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CSU22041: Information Management I

Information Modeling
Using
The Unified Modelling Language (UML)

2020-2021

Gaye Stephens gaye.stephens@tcd.ie

… the **art of communication** of the design of information..

Todays Session overview

- Review the Module Assessment
- Take Stock of where we are with the Assignment and Notes
- Look at an example UML exam question
- Observations and Feedback on Group work
- UML Exercises
- Working on your assignment In your blackboard groups

Module Assessment

- Coursework (20%)- Coursework will consist of a Group project with two parts

- Examination(80%)- More information will be given about the exam throughout the module

Group Project has 2 Parts

- Part 1: Group Project - Information Modeling (UML)

1. A recorded* **5 minute** presentation by the group on either Use Cases or Class Diagram or Activity Diagrams or Ethics Canvas) of your interim design, **including** strengths and weaknesses of the aspect of design. Each group can decide which aspect they would like to present. * Assuming you have access to facilities to do this.

2. A group UML Report

- Part 2: Group Project- eXtensible Markup Language (XML)

1. Demonstrate your XQueries during online sessions.
2. A group XML/Xquery Report

Check assignment sheet and assignment slides for full details concerning the assignment

Group-Project Evaluation and Marking

- Team mark, allocated to each team member

- Project Criteria
  - Adherence to the criteria (see earlier slides)
  - Quality of the designs, demos, reports

- Presentations
  - Quality of presentations made

- Marking

  Practical Tasks

  Part 1.- Presentation (20% marks)

  Part 2.- XML-based Implementation- X- Queries (10% marks)

  Design-Report Tasks

  Part 1.- UML Design Report (40% marks)

  Part 2.- XML Report (30% marks)

Check assignment sheet and assignment slides for full details concerning the assignment

Exam Question

Prof. Declan O'Sullivan Trinity Term 2018

1. Using UML diagrams and associated textual descriptions, design an information system to support aspects of the operation of an **Airport** (for example Dublin or Shannon Airport).

(a) Model at least 6 UML classes (each with at least 2 attributes) representing your information and include labels showing cardinalities, named associations and association roles between the classes.
Do not have more than 2 subclasses modelled in your model. Only include maximum of one aggregation association. [8 marks]

(b) Model 2 UML use cases (include diagrams and standard textual descriptions (e.g. preconditions etc.)) that will be supported by these classes. [6 marks]

(c) Provide a UML Activity diagram for each use case that indicates the flow of activities that will implement the UML use case provided in part (b) above. [6 marks]

(d) Provide a detailed commentary on the design decisions you took during the modelling tasks (a) to (c) above, and any ethical concerns that may need to be addressed during the design or implementation of the system. [5 marks]

[Total 25 Marks]

Two main changes to the exam this year.

1. The length of the exam has been extended

2. A change will be made to the weighting for each part of the question. I will be increasing the weighting for part d) and reducing the weighting for parts a) b) and c)

With the help of a use case diagram, you can communicate:

- The scope of the system
- Functionality of the system (tasks your information model supports)
- The people, organizations, or external systems using the system

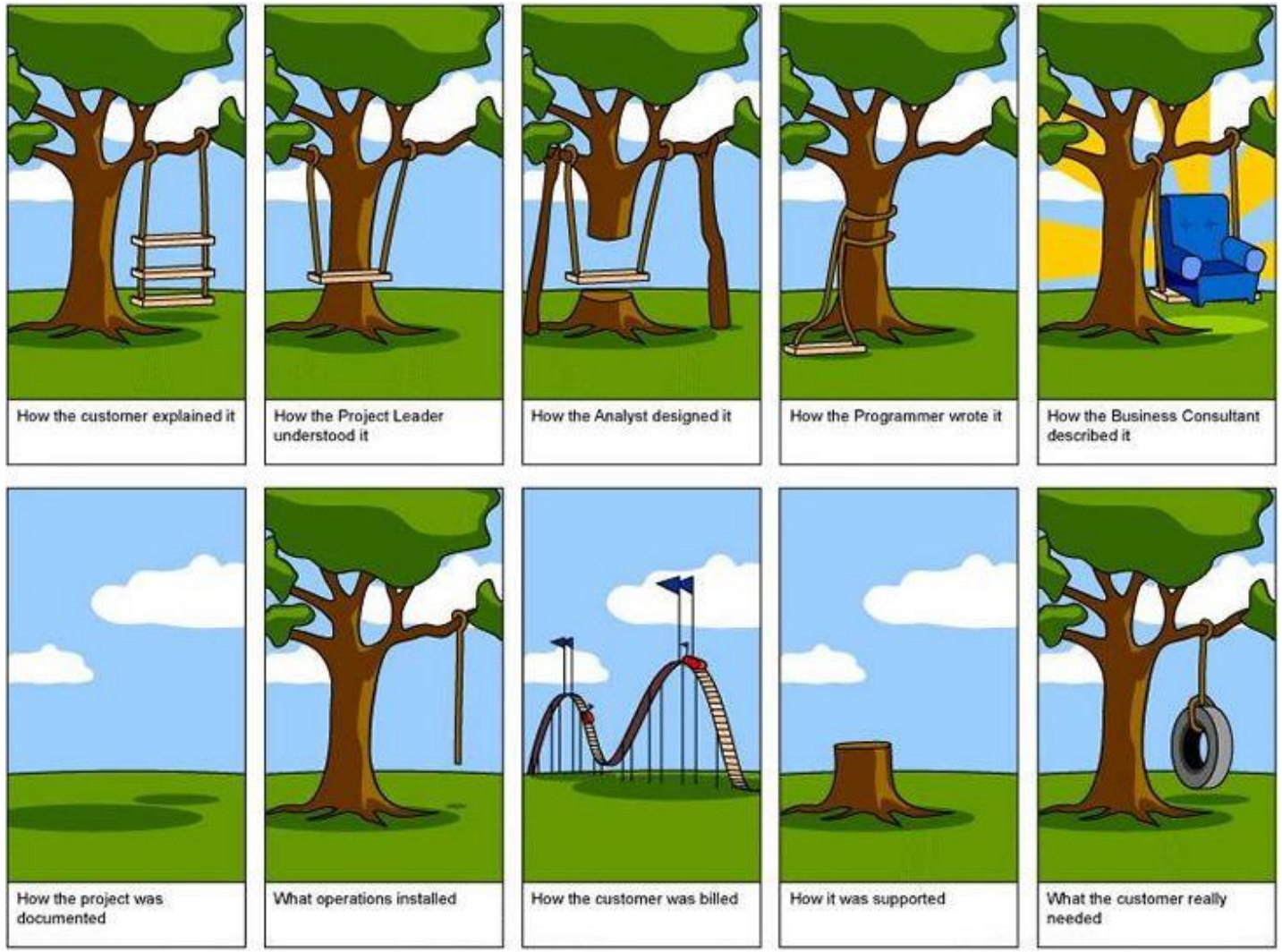
Use cases: advantages

•Documents behaviour of the system *from the user's point of view.*
Useful for…

•... Capturing Requirements
- Provides structure to the activity
- Find what user needs from system and uses cases that have direct value for them
- Find other situations where user interacts with the system

•… Planning iterations of development
- Estimation
- Negotiation
- Politics !
- High risk use case identification… do first

•… Validating Systems
- Upon implementation … "Walk the use cases" along with other diagrams.


How the customer explained it
How the Project Leader understood it
How the Analyst designed it
How the Programmer wrote it
How the Business Consultant described it
How the project was documented
What operations installed
How the customer was billed
How it was supported
What the customer really needed

Interesting Reads …..

