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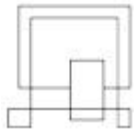

Semester Project 1 (SEP1) Single User System

Steffen Vissing Andersen (sva@via.dk)

Agenda – Analysis

- The case (an interview)
- Requirements
- Use Case modelling
  - Use Case diagram
  - Use Case descriptions

Use interview to find requirements

Requirements

1. An employee should be able to reserve a vehicle for a customer.
2. An employee making a reservation should always enter customer name, phone number,, pick up time, return time, and the vehicle to rent.
3. For a family car, a user should be able to get a list of vehicle information with registration number, model, make, manufacturer year, year of registration, amount of kilometers and notes e.g. about any defects.
4. For a van and a truck, an employee should be able to get the same vehicle information as for family cars and additional the length, the load size and the driver's license category needed.
5. An employee should be able to get vehicle information part of making a reservation.
6. An employee should be able to delete a reservation

...

24. An employee should be able to add data about new vehicles, modify data for an existing vehicle and delete a record for a vehicle no longer available for rent

Define use cases and descriptions

Requirements

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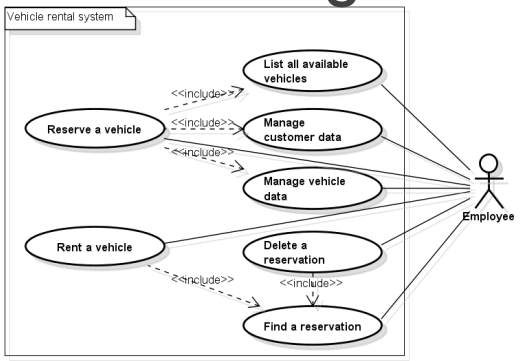
Use Case diagram



Use Case description #1

Use Case: Reserve a vehicle

….

1. Enter vehicle type (family car, van, truck or bus) and the two dates; pick-up date and return date
2. System returns a list of available vehicles of the given type in the given date interval (Use Case: List all available vehicles)
3. Select from the list the vehicle to reserve
4. System returns details about the vehicle (Use Case: Manage vehicle data)
5. If vehicle cannot be accepted by the customer then go to step 4 again
6. Verify the dates and vehicle to reserve
7. If dates are not correct then go to step 1
8. Enter name and phone number for the customer
9. System search for the customer by phone number and name (Use case: Manage customer data)

…

Present as activity diagrams

Use Case description #1

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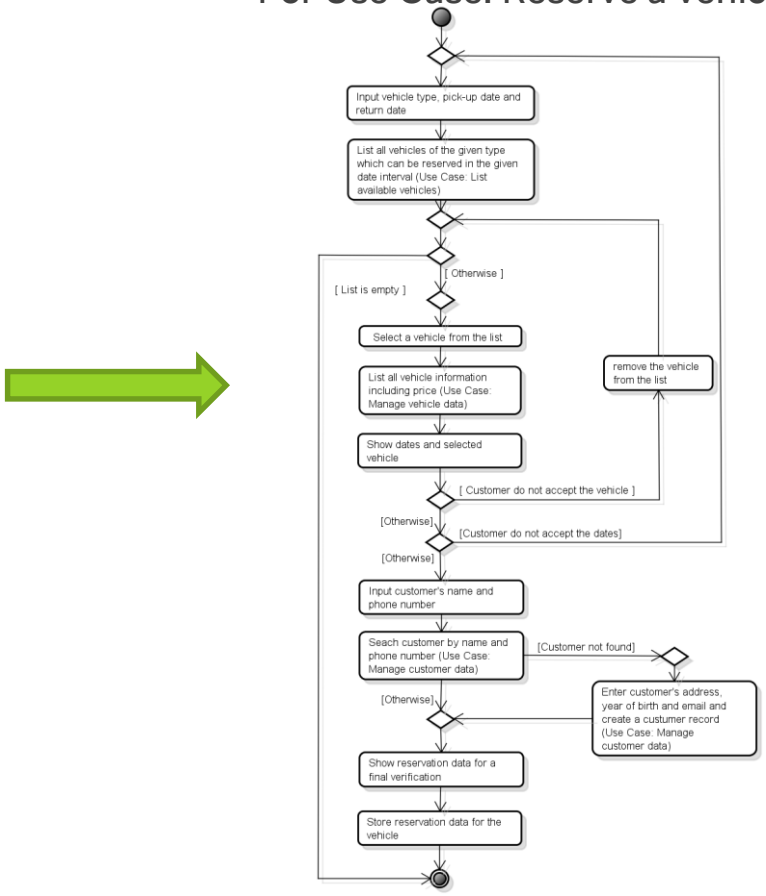
...

