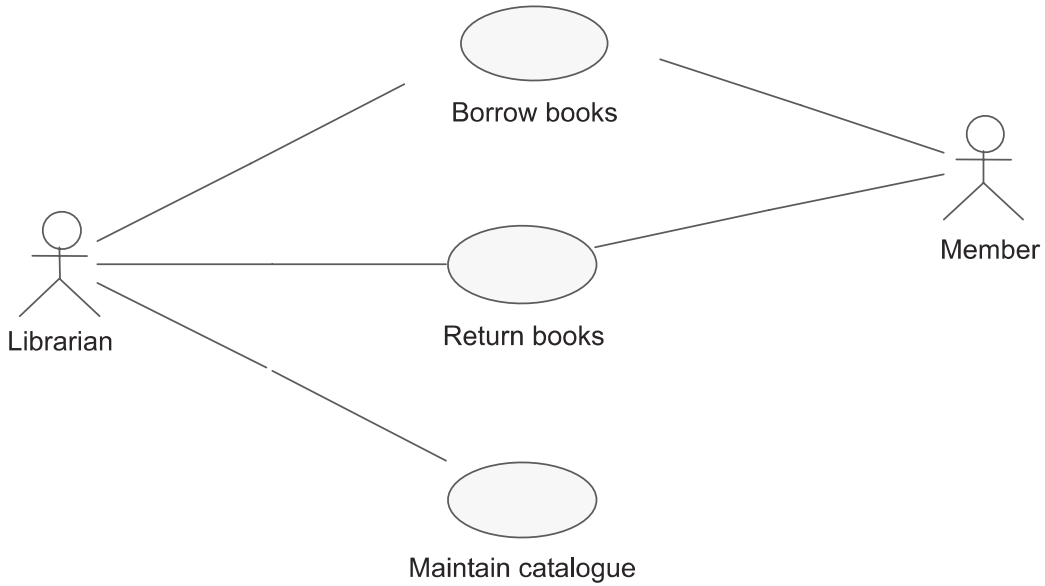
# Exercise 1: Class Diagram Exercise
# Module CSU22041

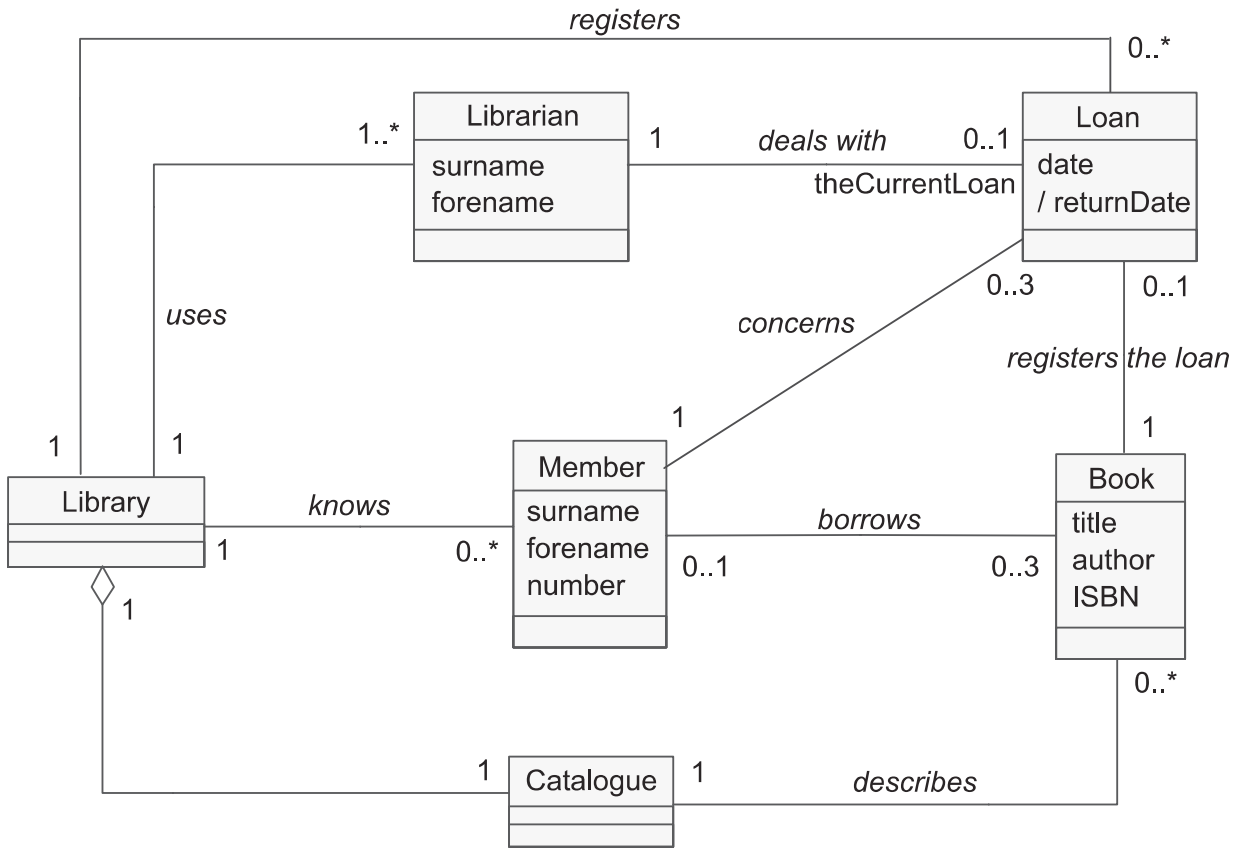
The use case diagram below shows the initial modelling for an information system for a library.
Draw a UML Class diagram including associations, cardinalities, roles and any derived attributes.
for a Library System including classes: Library, Loan, Catalogue, Member, Book, Librarian



Exercise 1: Class Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**




Could ask about

Attribute Types?

