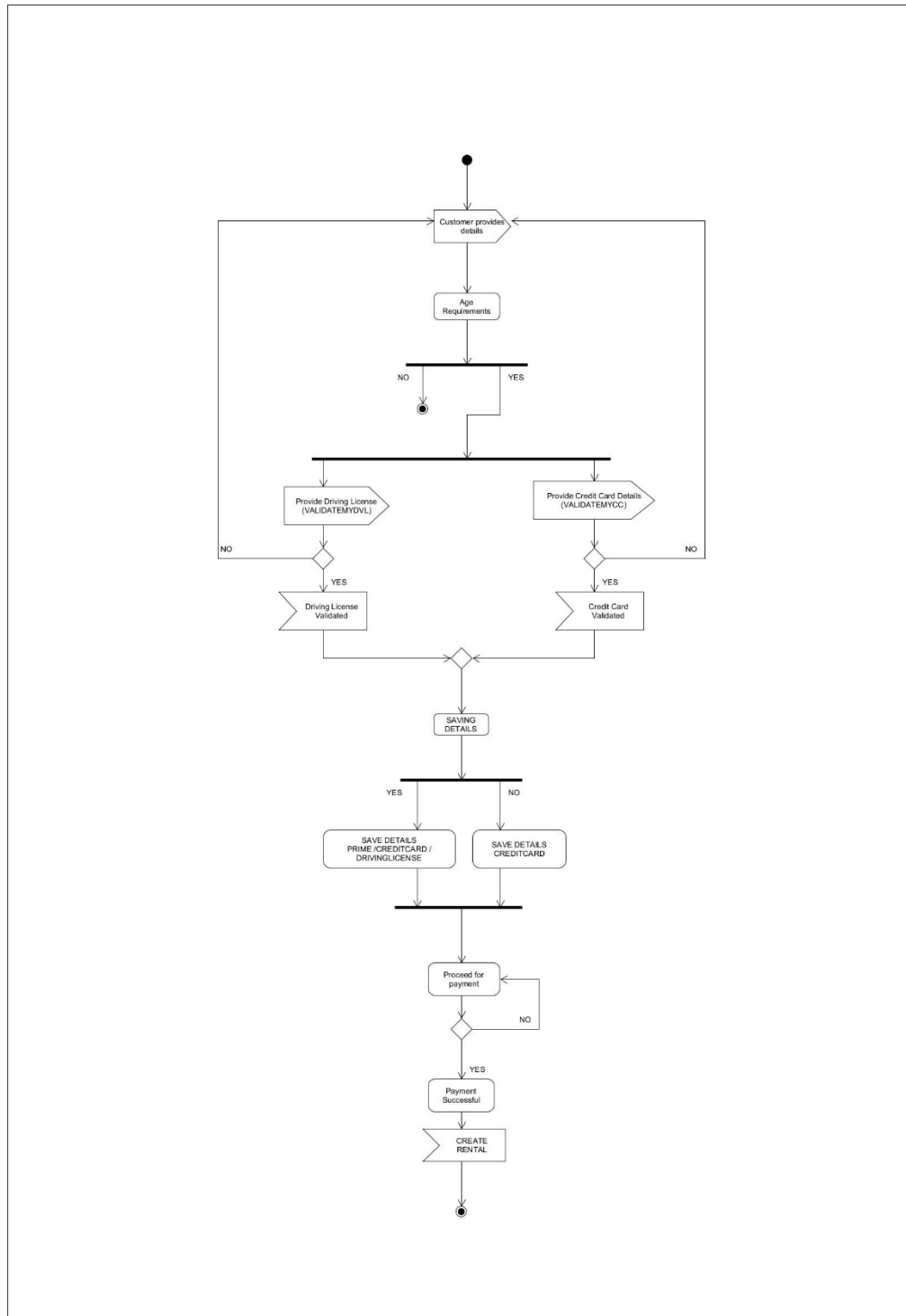


MAIN FLOW

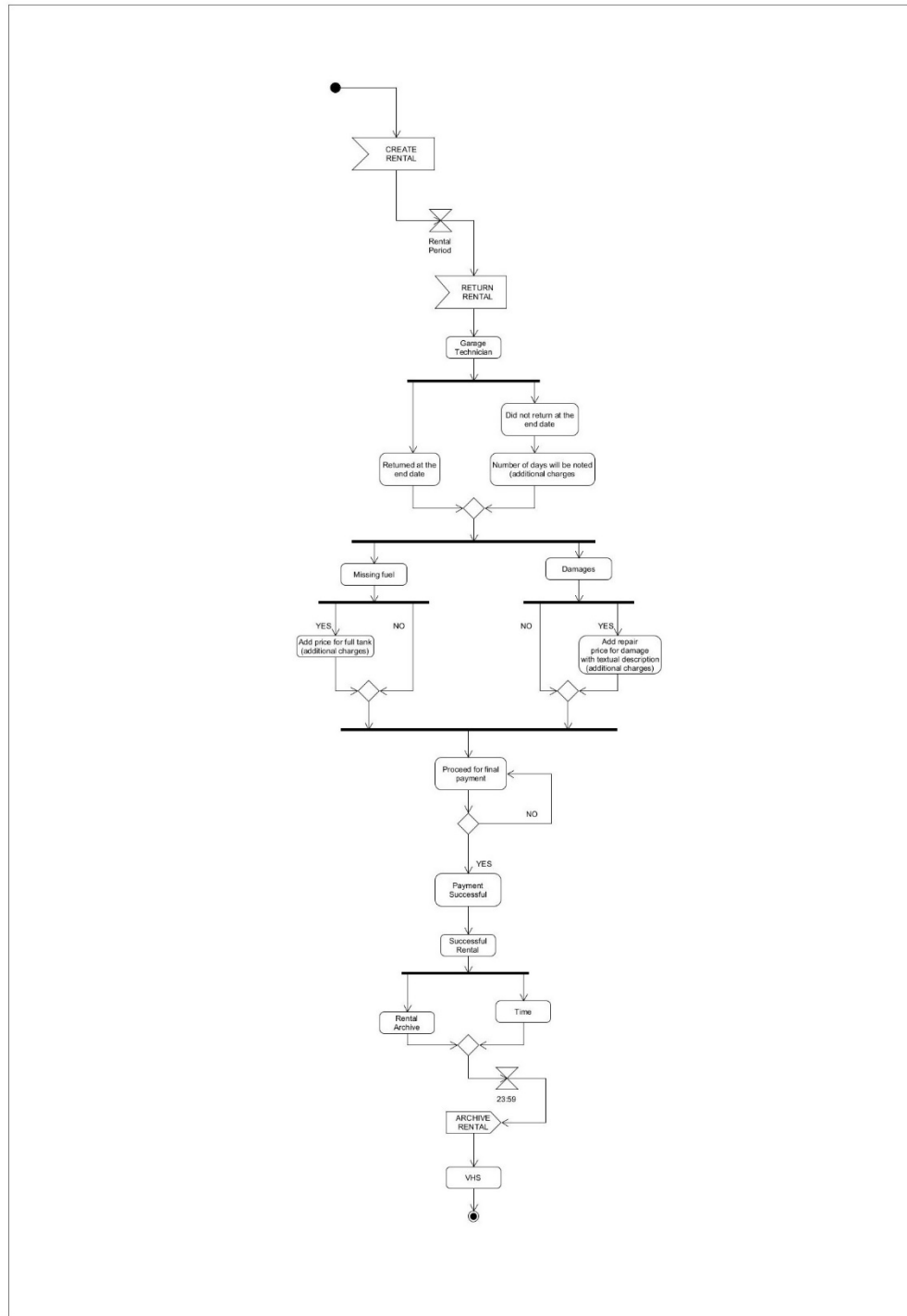


ALTERNATIVE FLOW

T7-ACTIVITY DIAGRAM

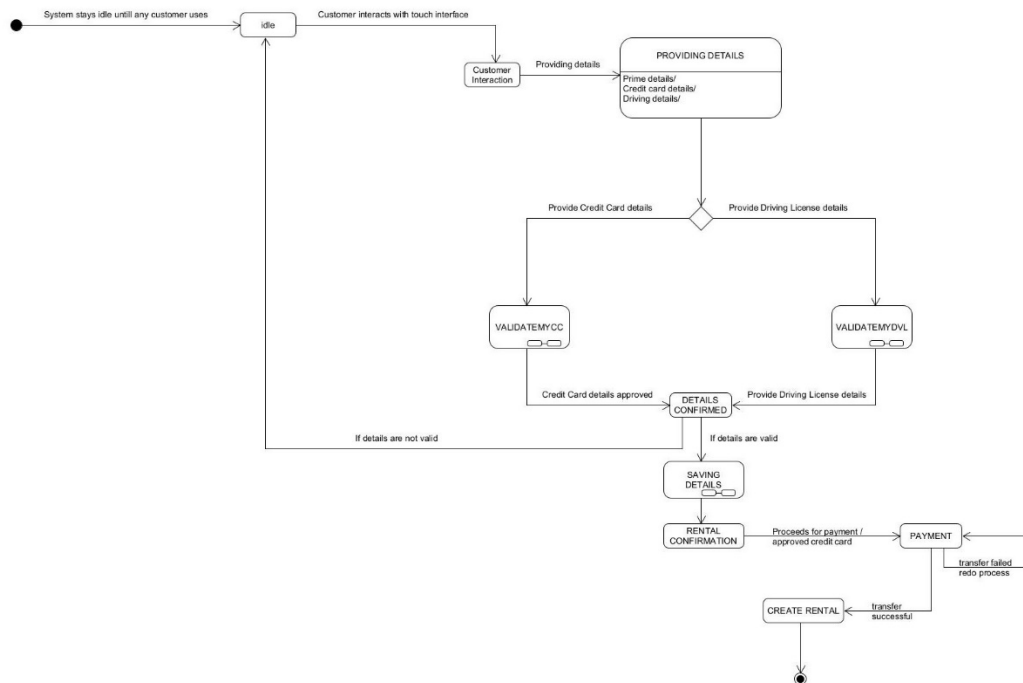


CREATING RENTAL

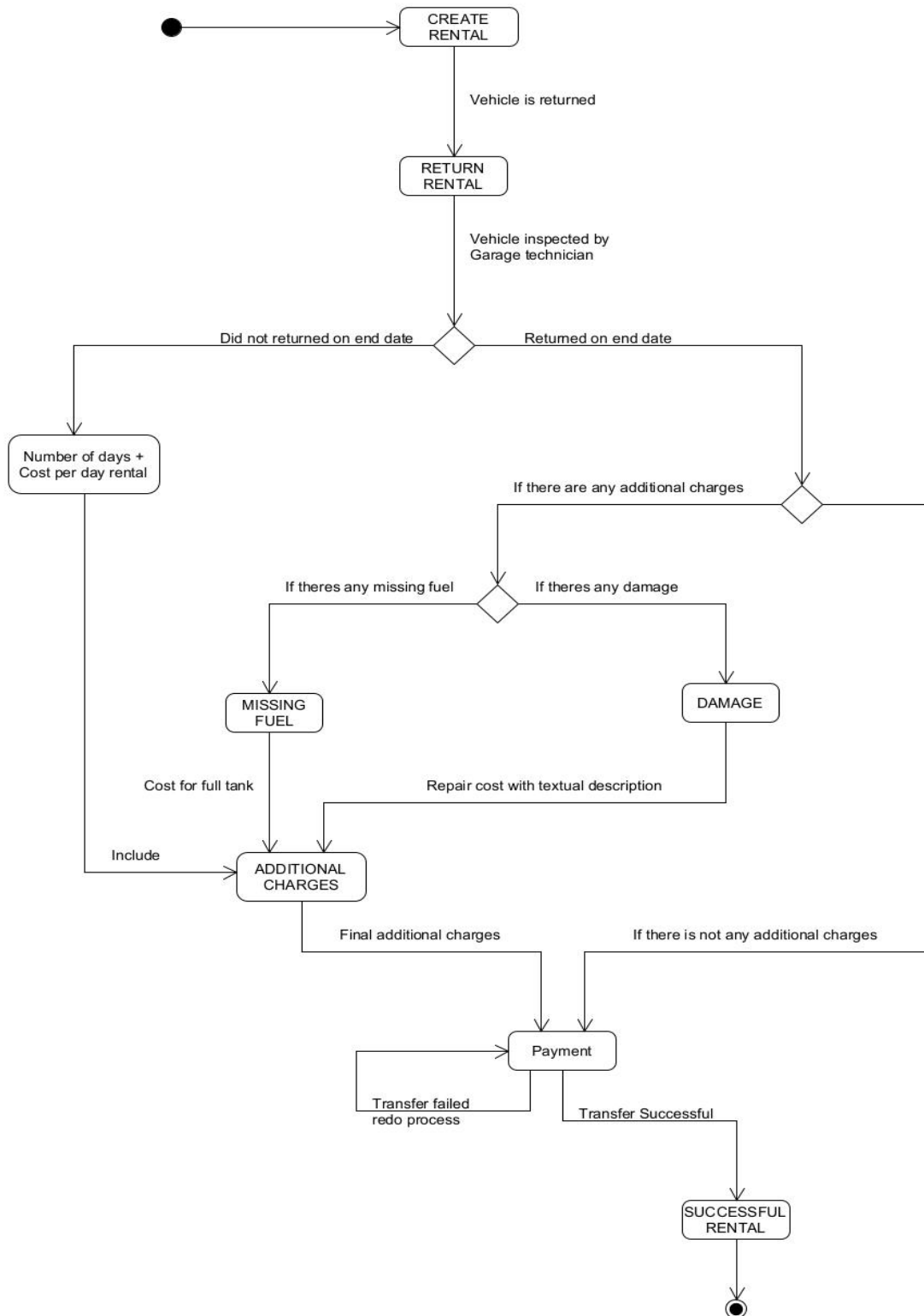


RETURN RENTAL AND ARCHIVE RENTAL

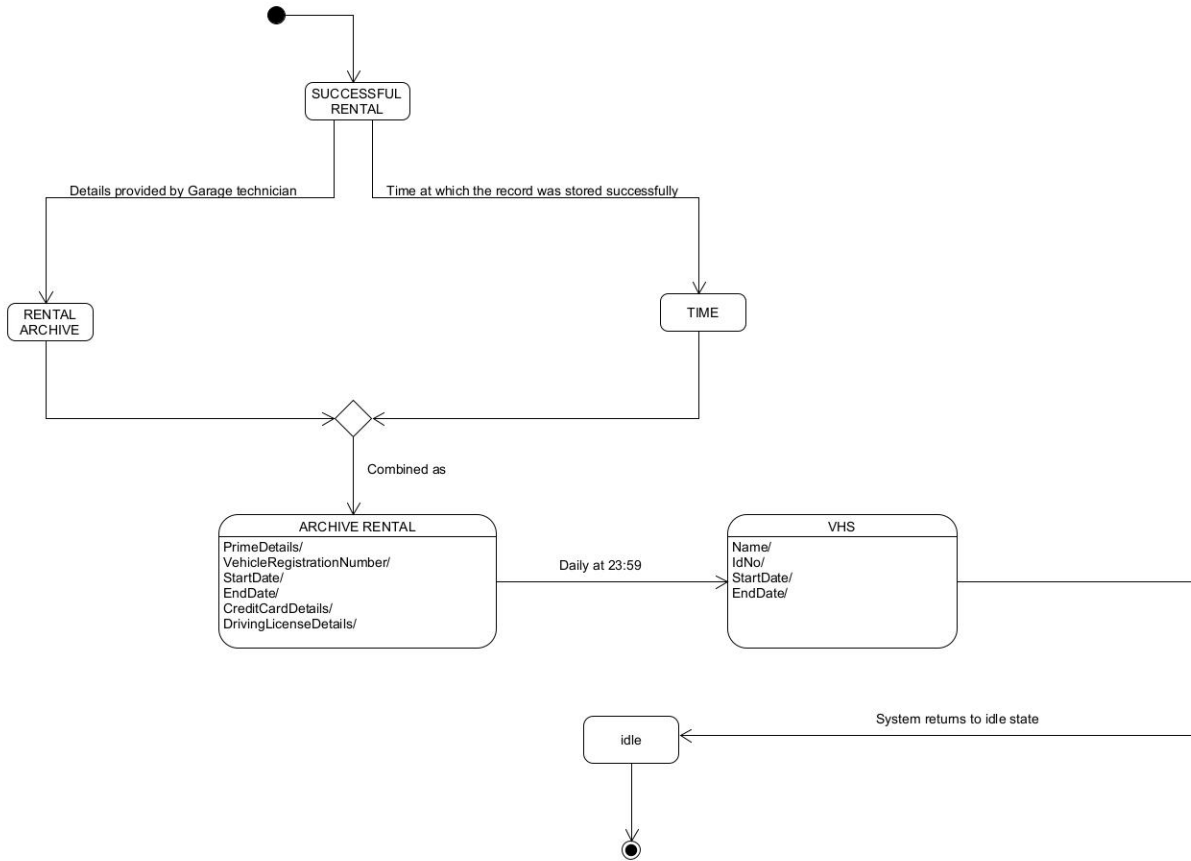