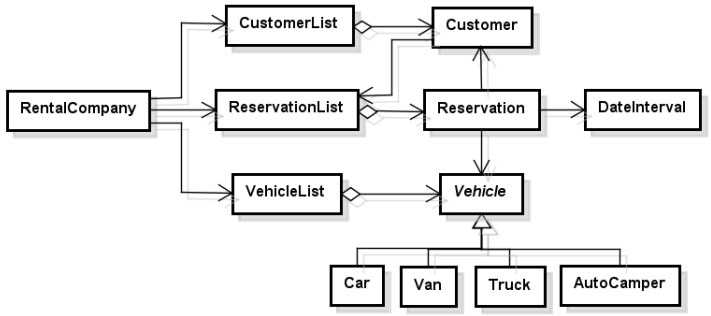
Activity diagram #1

For Use Case: Reserve a vehicle



Design, implementation and test

Class diagram



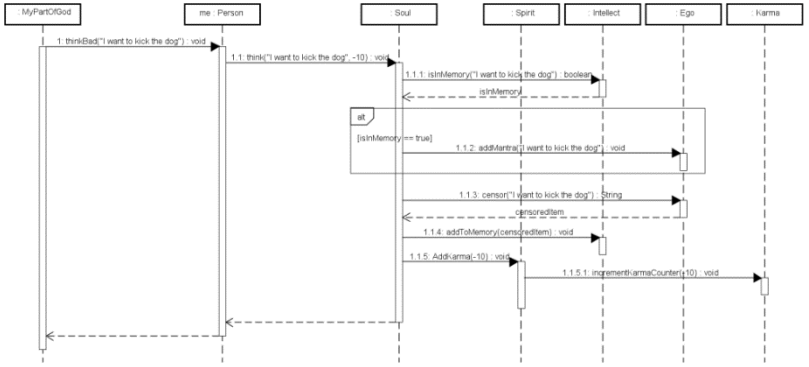
Source code

```
public class Customer
{
  private String name;
  private String address;
  private int phoneNumber;
  private int yearOfBirth;
  private String email;

  public Customer(String name, int phoneNumber)
  {
    this.name = name;
    this.phoneNumber = phoneNumber;
    this.yearOfBirth = -1;
    this.address = null;
    this.email = null;
  }

  // …
}
```

Sequence diagrams



Test cases

Test case 1

Reservation with pick-up date after return date
1) lorem ipsum uncleat de croin do servant walidonitus plankton
2) solidatus promptus tilladi pasko
Passed

Requirements

Requirements

- Requirements are
  - Things a program needs to do
  - Usually numbered
  - Short, precise, objective and measurable

Bad requirements

- We need customer data (imprecise)
- The system must be user friendly (subjective)
- The system needs to be fast (not measurable)
- The system must support any browser (?)