Clarification of roles for each class.

How are overdue books shown?

# Exercise 2: Use Case Diagram Exercise
# Module CSU22041

From the problem statement below Identify Actors, Use Cases and draw use case diagram. Write a textual description for “Process Sale” use case, (a) for a normal scenario and (b) for an error scenario

## PROBLEM STATEMENT

The standard procedure of using a cash register is as follows:

- A customer arrives at the checkout to pay for various items
- The cashier records the bar code number of each item, as well as the quantity if it is greater than one.
- The cash register displays the price of each item and its description.
- When all the purchases are recorded, the cashier indicates the end of the sale.
- The cash register displays the total cost of the purchases.
- The customer selects his or her payment method:
  - Cash: the cashier takes the money from the customer and puts it in the cash register, the cash register indicates how much change the customer is to be given;
  - Cheque: the cashier verifies that the customer is financially solvent by sending a request to an authorisation centre via the cash register;
  - Credit card: a banking terminal forms part of the cash register. It sends a request for authorisation to an authorisation centre, according to the card type.
- The cash register records the sale and prints a receipt.
- The cashier gives the receipt to the customer.

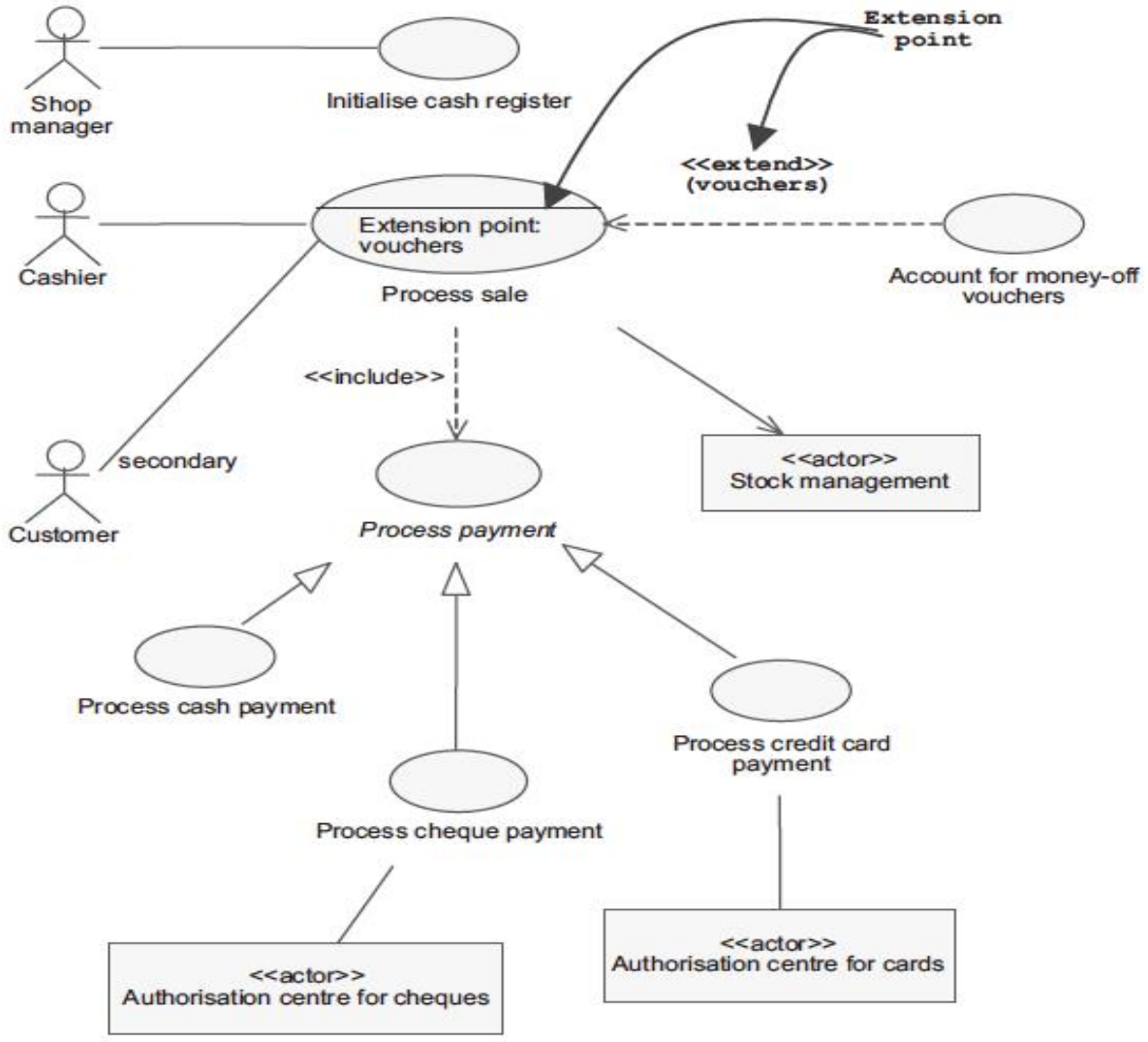
Once the items have been entered, the customer can present money-off vouchers for certain items to the cashier. When the payment transaction is finished, the cash register sends the information on the number of items sold to the stock management system.

Every morning, the shop manager initialises the cash registers for the day.