London Ambulance Service- https://pdfs.semanticscholar.org/23ea/815b5f5e3a28d872bbe07c0504e166246e8b.pdf

Therac Disaster- http://sunnyday.mit.edu/papers/therac.pdf

PPARS- Irish Health Service- https://www.imt.ie/opinion/guest-posts/could-ppars-happen-again-a-costly-lesson-for-the-hse-02-11-2007/

NIMIS Less than symbol Incident- https://www.hse.ie/eng/services/publications/hospitals/nimis-less-than-symbol-incident.pdf

When you are finished reading reflect on one of the incidents and list the points which caused/exacerbated/contributed to the situation.

Group Projects – A selection of observations, feedback and responses to student questions.

Extracts from the Module Announcement emails

1.Some of the use cases had a large amount of use cases.
This is fine but there is no need to create use case descriptions for more than 8 of them. If your use case diagram has more than 8 use cases, then select 8 to describe. This will give you an opportunity to select the most important ones or the most complex ones or maybe the ones you think would get you some quick wins when communicating with the person you are creating the model for.

2. If the use case diagram is getting big and unwieldy , it can be divided up. Remember one of the main reasons for using UML is to support communication. If you do divide your diagram up please ensure that you make it clear to users that there are other parts to it. So, for example if you had 3 use case diagrams you could label the first one 1 of 3 and so on.

3. Now that you have seen all the types of diagrams it would be a good idea to think about which one your group will choose to include in the presentation. **Choose the diagram you can describe the best and that you think gives you an opportunity to talk about your information system and the work that you have done so far.**
Tip: you could imagine that you are presenting your work to the person you are creating the model for.

4. Remember to **divide the work** up among the various group members.

Extracts from the Module Announcement emails

5. **In lots of the groups today there was very good discussion, reflecting and decision making happening.** Please try to get this across in your reports. For example rather than saying "here are our 15 classes" you could say "The diagram below shows the 15 classes that we as a group felt were the most important classes we should include to support user functionality. We considered other classes that may be useful in another phase of the project. These other classes are listed in the appendix.

6. **A page count or word count hasn't been set for the report.** The report will mainly be comprised of diagrams and tables with a small amounts of text. So your report size will vary according to the diagrams you create. If you want to show earlier versions of your diagrams you can include these in an appendix. You might want to do this to indicate how your diagram developed over time.

7. There were a variety of **software tools** used e.g. lucidchart, visual paradigm, drawio, visio. If you choose the tool purposefully you could describe the reasons for your choice in the report. If it is more convenient, you can draw your diagrams by hand and include clear photos of them in the report.

8. **The submission of the report and the presentation will be via blackboard**- I have not made these links visible yet.

Some observations on Use Cases

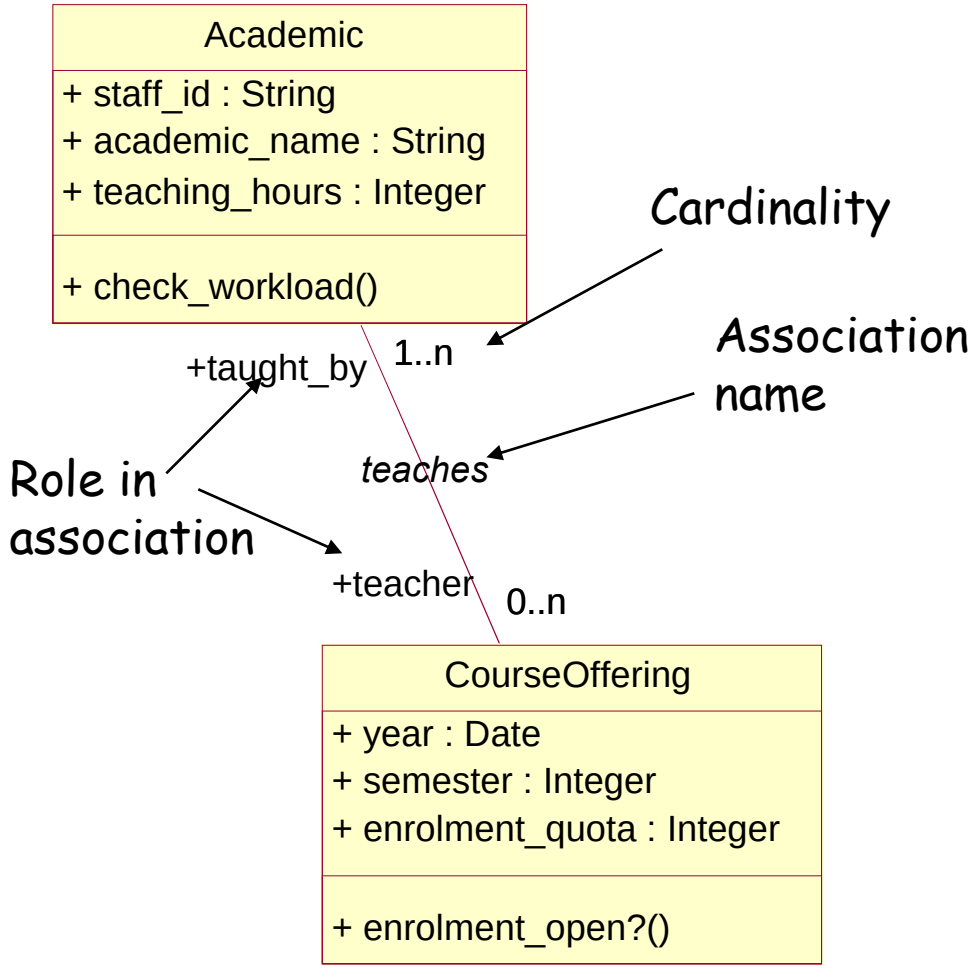
- Majority of students are using box, actors, oval, arrows, lines properly for UC diagrams
- Some students showed use of extends and includes
- Some good examples of error scenarios
- Varying formats of textual descriptions
- Good use of Actor description tables
- Good use of Actor/Use case tables

•Take note of

- Action words to label Use Cases
- The difference between manual/business Use cases and system use cases
- The direction of arrows on extend and include relationships
- Use terms relevant to the domain of interest
- Avoid abbreviations, computer terms or acronyms

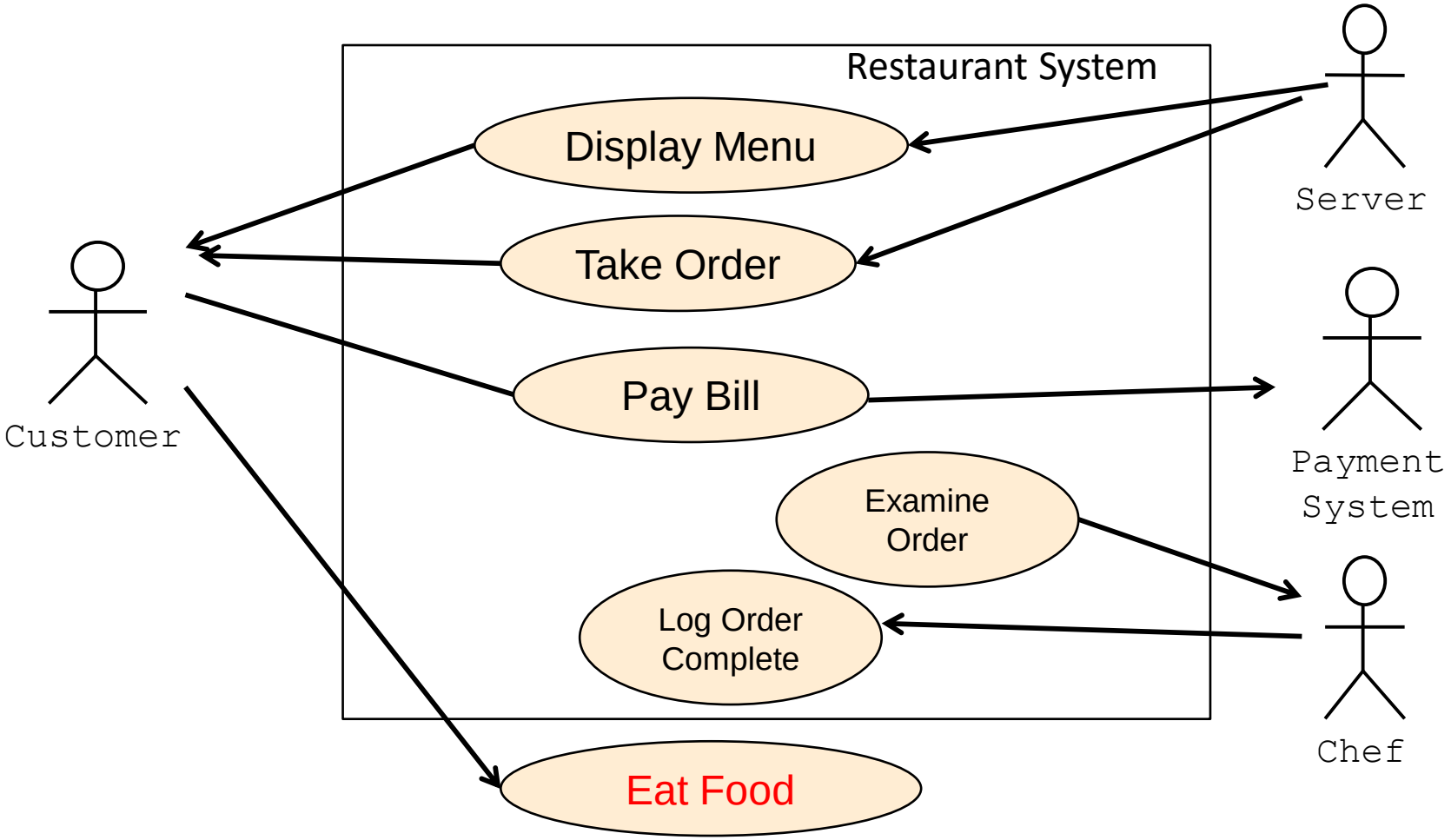
Some observations on Class diagrams from Group work