Better requirements

1. The system must store customer name, phone number and address
2. The system must be usability tested by end users
3. The system needs to answer within 2 seconds 95% of the time
4. The system must support Microsoft Internet Explorer 9, 10 and 11, Google Chrome 28-47, Mozilla Firefox 32 and Microsoft Edge 20

Functional requirements

- Functional requirements tells us what a user can do with the system:
  1. The system must store customer name, phone number and address
  2. The librarian must be able to perform a search by title, by author and by ISBN number
  3. The employee must be able to print out an order from a customer

Non-functional requirements

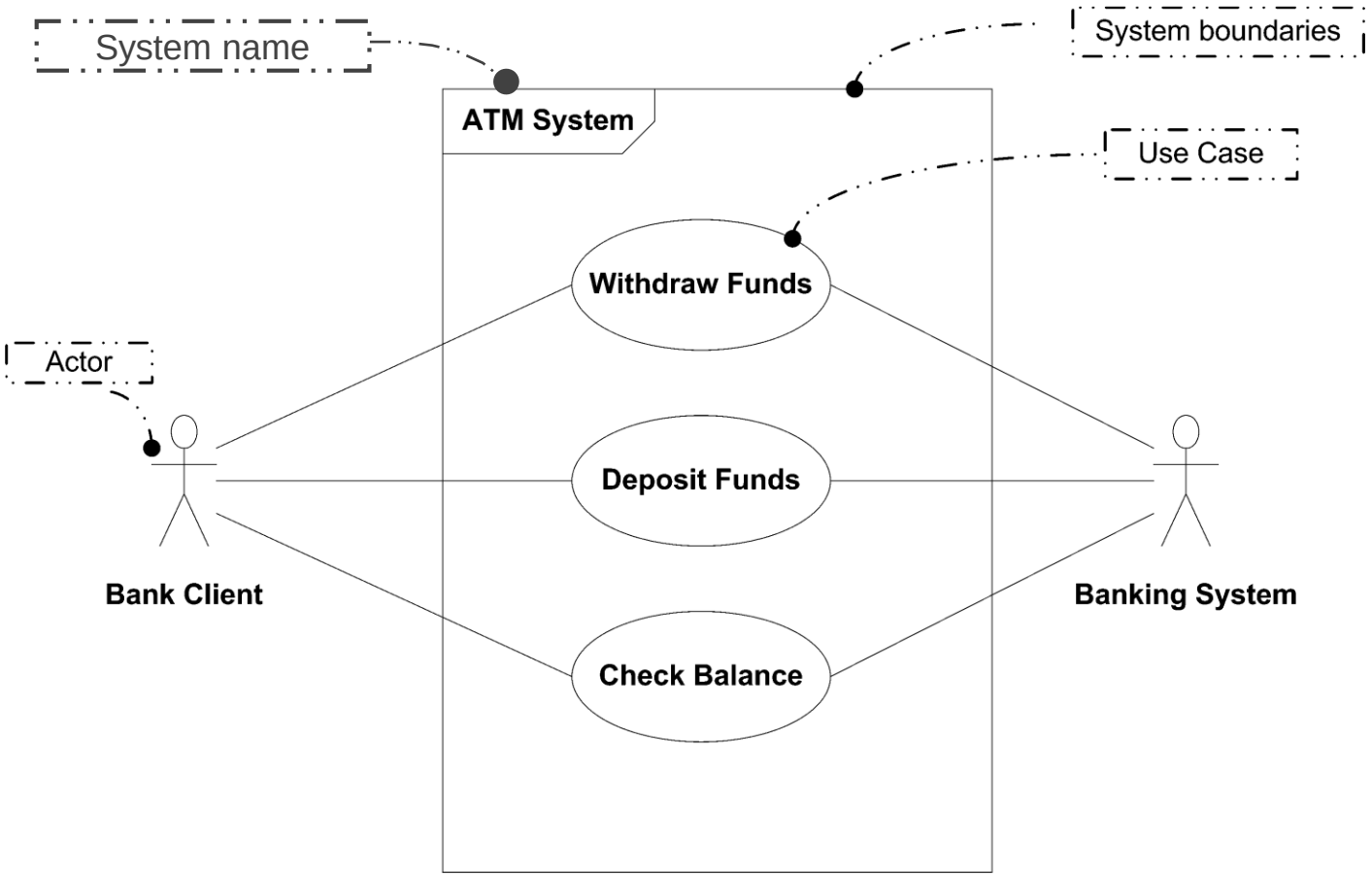
- **Non-functional requirements says something about the quality of the system:**
  1. The system needs to answer within 2 seconds 95% of the time
  2. The system must be usability tested by end users
  3. The system must support Microsoft Internet Explorer 9, 10 and 11, Google Chrome 28-47, Mozilla Firefox 32 and Microsoft Edge 20
  4. The system has to be implemented in Java