Exercise 2: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**




Take note of the different notations used

Exercise 2: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

**Title**: Process sale **Type**: detailed essential

**Summary**: a customer arrives at the checkout with the items he or she would like to purchase. The cashier records the items and collects payment. At the end of the transaction, the customer leaves with the items.

**Actors**: Cashier (primary), *Customer (secondary)*.

**Creation date**: 05/17/02 **Date of update**: 11/10/02

**Version**: 1.1 **Person in charge**: Pascal Roques

# Exercise 2: Use Case Diagram Exercise- Possible Solution

## Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

**Preconditions:**

- The cash register is open; a checkout assistant is signed on to it.

**Main success scenario:**

1. This use case starts when a customer arrives at the checkout with items that he or she would like to purchase.
2. The cashier records each item. If there is more than one of the same item, the cashier also indicates the quantity.
3. The cash register establishes the price of the item and adds the information on the item to the sale in progress. The cash register displays the description and the price of the item in question.
4. Once the cashier has recorded all the items, he or she indicates that the sale is finished.
5. The cash register calculates and displays the total amount of the sale.
6. The cashier informs the customer of the total amount.
7. The customer chooses a payment method:
   a. In the case of cash payment, execute the "Process cash payment" use case;
   b. In the case of credit card payment, execute the "Process credit card payment" use case;
   c. In the case of cheque payment, execute the "Process cheque payment" use case.
8. The cash register records the sale that has been carried out and prints a receipt.
9. The cashier gives the cash register receipt to the customer.
10. The customer leaves with the items he or she has purchased.

Exercise 2: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

# Error Scenarios: Process Sale

*E1: customer is unable to pay*

The E1 sequence starts at point 1 of the main success scenario.

2. The customer does not have enough cash to pay for the items.
3. The cashier cancels the whole sale and the use case fails, or the customer pays using another payment method (Cf. "Process cheque payment", or "Process credit card payment").

*E2: cashier is unable to give change*

The E1 sequence starts at point 4 of the main success scenario.

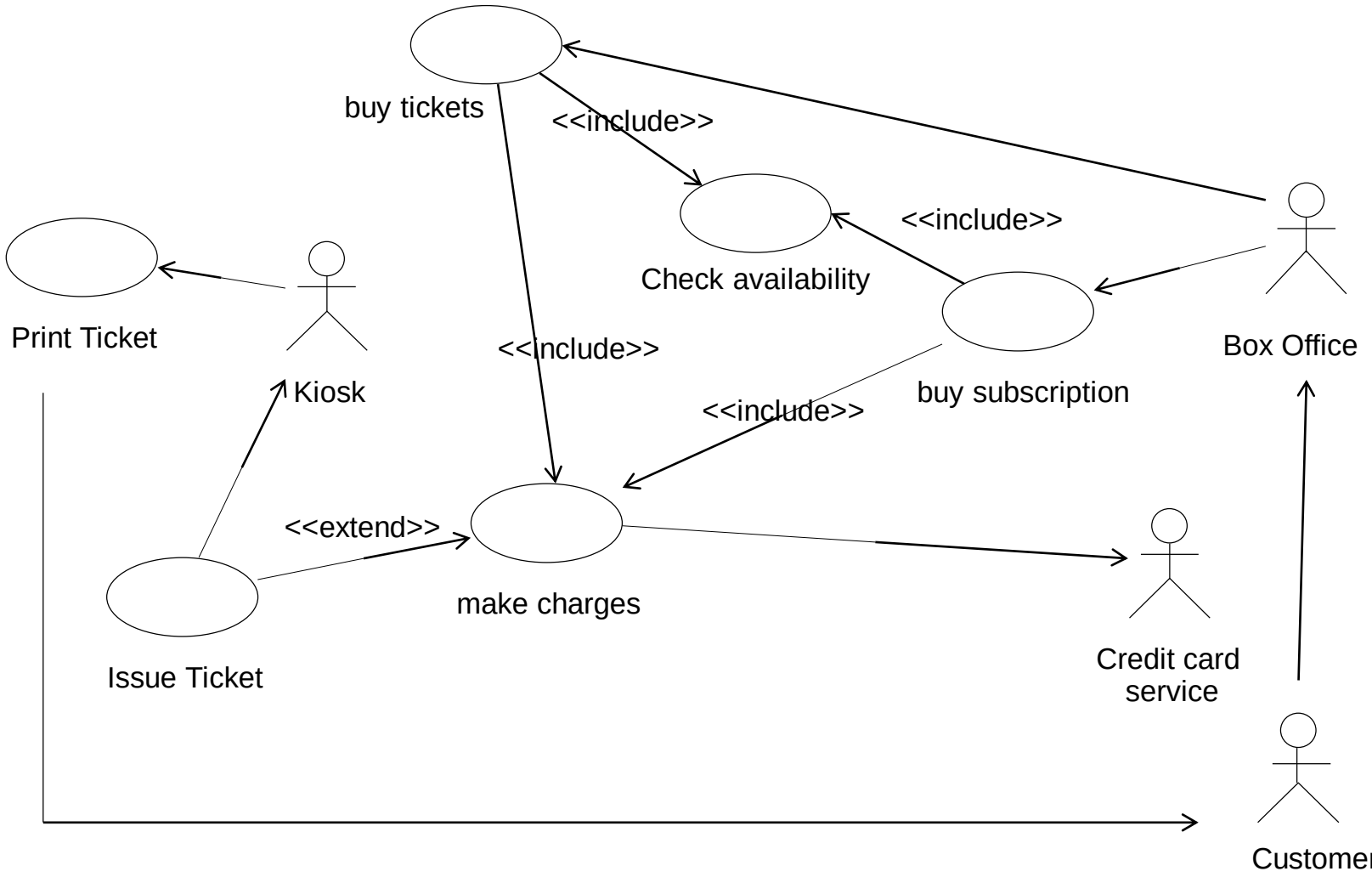
5. The cash register drawer does not contain enough change in order to give the customer the money he or she is owed.
6. The cashier asks his or her supervisor for more change, or suggests to the customer that he or she pay using a different payment method (Cf. "Process cheque payment", or "Process credit card payment").