- In general good at identifying classes and attributes.
- Good use of lists by some to identify classes- this is a chance for your group to demonstrate the thinking process you went through when designing your diagram
- Remember to Include attribute types
- Very variable naming of associations, labelling of lines
- You MUST include roles and cardinalities!!!



CourseOffering is taught_by one or more academics
Academic is teacher_of zero or more course offerings

One Possible Solution



Note that we can model "Eat Food" if we like in our diagram
BUT as the INFO SYSTEM does not support it, it is drawn outside the box

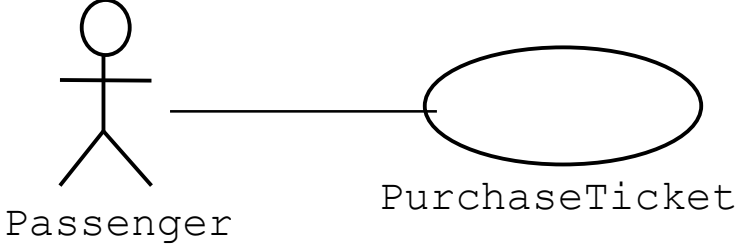
Example Table of Actors

Actor	Synonym	Role
Student		An individual who will attend courses, do assignments and produce results
Data Entry Staff	Administrator	……
Registrar Office		…….
Student Information System	SIS	…….
Department delegate	Academic	……..

Example Use-Case/Actor Table

Use Case Name	Participating Actors
Validate Program of Study	Academic
Program of Study Entry	Data Entry Staff, Academic
Approve Program of Study	Registrar Office, Student, Academic
Provide Exam Results	Student, SIS
Provide Enrolment instructions	Student, SIS
Provide Previous Programs of Study	Student

Modelling what the system will do: Use Case Descriptions Step 5



1. Name: `Purchase ticket`

2. Participating actor: `Passenger`

3. Entry condition:

- `Passenger` stands in front of ticket distributor
- `Passenger` has sufficient money to purchase ticket

4. Exit condition:

- `Passenger` has ticket

5. Normal Scenario:

1. `Passenger` selects the number of zones to be traveled
2. Ticket Distributor displays the amount due
3. `Passenger` inserts money, at least the amount due
4. Ticket Distributor returns change
5. Ticket Distributor issues ticket

6. Error Scenario:

Some money inserted of wrong type

- Return money and provide explanation.

Example High-Level Version of a Use-Case Textual Description

Member Services System

Author (s): (1) _____ **Date:** (2) _____

Version: (3)

Use-Case Name:	Place New Order (4)	**Use-Case Type** **Business Requirements:** ☑ (5)
Use-Case ID:	MSS-BUC002.00 (6)	
Priority:	High (7)	
Source:	Requirement — MSS-R1.00 (8)	
Primary Business Actor:	Club member (9)	
Other Participating Actors:	• Warehouse (external receiver) • Accounts Receivable (external server) (10)	
Other Interested Stakeholders: (11)	• Marketing — Interested in sales activity in order to plan new promotions. • Procurement — Interested in sales activity in order to replenish inventory. • Management — Interested in order activity in order to evaluate company performance and customer (member) satisfaction.	
Description: (12)	This use case describes the event of a club member submitting a new order for SoundStage products. The member's demographic information as well as his or her account standing is validated. Once the products are verified as being in stock, a packing order is sent to the warehouse for it to prepare the shipment. For any product not in stock, a back order is created. On completion, the member will be sent an order confirmation.	

Sample Expanded Version of a Use-Case Textual Description

Member Services System

Author (s): _____ **Date:** _____

Version:

Use-Case Name:	Place New Order	**Use-Case Type** **Business Requirements:** ☑
Use-Case ID:	MSS-BUC002.00	
Priority:	High	
Source:	Requirement — MSS-R1.00	
Primary Business Actor:	Club member	
Other Participating Actors:	• Warehouse (external receiver) • Accounts Receivable (external server)	
Other Interested Stakeholders:	• Marketing — Interested in sales activity in order to plan new promotions. • Procurement — Interested in sales activity in order to replenish inventory. • Management — Interested in order activity in order to evaluate company performance and customer (member) satisfaction.	
Description:	This use case describes the event of a club member submitting a new order for SoundStage products. The member's demographic information as well as his or her account standing is validated. Once the products are verified as being in stock, a packing order is sent to the warehouse for it to prepare the shipment. For any product not in stock, a back order is created. On completion, the member will be sent an order confirmation.	
Precondition: 1	The party (individual or company) submitting the order must be a member.	
Trigger: 2	This use case is initiated when a new order is submitted.	

continued

Sample Expanded Version of a Use-Case Textual Description (cont)

Typical Course of Events: 3	Actor Action	System Response
	Step 1: The club member provides his or her demographic information as well as order and payment information.	**Step 2:** The system responds by verifying that all required information has been provided. **Step 3:** The system verifies the club member's demographic information against what has been previously recorded. **Step 4:** For each product ordered, the system validates the product identity. **Step 5:** For each product ordered, the system verifies the product availability. **Step 6:** For each available product, the system determines the price to be charged to the club member. **Step 7:** Once all ordered products are processed, the system determines the total cost of the order. **Step 8:** The system checks the status of the club member's account. **Step 9:** The system validates the club member's payment if provided. **Step 10:** The system records the order information and then releases the order to the appropriate distribution center (warehouse) to be filled. **Step 10:** Once the order is processed, the system generates an order confirmation and sends it to the club member.