Use Case Modelling

Use Case Modelling

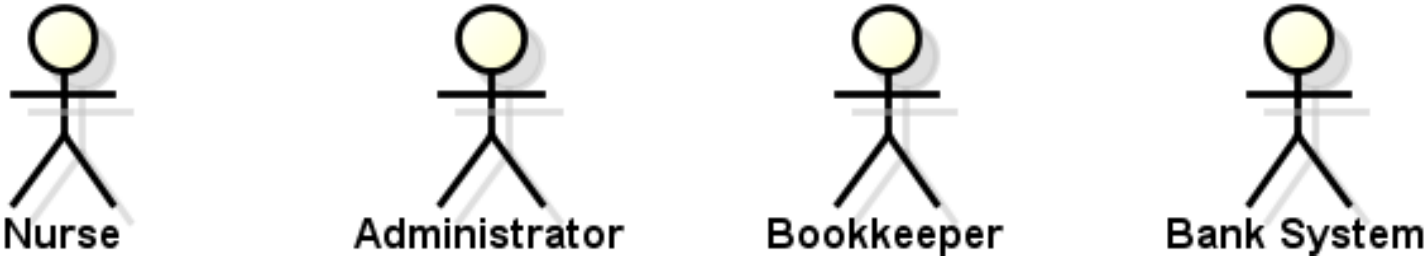
- What the system should do – step-by-step
- A way to communicate with the customer of the system
  - Easy understandable diagram and description
  - No implementation details

UML Use Case Diagram



What is an Actor?

- Represent **roles** that people or things/systems play in relation to the system
- Interact directly with the system
- Naming: Singular noun describing a role known in the problem-domain – **not** in the programmers world

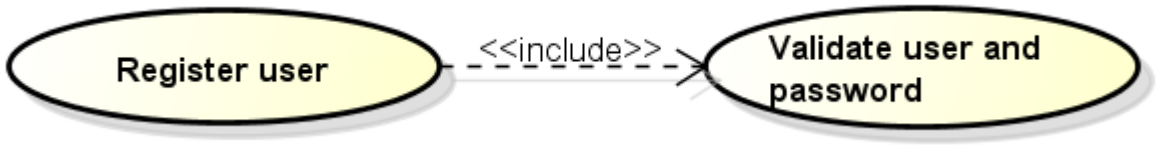


What is a Use Case?

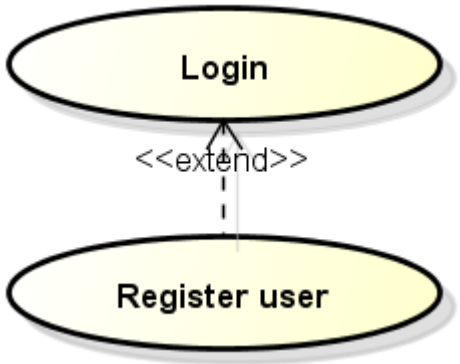
- A functionality in the system seen from an actors point of view
- Complete description of a functionality – including all exceptions
- All Use cases as a whole describes the total functionality of the system
- Naming: Verb followed by a noun describing the action the **actors wants** the system to perform