# Exercise 3: Use Case Diagram and Class Diagram Exercise
# Module CSU22041

Draw a UML Use Case diagram and Class diagram including associations, cardinalities, roles and any derived attributes for a Theatre Ticket Booking Information System

- Customers may have many reservations
- Each reservation is made by one customer through a box office
- Reservations are of two kinds – subscription series and individual
- Each reservation is associated with a ticket or tickets
- Each ticket is either associated with a subscription series reservation or an individual reservation but not both
- A subscription series comprises at least 3 but not more than 6 tickets
- Each ticket or subscription must be paid for
- Customers can pay by credit card or cash
- Tickets are issued from a kiosk
- Every performance has many tickets available each with a unique seat number.
- A performance can be identified by a show, date and time.
- A performance schedule is a list of performances for a particular show.
- A cast and a reserve cast is associated with each show
- A cast is composed of a group of actors

# A possible Use Case Solution




Could ask about

How is Paying by cash managed?

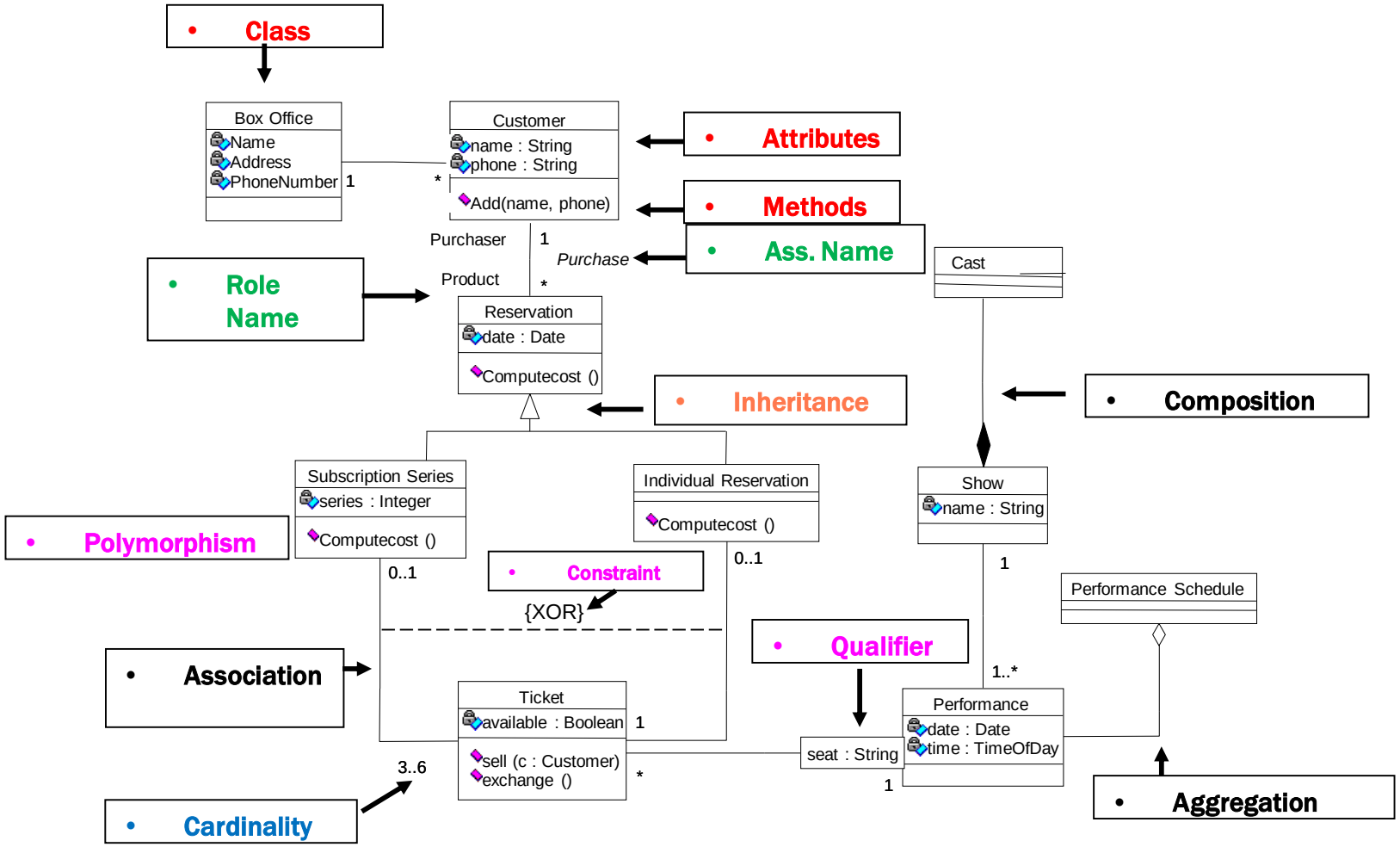
How is the seat number to be managed?