T8-STATE DIAGRAM



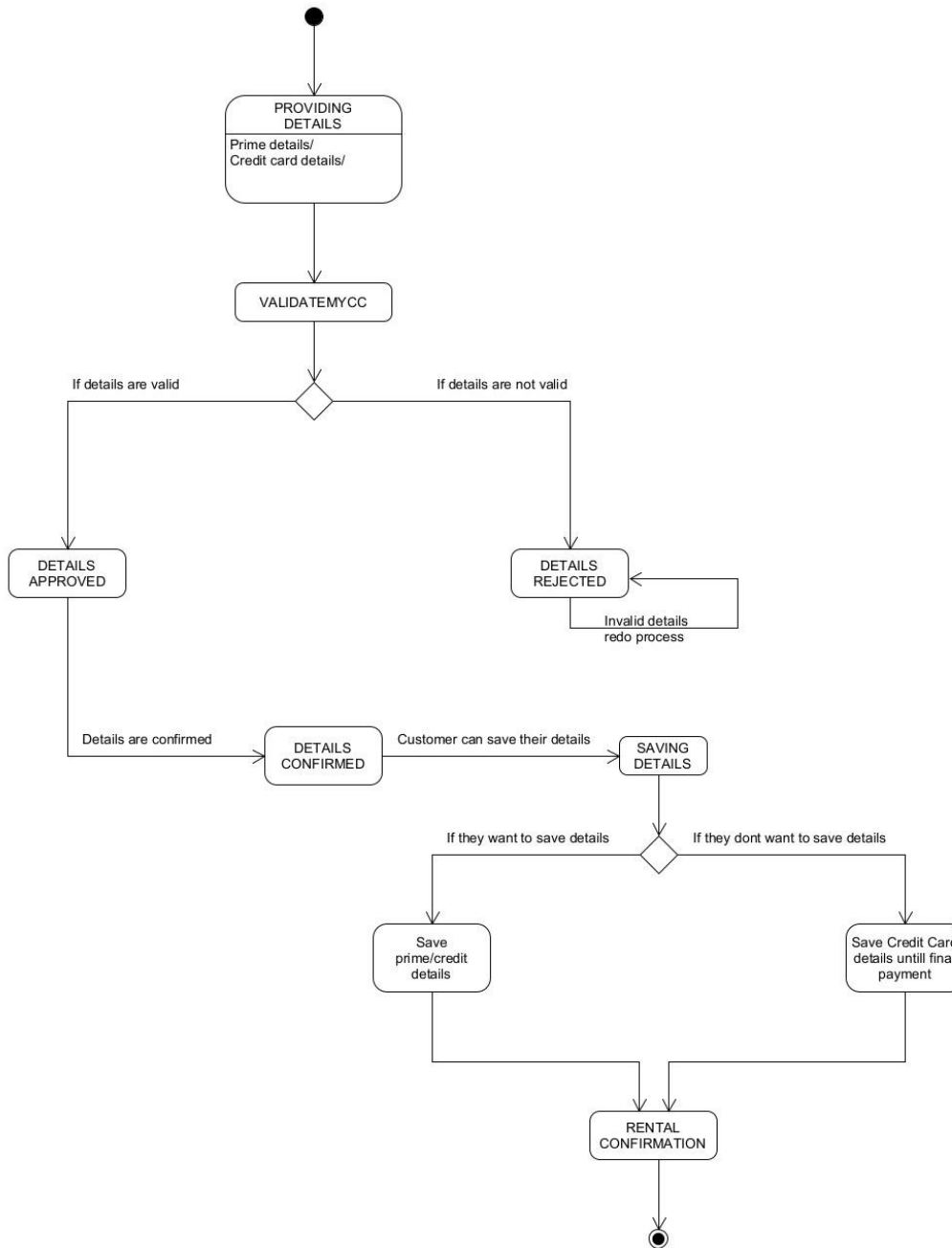
CREATE RENTAL



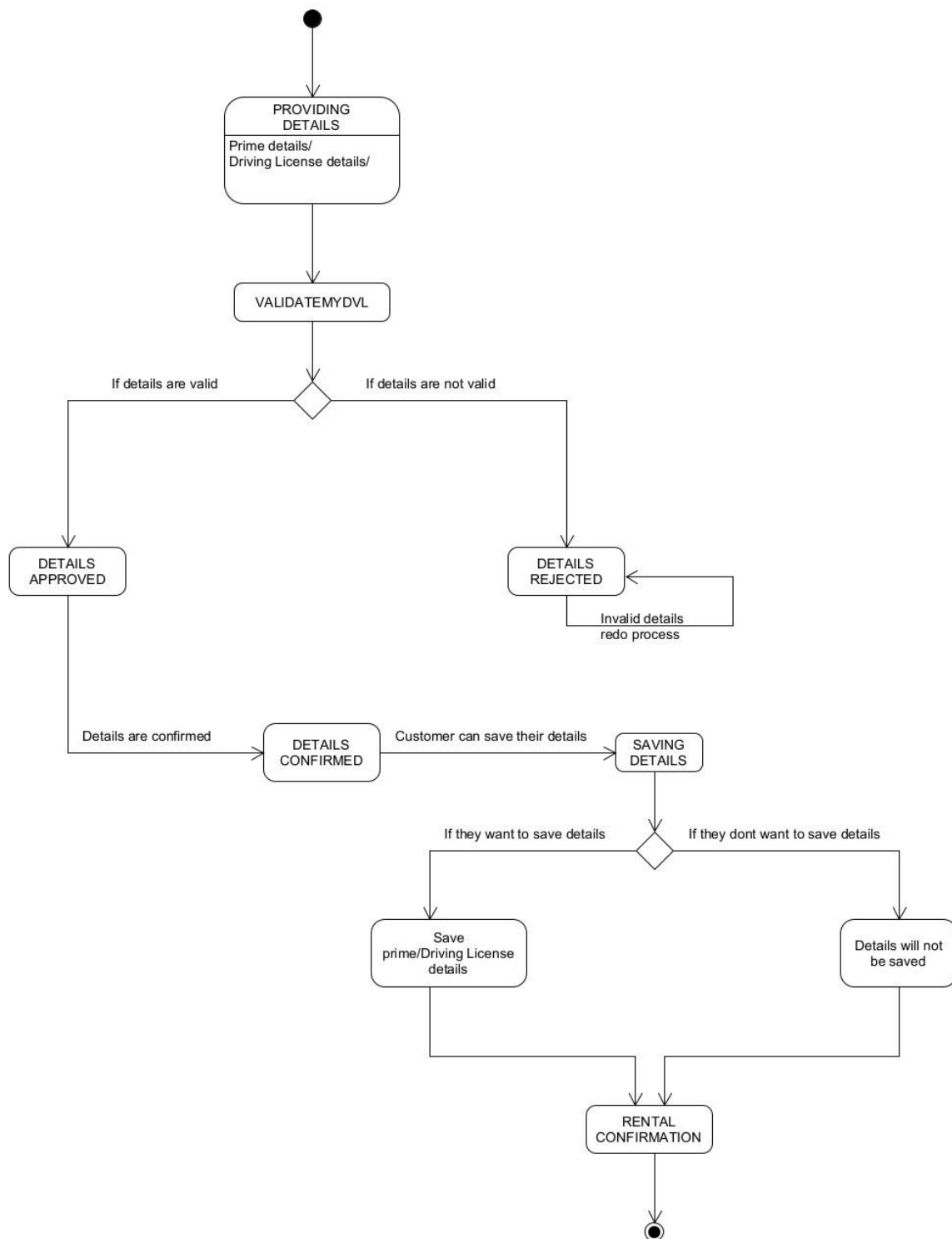
RETURN RENTAL



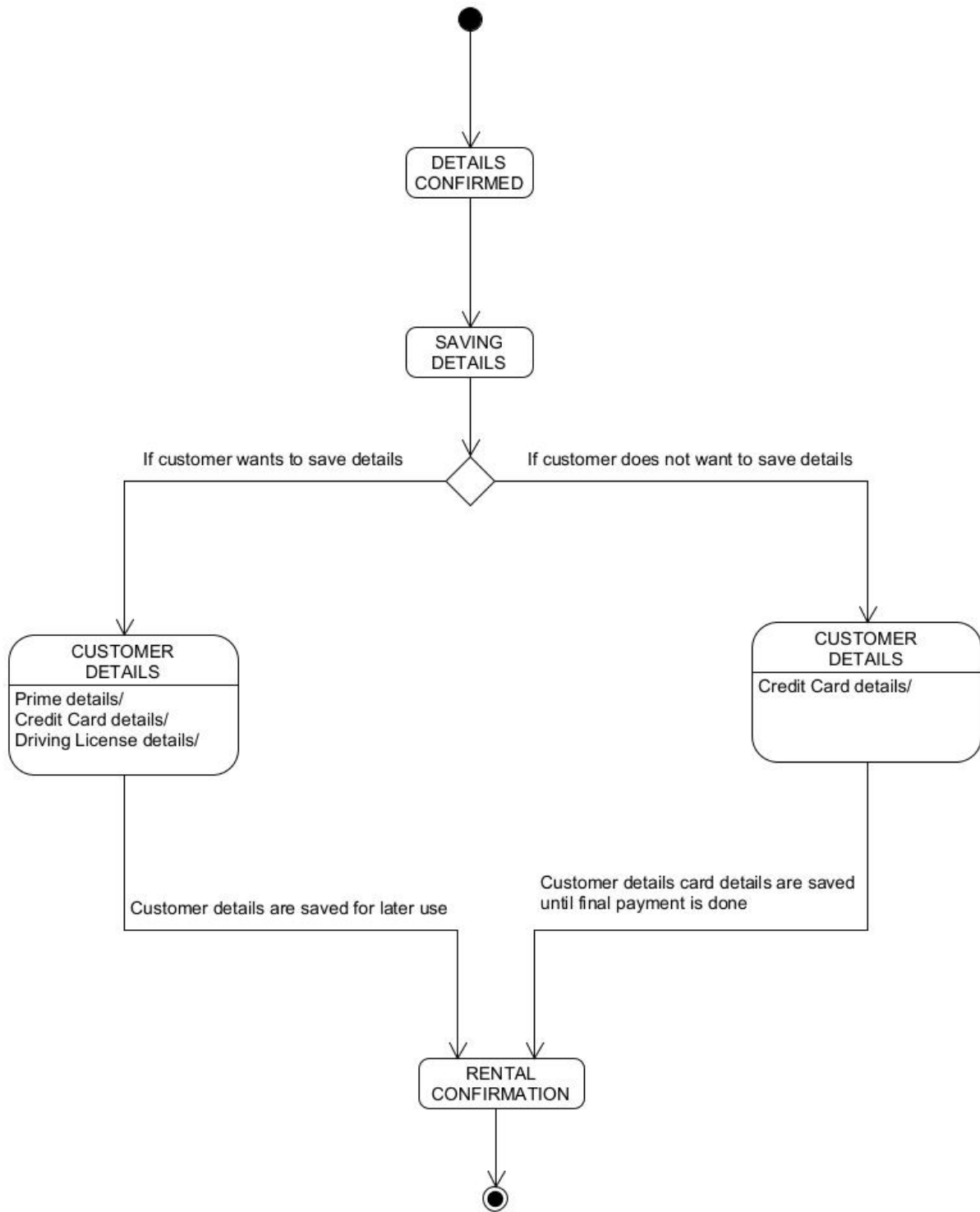
ARCHIVE RENTAL



VALIDATEMYCC



VALIDATEMYDVL

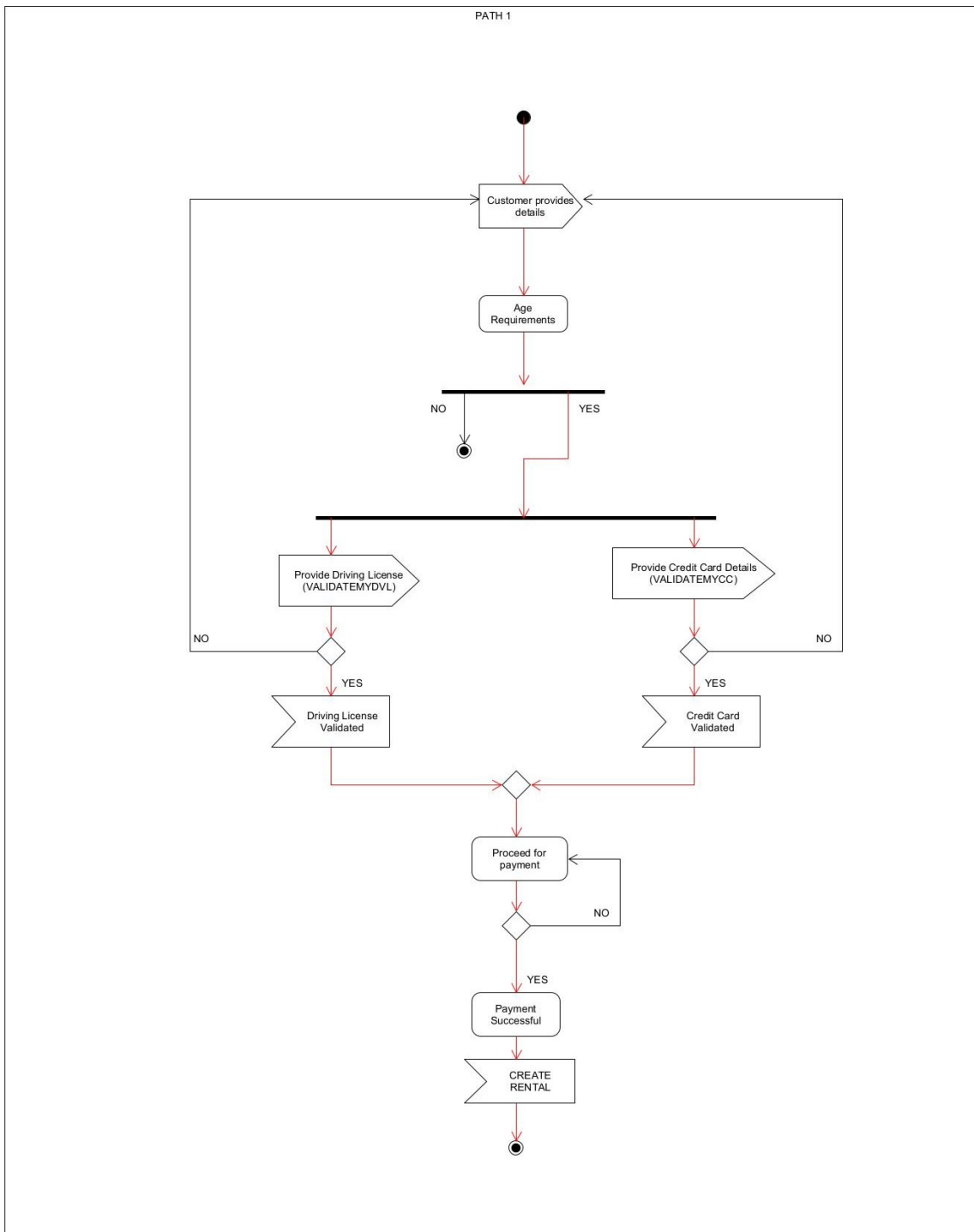


SAVING DETAILS

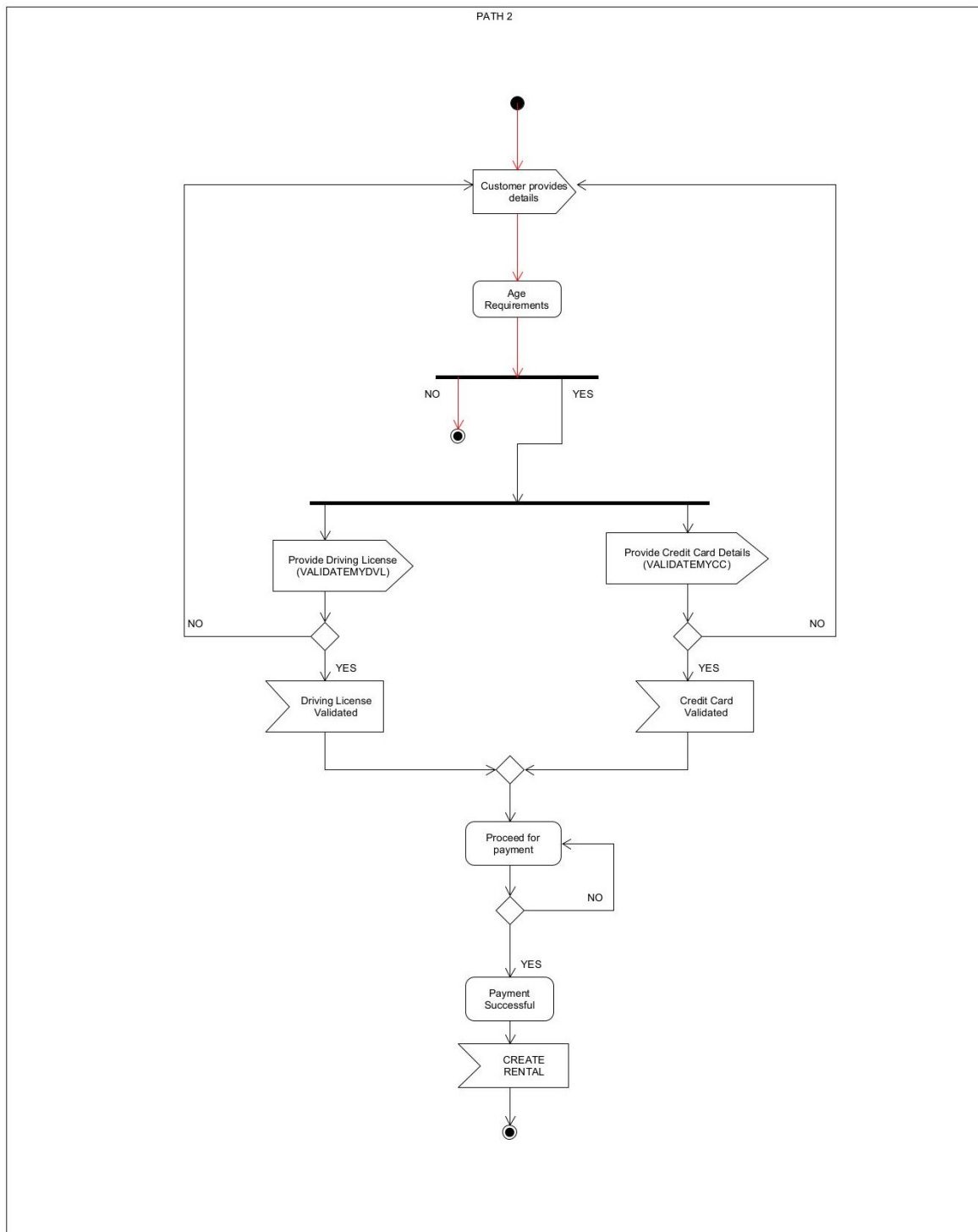
T9-TEST CASE SCENARIO

<i>Path</i>	<i>Comment</i>	<i>Path condition</i>
1	Successful creation of rental.	-Provide prime details including age(valid) -Minimum Age requirement met (valid) -Provide Credit Card details to VALIDATEMYCC (valid) -Credit Card approved (valid) -provide Driving License details to VALIDATEMYDVL (valid) -Driving License approved (valid) -Proceed to payment using approved Credit card (valid) -Payment done successfully (valid)
2	Rejecting the request for rental because age requirement not met.	-Provide prime details including age (valid) -Minimum age required met (invalid) -Request rejected (valid)
3	Rejecting the request for rental by VALIDATEMYCC due to wrong/invalid information.	-Provide prime details including age(valid) -Minimum Age requirement met (valid) -Provide Credit Card details to VALIDATEMYCC (valid) -Credit Card approved (invalid) -Provide again with correct details (valid) -Credit Card approved (valid)
4	Rejecting the request for rental by VALIDATEMYDVL due to wrong/invalid information.	-Provide prime details including age(valid) -Minimum Age requirement met (valid) -Provide Driving License details to VALIDATEMYDVL (valid) -Driving License approved (invalid) -Provide again with correct details (valid) -Driving License approved (valid)