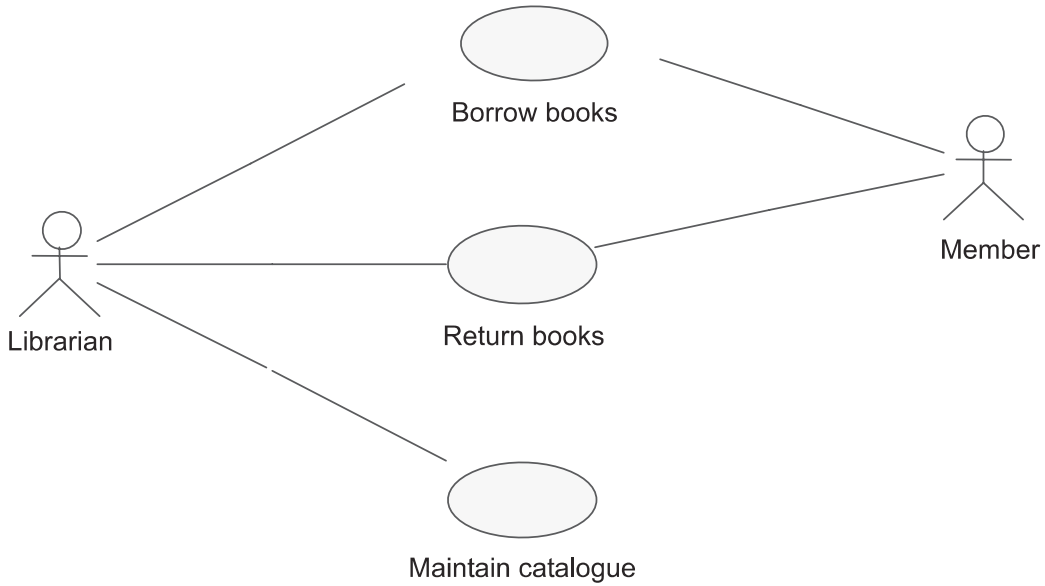
continued

Sample Expanded Version of a Use-Case Textual Description (cont)

Alternate Courses: 4	**Alt-Step 2:** The club member has not provided all the information necessary to process the order. The club member is notified of the discrepancy and prompted to resubmit. **Alt-Step 3:** If the club member information provided is different from what was previously recorded, verify what was recorded is current, then update the club member information accordingly. **Alt-Step 4:** If the product information the club member provided does not match any of SoundStage's products, notify the club member of the discrepancy and request clarification. **Alt-Step 5:** If the quantity ordered of the product is not available, a back order is created. **Alt-Step 8:** If the status of the club member's account is not in good standing, record the order information and place it in hold status. Notify the club member of the account status and the reason the order is being held. Terminate use case. **Alt-Step 9:** If the payment the club member provided (credit card) cannot be validated, notify the club member and request an alternative means of payment. If the club member cannot provide an alternate means, cancel the order and terminate the use case.
Conclusion: 5	This use case concludes when the club member receives a confirmation of the order.
Postcondition: 6	The order has been recorded and if the ordered products were available, they were released. For any product not available a back order has been created.
Business Rules: 7	• The club member responding to a promotion or a member using credits may affect the price of each ordered item. • Cash or checks will not be accepted with the orders. If provided, they will be returned to the club member. • The club member is billed for products only when they are shipped.
Implementation Constraints and Specifications: 8	• GUI to be provided for Member Services associate, and web screen to be provided for club member.
Assumptions: 9	Procurement will be notified of back orders by a daily report (separate use case).
Open Issues: 10	1. Need to determine how distribution centers are assigned.

Exercise 1: Class Diagram Exercise
Module CSU22041

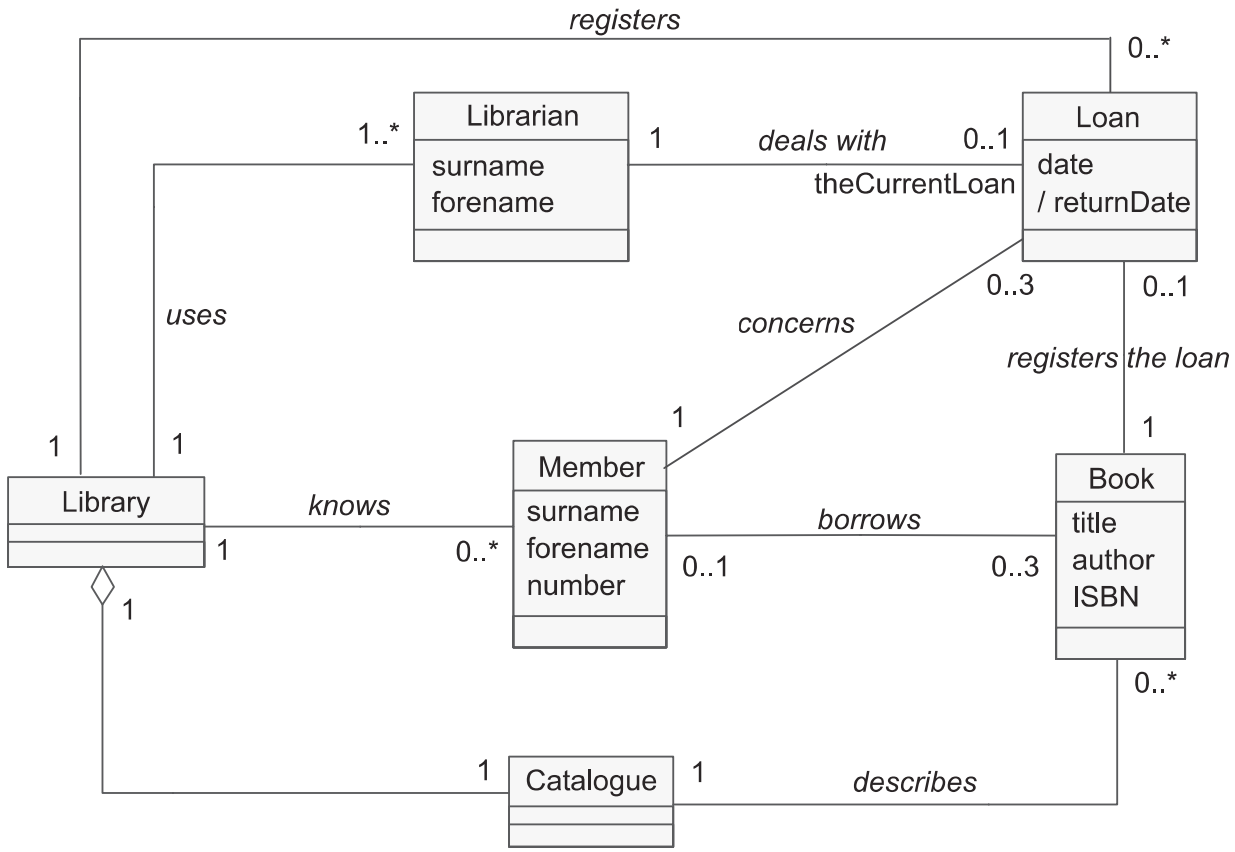
The use case diagram below shows the initial modelling for an information system for a library.
Draw a UML Class diagram including associations, cardinalities, roles and any derived attributes.
for a Library System including classes: Library, Loan, Catalogue, Member, Book, Librarian



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.