**What questions/clarifications would you ask for the next iteration of modelling?**

Exercise 3: Class Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

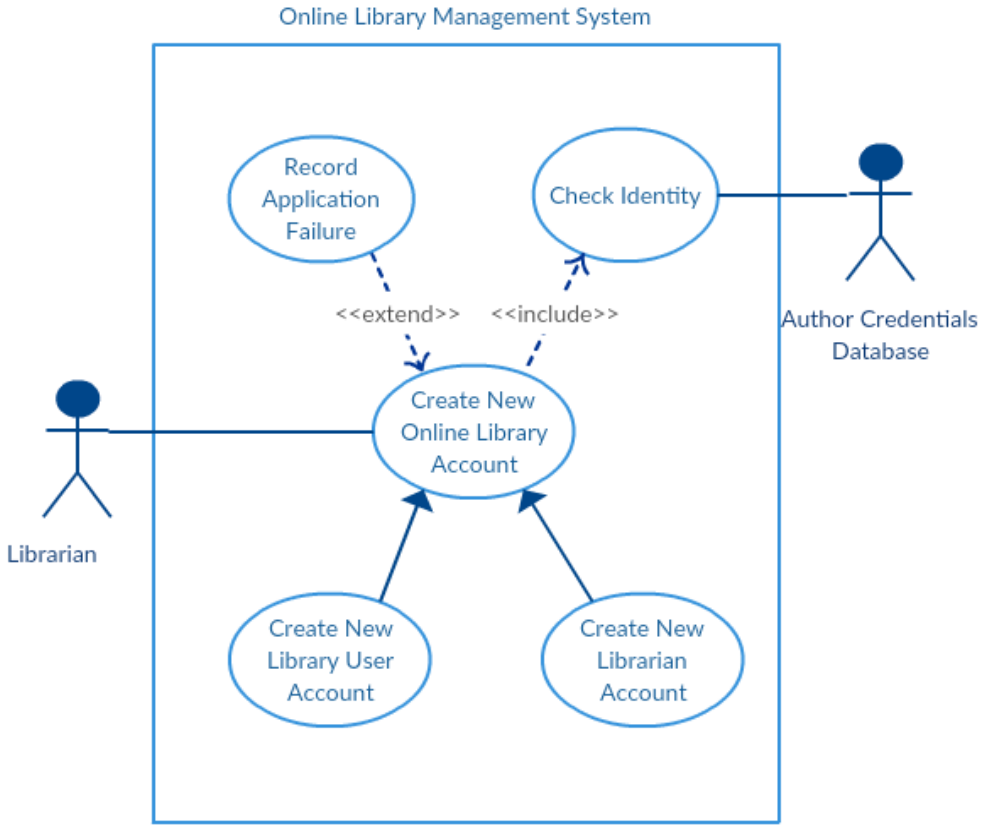



**What questions/clarifications would you ask for the next iteration of modelling?**

http://blue-walrus.com/2011/06/uml-tip-xor-in-uml/ Link showing examples of XOR constraint

# Exercise 4: Sequence Diagram Exercise
# Module CSU22041

DRAW A SEQUENCE DIAGRAM TO DESCRIBE THE FLOW OF ACTIVITY FOR THE "CREATE NEW ONLINE LIBRARY ACCOUNT" USE CASE




Here are the steps that occur in the use case named 'Create New Library User Account'.

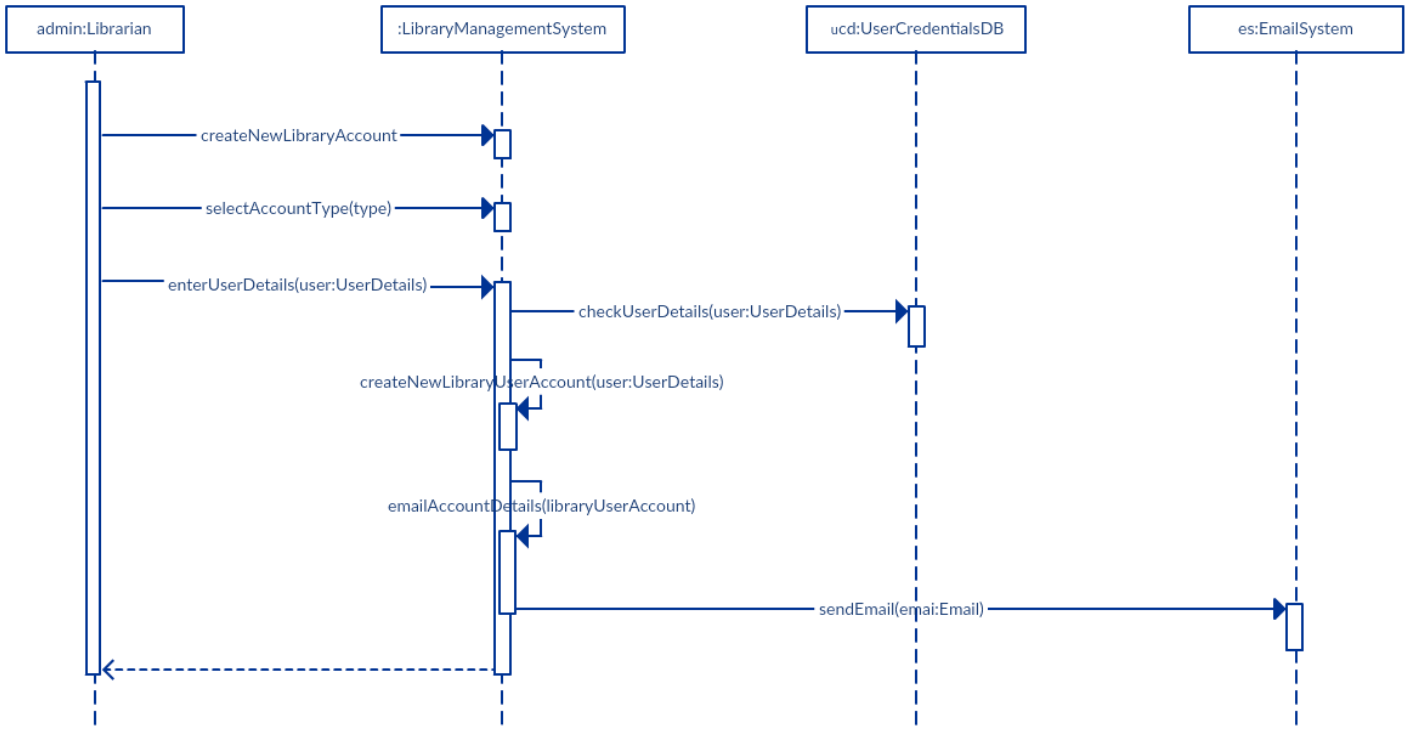
- The librarian request the system to create a new online library account
- The librarian then selects the library user account type
- The librarian enters the user's details
- The user's details are checked using the user Credentials Database
- The new library user account is created
- A summary of the of the new account's details are then emailed to the user