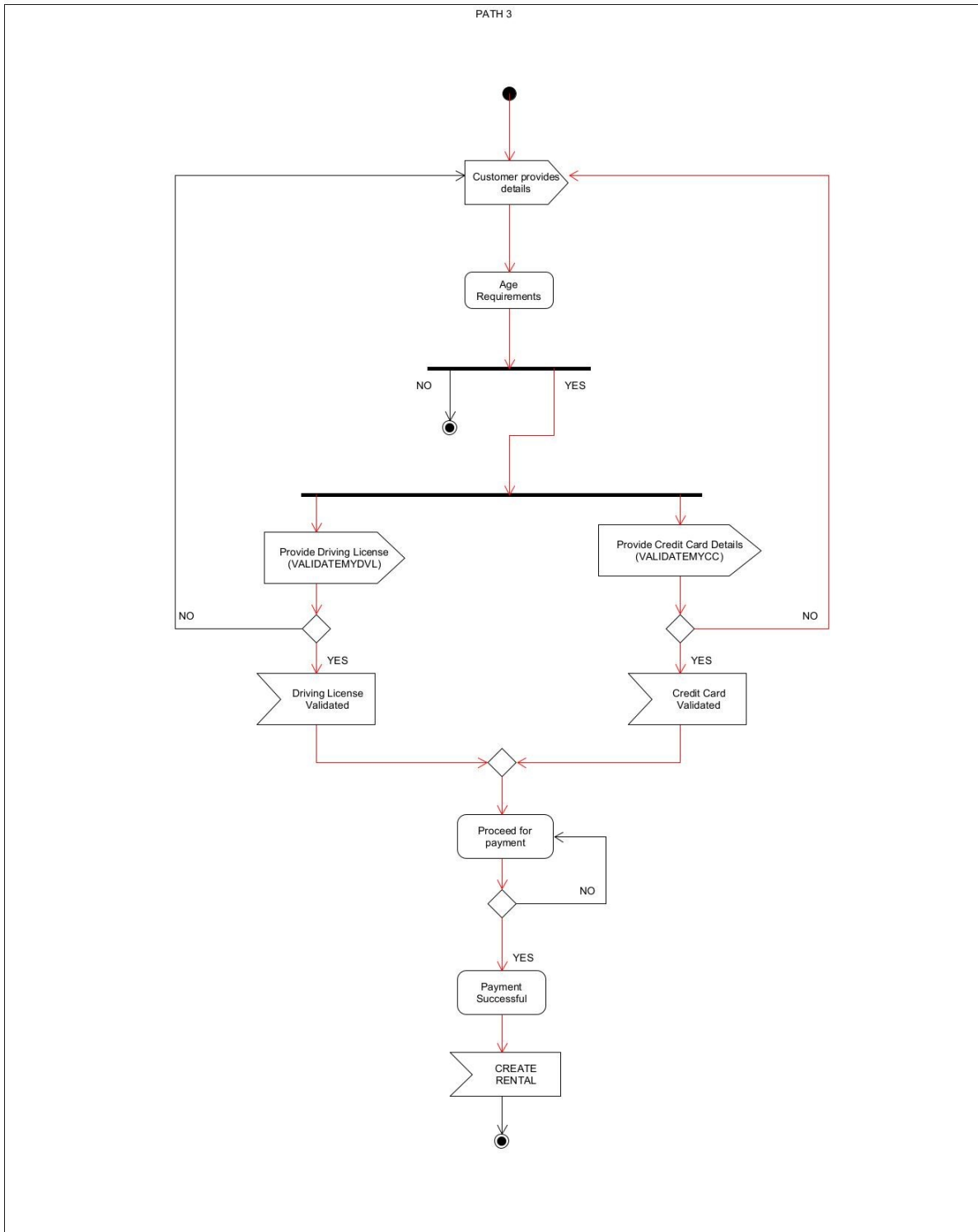
5	Payment failed due to technical glitch or network error.	<ul style="list-style-type: none">-Provide prime details including age(valid)-Minimum Age requirement met (valid)-Provide Credit Card details to VALIDATEMYCC (valid)-Credit Card approved (valid)-provide Driving License details to VALIDATEMYDVL (valid)-Driving License approved (valid)-Proceed to payment using approved Credit card for payment (valid)-Payment done successfully (invalid)-Repeat the process again using the same Credit Card (valid)-Payment done successfully (valid)
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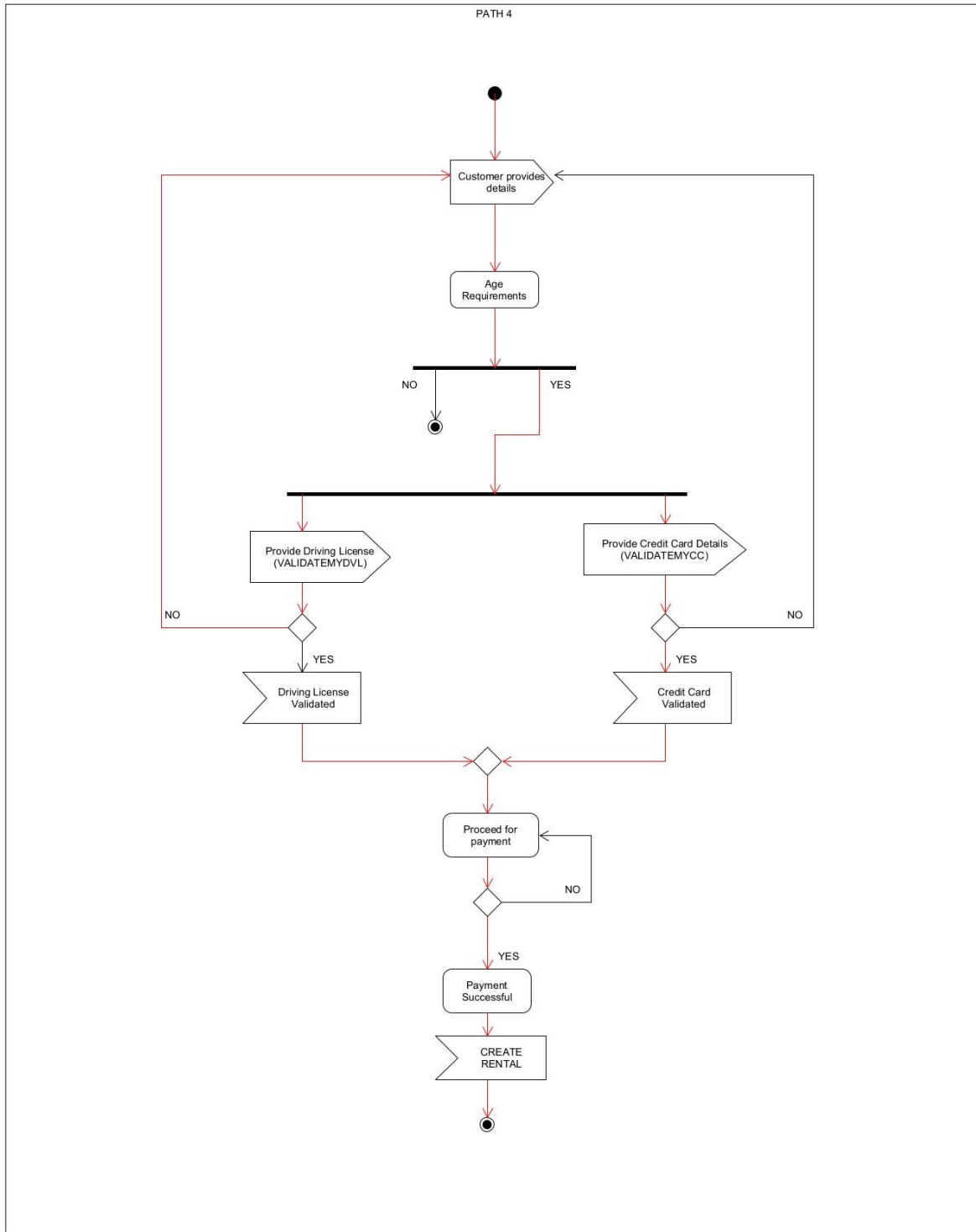
PATH 1