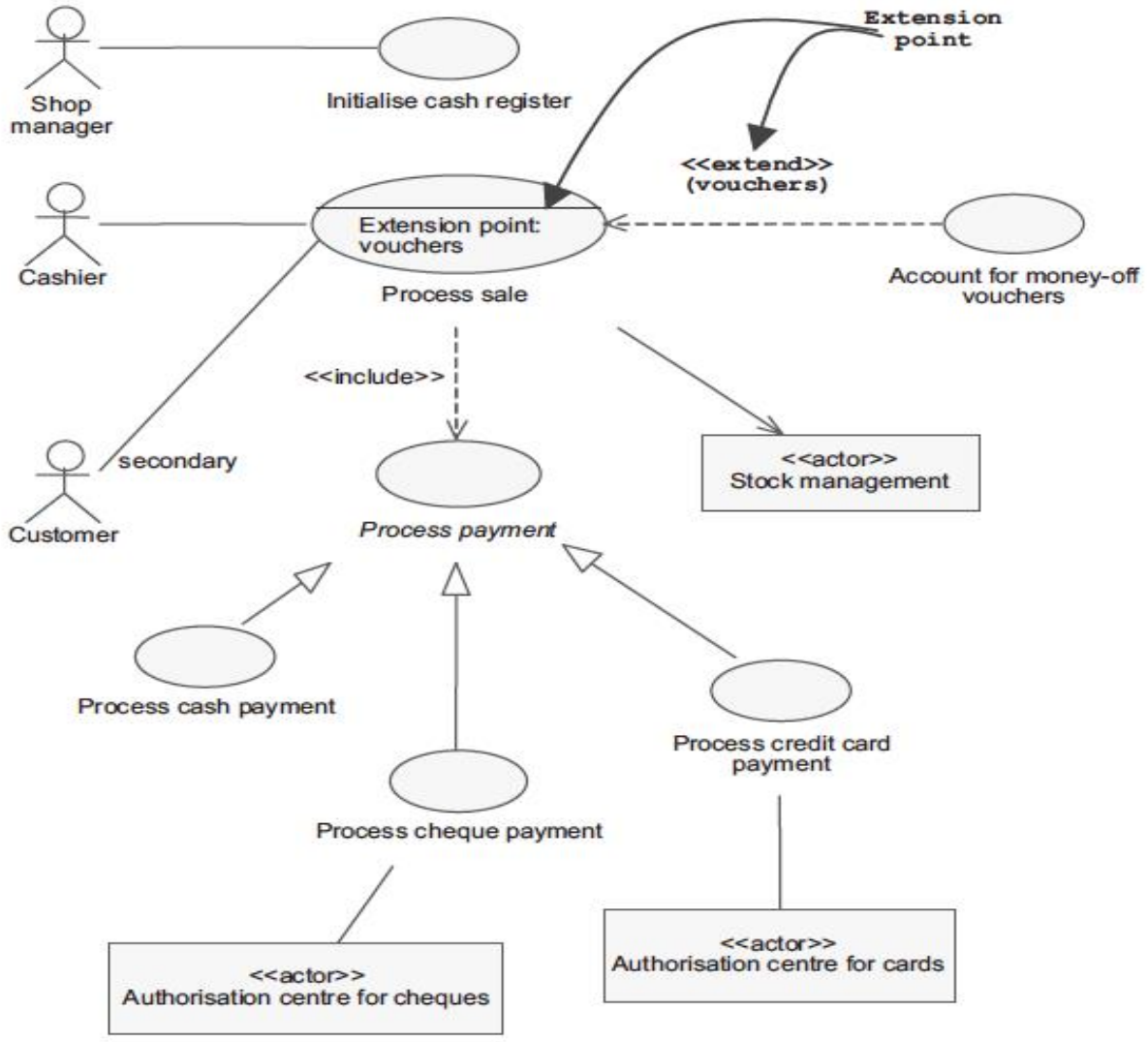
Once the items have been entered, the customer can present money-off vouchers for certain items to the cashier. When the payment transaction is finished, the cash register sends the information on the number of items sold to the stock management system.

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.

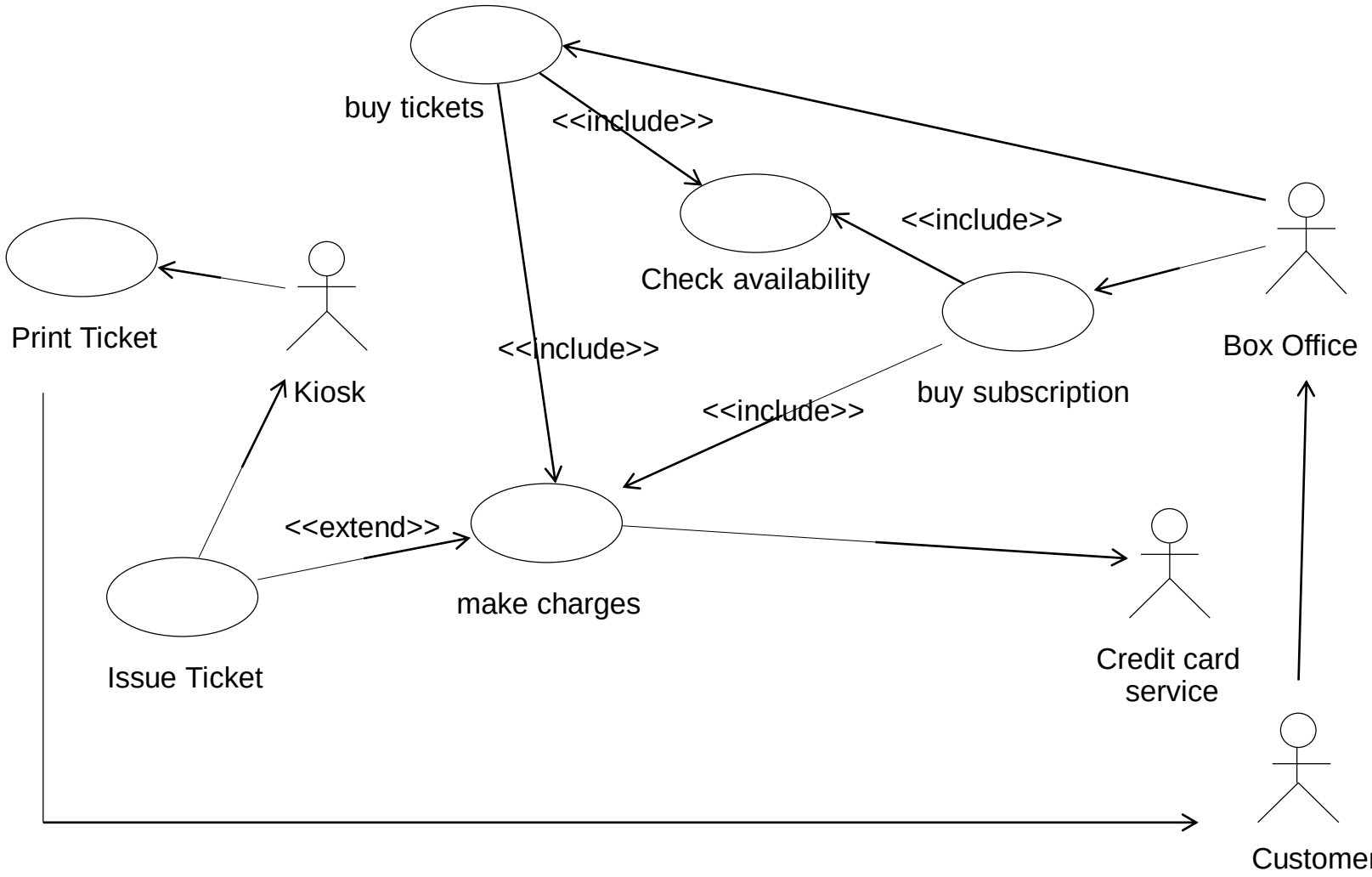
5. The cash register drawer does not contain enough change in order to give the customer the money he or she is owed.
6. The cashier asks his or her supervisor for more change, or suggests to the customer that he or she pay using a different payment method (Cf. "Process cheque payment", or "Process credit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