https://creately.com/blog/diagrams/sequence-diagram-tutorial/

Exercise 4: Sequence Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

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https://creately.com/blog/diagrams/sequence-diagram-tutorial/#Templates

# Exercise 5: Activity Diagram Exercise
# Module CSU22041

Draw an activity diagram that describes the dynamics of the process below. Use swimlanes to assign responsibilities to the actors.

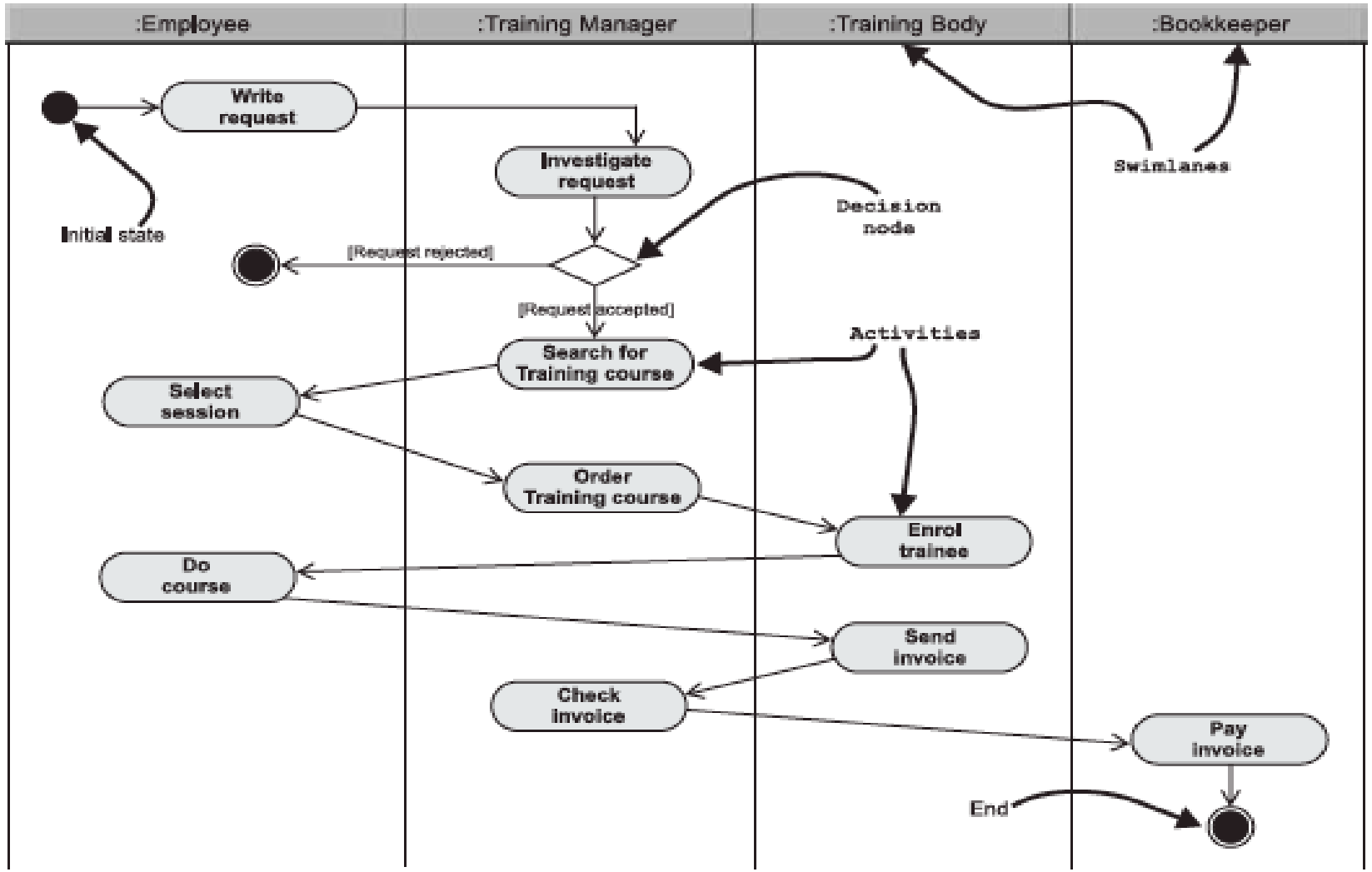
Let's suppose that an organisation wants to improve its information system and, first of all, wishes to model the training process of its employees so that some of their tasks may be computerised.