Use Case relationships

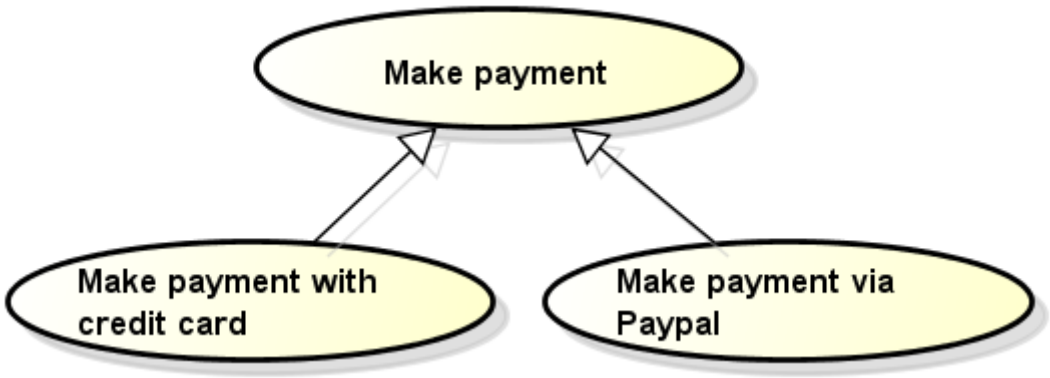
- **Include** (part of – always)



- **Extend**
  (more functionality – sometimes)

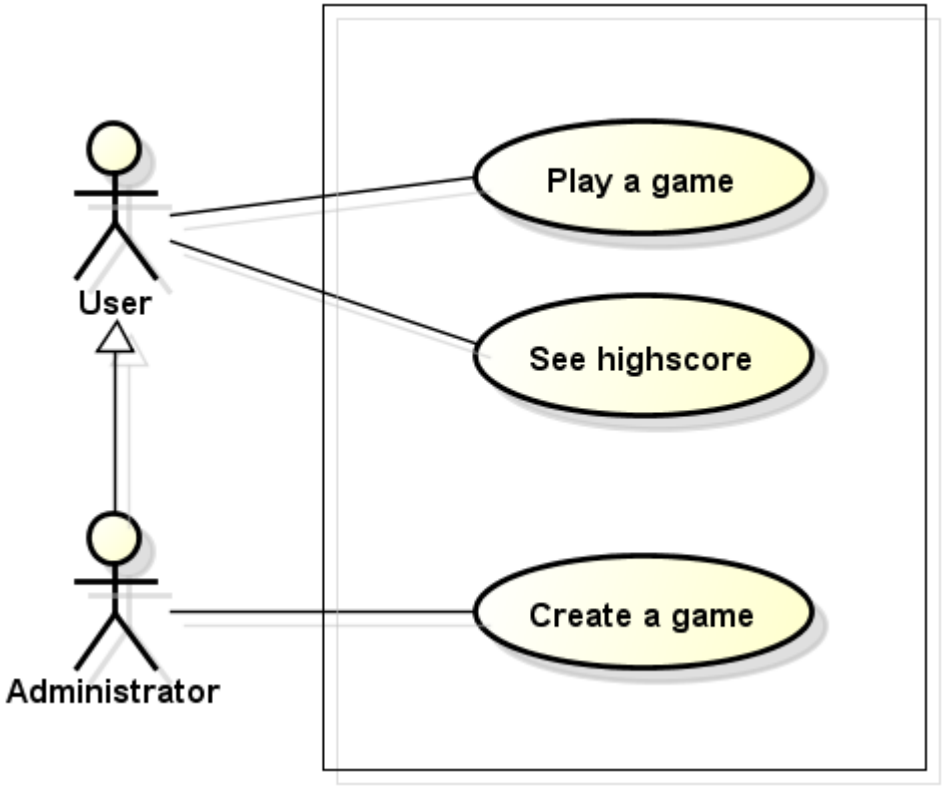


- **Generalization**
  (replacement)



Actor relationships

- Generalization



The Use Case description

- Communication instrument between "customer", user and developer
- Description techniques:
  - Ordinary language
  - Additional: structured language (WHILE, IF THEN ELSE)
  - Write the "sunny scenario first" – where everything just goes right (base sequence)
  - Add then the exception flows
  - Specify pre- and post-conditions

Use Case Description – Template

- Use Case name/title
- Summary
- Actors
- Precondition
- Postcondition
- Base Sequence
- Exception Sequence
- Sub Use Cases
- Notes

Example: A vehicle rental system

- Use case diagram in Astah (link)
- Use case description in Astah (link)

Use interview to find requirements

Requirements

1. An employee should be able to reserve a vehicle for a customer.
2. An employee making a reservation should always enter customer name, phone number,, pick up time, return time, and the vehicle to rent.
3. For a family car, a user should be able to get a list of vehicle information with registration number, model, make, manufacturer year, year of registration, amount of kilometers and notes e.g. about any defects.
4. For a van and a truck, an employee should be able to get the same vehicle information as for family cars and additional the length, the load size and the driver's license category needed.
5. An employee should be able to get vehicle information part of making a reservation.
6. An employee should be able to delete a reservation

...