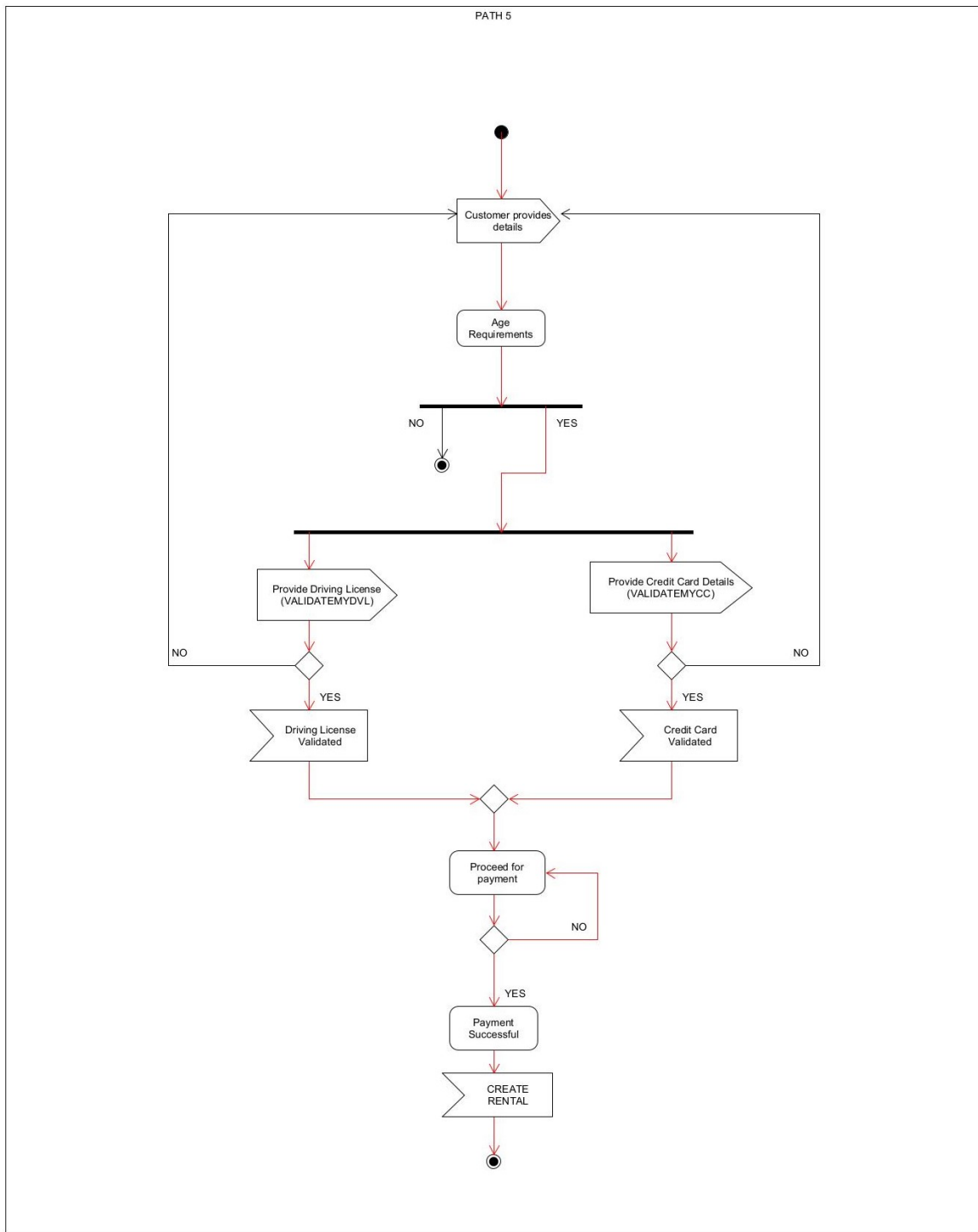
PATH 2



PATH 3



PATH 4



PATH 5