1. The training process is initialised when the training manager receives a training request on behalf of an employee. This request is acknowledged by the person in charge who qualifies it and then forwards his or her agreement or disagreement to the person who is interested.
2. In the case of agreement, the person in charge looks in the catalogue of registered courses for a training course, which corresponds to the request. He or she informs the employee of the course content and suggests a list of subsequent sessions to him or her. When the employee has reached a decision, the training manager enrols the entrant in the session with the relevant training body.
3. If something crops up, the employee must inform the training manager as soon as possible in order to cancel the enrolment or application.
4. At the end of the employee's training, he or she must submit an assessment to the training manager on the training course that he or she completed, as well as a document proving his or her attendance.
5. The training manager then checks the invoice that the training body has sent him or her before forwarding it to the bookkeeper of purchases.

Exercise 5: Activity Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**




Notice that a merge diamond is not used.

# Exercise 6: Class Diagram Exercise
# Module CSU22041

From the problem statement below, draw a UML Class diagram.

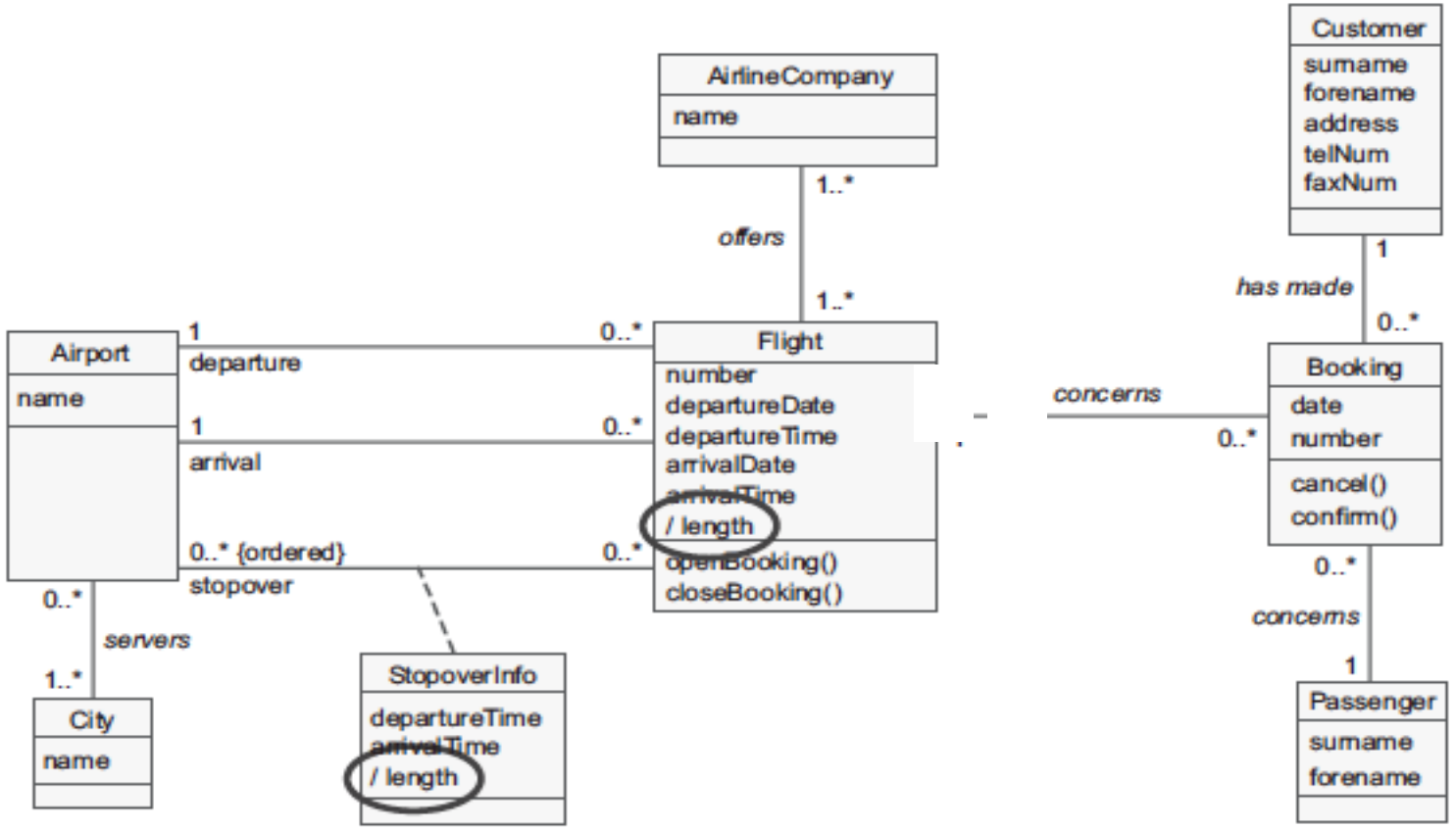
This case study concerns a simplified flight booking system for a travel agency.
The interviews that we had with domain experts enabled us to summarise their knowledge of the field in the form of the following sentences:

1. Airline companies offer various flights.
2. A flight is open to booking and closed again by order of the company.
3. A customer can book one or more flights and for different passengers.
4. A booking concerns a single flight and a single passenger.
5. A booking can be cancelled or confirmed.
6. A flight has a departure airport and an arrival airport.
7. A flight has a departure day and time, and an arrival day and time.
8. A flight may involve stopovers in airports.
9. A stopover has an arrival time and a departure time.
10. Each airport serves one or more cities.