24. An employee should be able to add data about new vehicles, modify data for an existing vehicle and delete a record for a vehicle no longer available for rent

Ex.: Requirements (1/?)

1. An employee should be able to reserve a vehicle for a customer.
2. An employee making a reservation should always enter customer name, phone number, pick up time, return time, and the vehicle to rent.
3. For a family car, a user should be able to get a list of vehicle information with registration number, model, make, manufacturer year, year of registration, amount of kilometers and notes e.g. about any defects.
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Ex.: Requirements (?/?)

5. An employee should be able to get vehicle information part of making a reservation.
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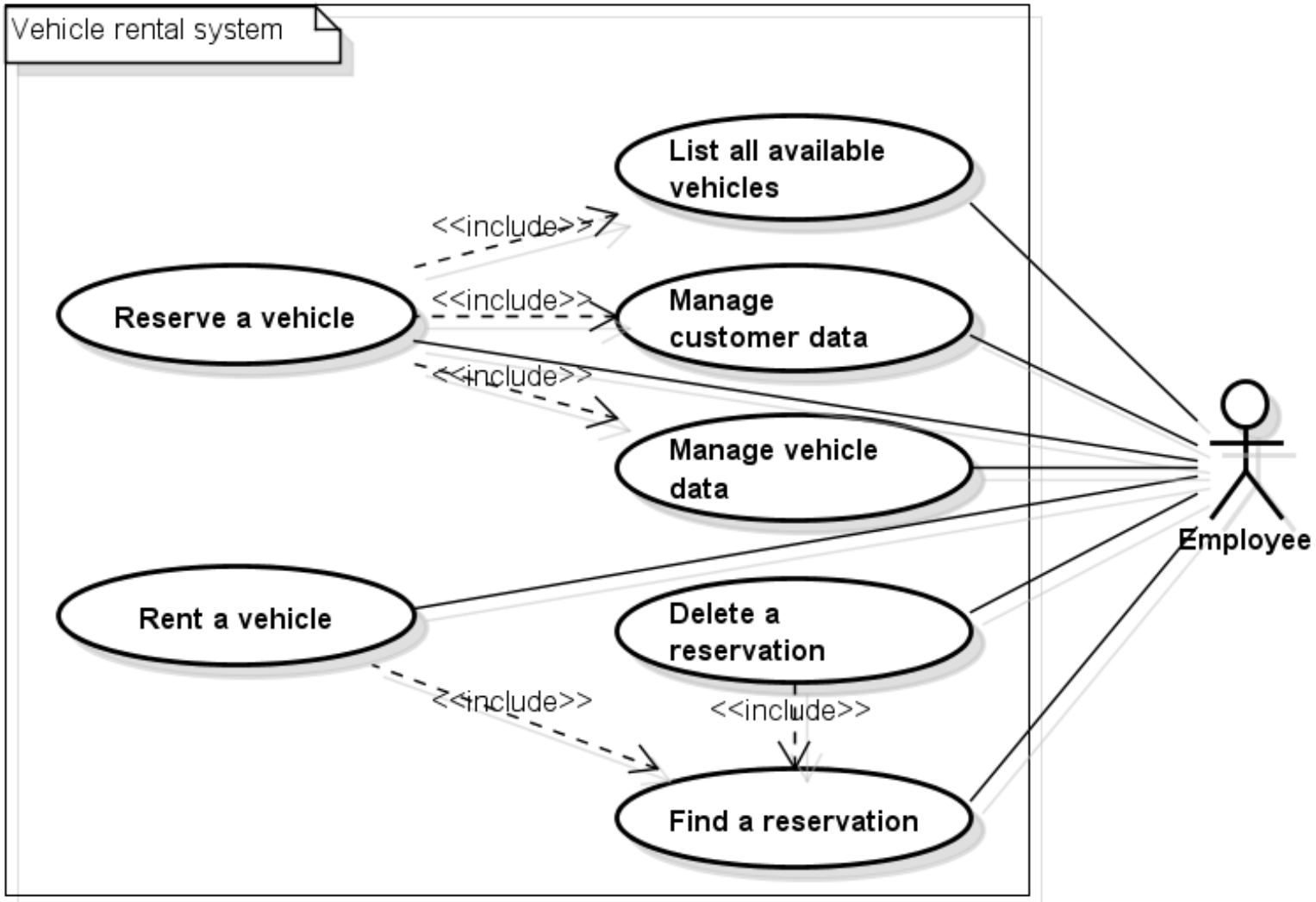
Use case diagram