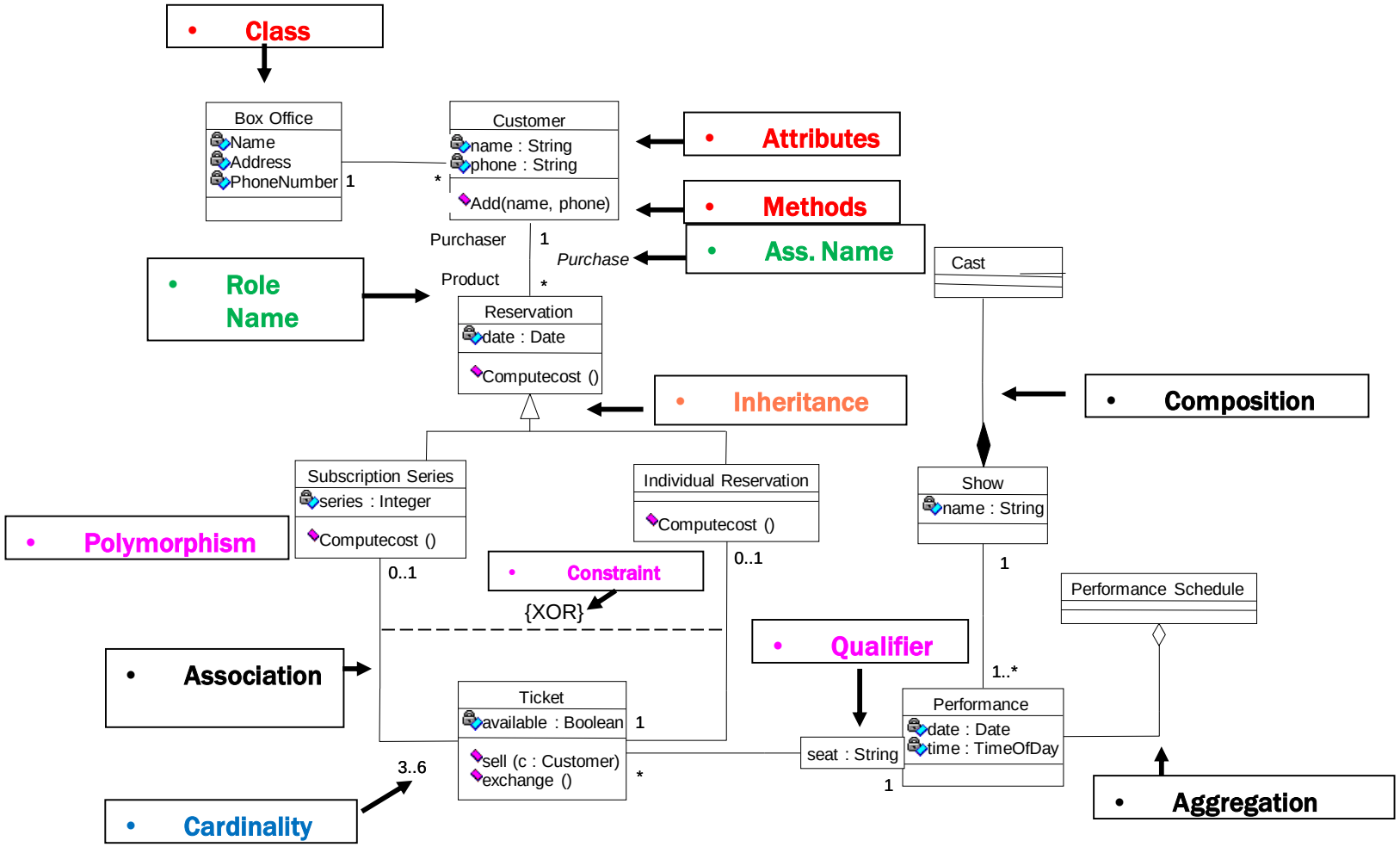
How is the seat number to be managed?

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?

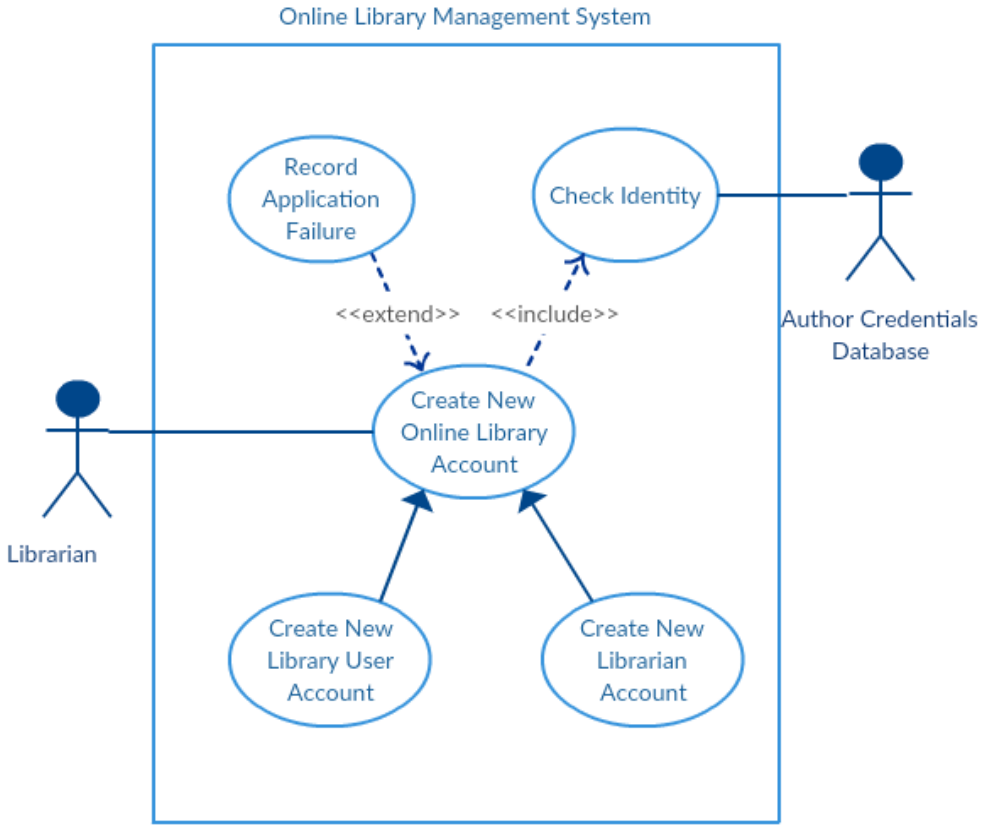


What questions/clarifications would you ask for the next iteration of modelling?

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'.

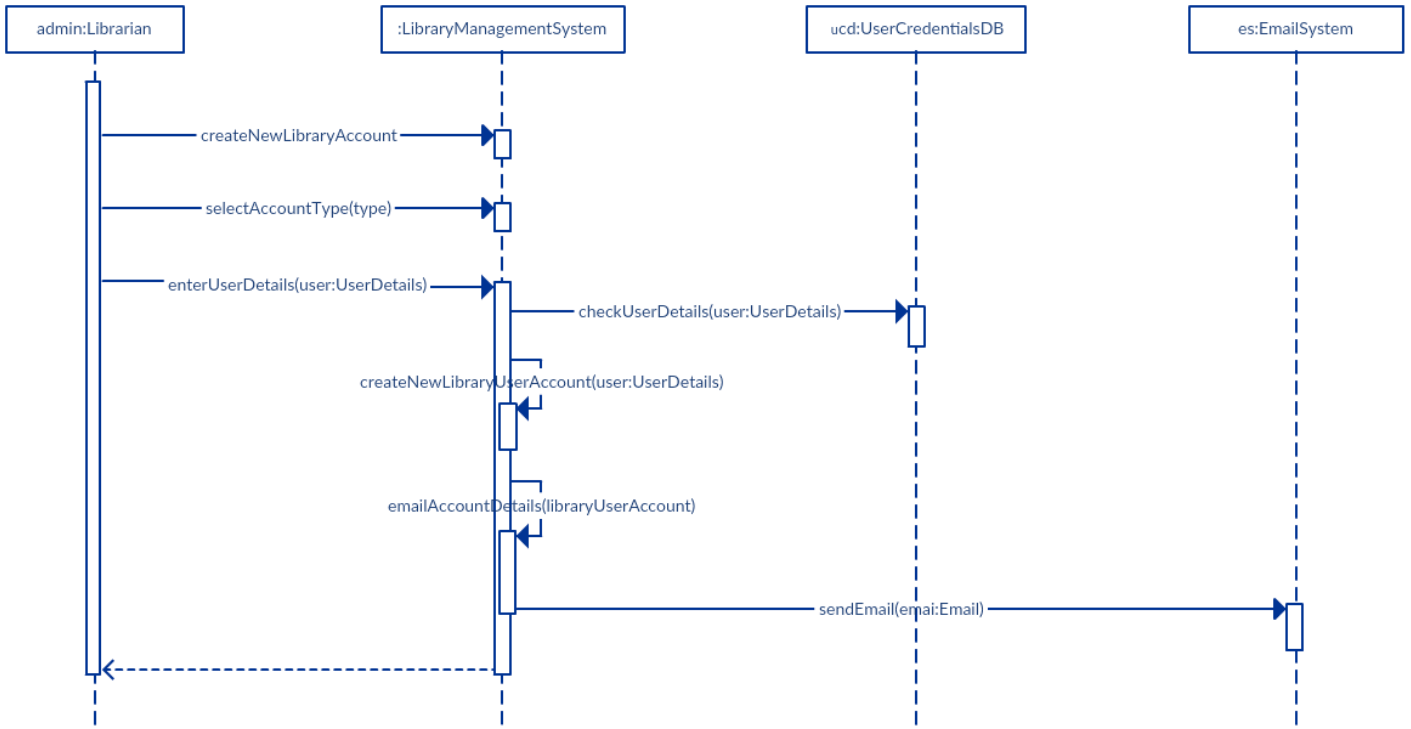
- The librarian request the system to create a new online library account
- The librarian then selects the library user account type
- The librarian enters the user's details
- The user's details are checked using the user Credentials Database
- The new library user account is created
- A summary of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