Exercise 6: Class Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**




Why is the cardinality on flight "0..*"

# Exercise 7: Use Case Diagram Exercise
# Module CSU22041

- From the statement below
  1. Identify Actors, Use Cases and draw use case diagram
  2. Write a textual description for the “withdraw money using a visa card” use case [where the visa customer is not a customer of the bank], (a) for a normal scenario and (b) for an error scenario

This case study concerns a simplified system of the automatic teller machine (ATM). The ATM offers the following services:

1. Distribution of money to every holder of a smartcard via a card reader and a cash dispenser.
2. Consultation of account balance, cash and cheque deposit facilities for bank customers who hold a smartcard from their bank.

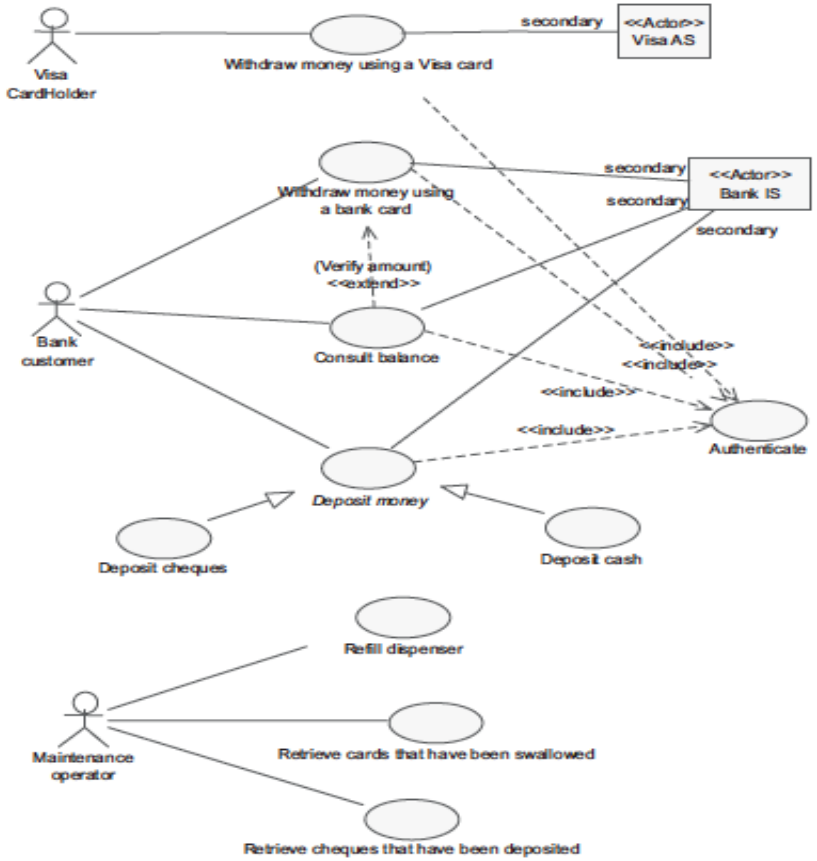
Do not forget either that:

3. All transactions are made secure.
4. It is sometimes necessary to refill the dispenser, etc.

Exercise 7: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

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Do not forget either that:

3. All transactions are made secure.
4. It is sometimes necessary to refill the dispenser, etc.

Could ask about

What is a Visa AS?

Is the authentication being handled correctly?- check text description on following slides

What does “etc” mean in point 4?

Exercise 7: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

**Title:** Withdraw money using a Visa card

**Summary:** this use case allows a Visa card holder, who is not a customer of the bank, to withdraw money if his or her daily limit allows it.

**Actors:** Visa CardHolder (primary), Visa AS (secondary).

**Creation date:** 02/03/02 **Date of update:** 08/19/03

**Version:** 2.2 **Person in charge:** Pascal Roques

*Flow of events*

**Preconditions:**

- The ATM cash box is well stocked.
- There is no card in the reader.

Exercise 7: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

## Use Case Description: Normal Scenario

1. The Visa CardHolder inserts his or her card in the ATM's card reader.
2. The ATM verifies that the card that has been inserted is indeed a Visa card.
3. The ATM asks the Visa CardHolder to enter his or her pin number.
4. The Visa CardHolder enters his or her pin number.
5. The ATM compares the pin number with the one that is encoded on the chip of the card.
6. The ATM requests an authorisation from the VISA authorisation system.
7. The VISA authorisation system confirms its agreement and indicates the daily balance.
8. The ATM asks the Visa CardHolder to enter the desired withdrawal amount.
9. The Visa CardHolder enters the desired withdrawal amount.
10. The ATM checks the desired amount against the daily balance.
11. The ATM asks the Visa CardHolder if he or she would like a receipt.
12. The Visa CardHolder requests a receipt.
13. The ATM returns the card to the Visa CardHolder.
14. The Visa CardHolder takes his or her card.
15. The ATM issues the notes and a receipt.
16. The Visa CardHolder takes the notes and the receipt.

Exercise 7: Use Case Diagram Exercise- Possible Solution

Module CSU22041

**What questions/clarifications would you ask for the next iteration of modelling?**

## Use Case Description: Error Scenario

**Error sequences:**

*E1: invalid card*

The E1 sequence starts at point 2 of the main success scenario.

3. The ATM informs the Visa CardHolder that the smartcard is not valid (unreadable, expired, etc.) and confiscates it; the use case fails.

*E2: conclusively incorrect pin number*

The E2 sequence starts at point 5 of the main success scenario.

6. The ATM informs the Visa CardHolder that the pin is incorrect for the third time.
7. The ATM confiscates the smartcard.
8. The VISA authorisation system is notified; the use case fails.

*E3: unauthorised withdrawal*

The E3 sequence starts at point 6 of the main success scenario.

7. The VISA authorisation system forbids any withdrawal.
8. The ATM ejects the smartcard; the use case fails.