Use case description #1

Name

Reserve a vehicle

Summary

An employee reserves a vehicle for a customer in a given time period.

Precondition

None

Postcondition

A reservation has been made and data for reservation, vehicle and customer has been saved in the system.

Use case description #1

Base Sequence

1. Enter vehicle type (family car, van, truck or bus) and the two dates; pick-up date and return date
2. System return a list of available vehicles of the given type in the given date interval (Use Case: List all available vehicles)
3. Select from the list the vehicle to reserve
4. System return details about the vehicle (Use Case: Manage vehicle data)
5. If vehicle cannot be accepted by the customer then go to step 3 again
6. Verify the dates and vehicle to reserve
7. If dates are not correct then go to step 1
8. Enter name and phone number for the customer
9. System search for the customer by phone number and name (Use case: Manage customer data)
10. If customer is not found in the system THEN enter customers address, year of birth and email and create a customer record (Use Case: Manage customer data)
11. Show information of the reservation for a final verification
12 Store the reservation data in the system

Use case description #1

Exception Sequence

No available vehicles of the given type in the given date interval:

1-2 as base sequence

The returned list is empty and use case ends.

Customer will not reserve one of the available vehicles:

1-5 as base sequence

no more vehicles to select and use case ends.

Use case description #1

Sub use cases

- List all available vehicles
- Manage customer data
- Manage vehicle data

Notes

A reservation can be cancelled any time

Use Case Description (Astah)

Reserve a vehicle / UseCase Description

ITEM	VALUE
UseCase	Reserve a vehicle
Summary	An employee reserves a vehicle for a customer in a given time period.
Actor	Employee
Precondition	None
Postcondition	A reservation has been made and data for reservation, vehicle and customer has been saved in the system.
Base Sequence	1. Enter vehicle type (family car, van, truck or bus) and the two dates; pick-up date and return date 2. System returns a list of available vehicles of the given type in the given date interval (Use Case: List all available vehicles) 3. Select from the list the vehicle to reserve 4. System returns details about the vehicle (Use Case: Manage vehicle data) 5. If vehicle cannot be accepted by the customer then go to step 4 again 6. Verify the dates and vehicle to reserve 7. If dates are not correct then go to step 1

Use Case Description (Astah)

	8. Enter name and phone number for the customer 9. System seach for the customer by phone number and nam e (Use case: Manage customer data) 10. If customer is not found in the system THEN enter cu stomers address, year of birth and email and create a cu stomer record (Use Case: Manage customer data) 11. Show information of the reservation for a final veri fication 12 Store the reservation data in the system
Branch Sequence	
Exception Sequence	No available vehicles of the given type in the given dat e interval: 1-2 as base sequence The returned list is empty and use case ends. Customer will not reserve one of the available vehicles: 1-5 as base sequence no more vehicles to selct and use case ends.
Sub UseCase	List all available vehicles Manage customer data Manage vehicle data
Note	A reservation can be cancelled any time

What to do now?

1. Requirements
   - Use interview to find requirements
   - Point out potentially missing requirements from the interview
   - Understand the domain model – the customers world
2. Use Case Modelling
   - Draw a Use Case diagram
   - Write Use Case descriptions for each Use Case
     - Each requirement needs to be covered in one or more of the Use Case descriptions
     - Use a template

Use interview to find requirements

Requirements

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Draw a Use Case diagram

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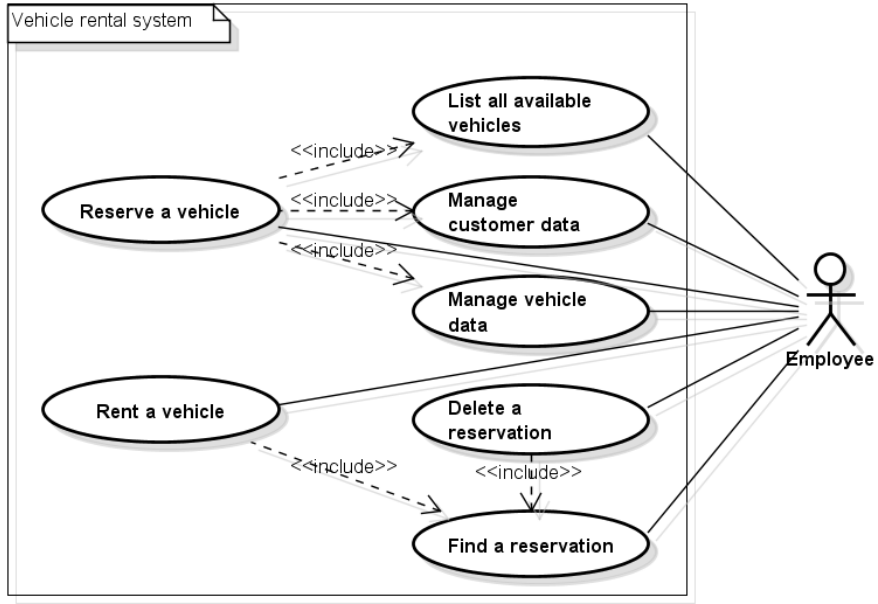
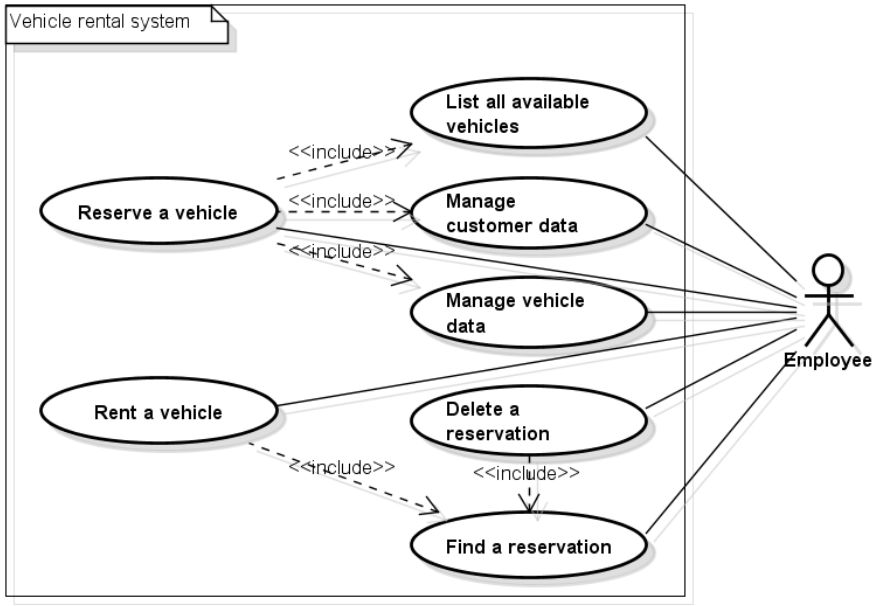
Use Case diagram



Write a Use Case description for each Use Case



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Use Case: Reserve a vehicle

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