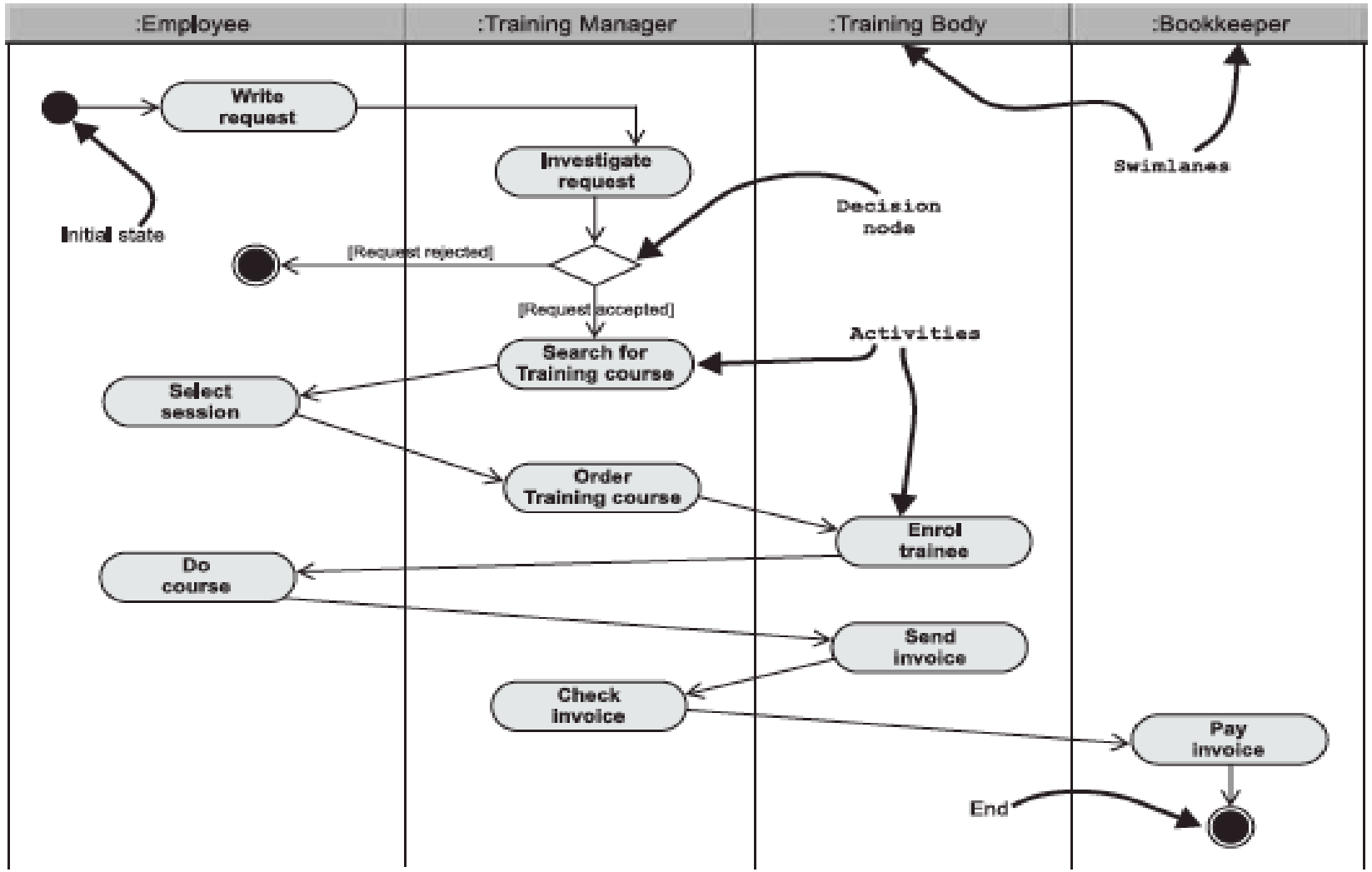
Let's suppose that an organisation wants to improve its information system and, first of all, wishes to model the training process of its employees so that some of their tasks may be computerised.

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.

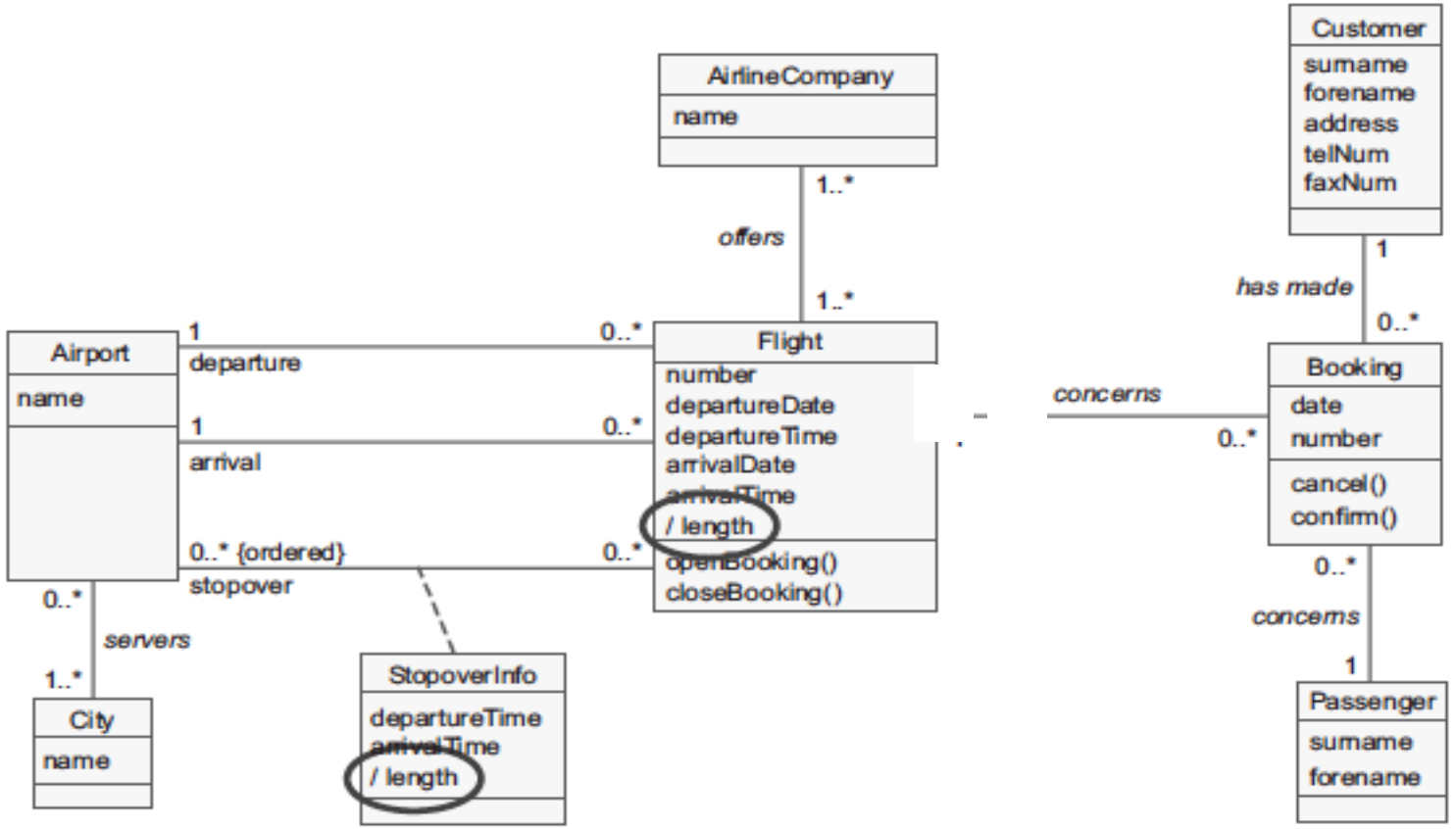
This case study concerns a simplified flight booking system for a travel agency.
The interviews that we had with domain experts enabled us to summarise their knowledge of the field in the form of the following sentences:

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.

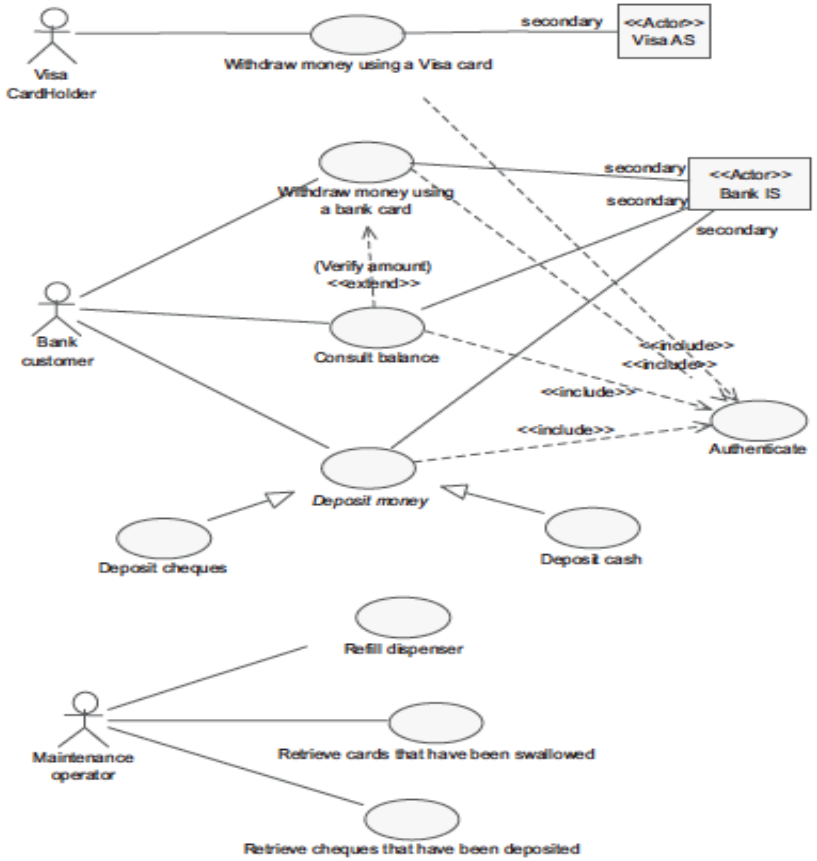
Do not forget either that:

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.

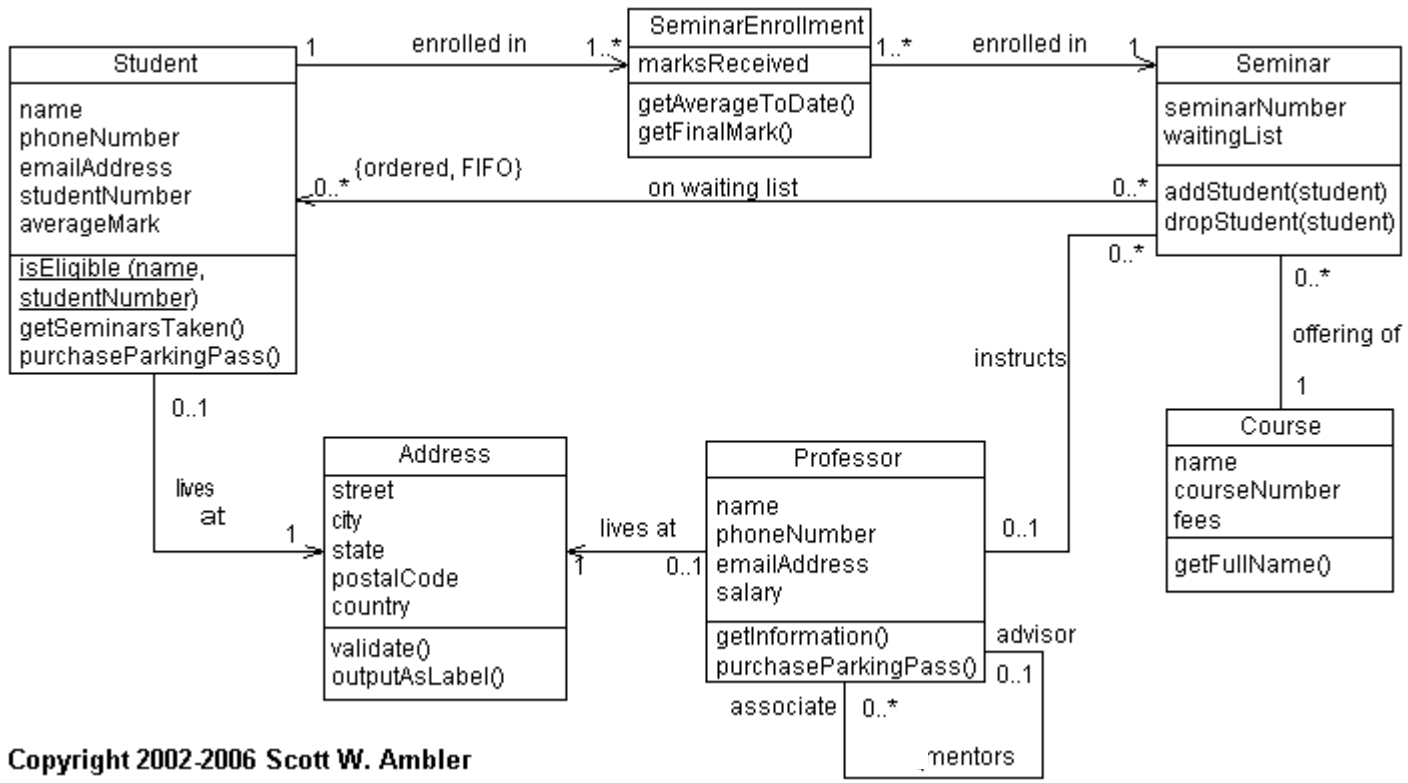
6. The ATM informs the Visa CardHolder that the pin is incorrect for the third time.
7. The ATM confiscates the smartcard.
8. The VISA authorisation system is notified; the use case fails.

E3: unauthorised withdrawal

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

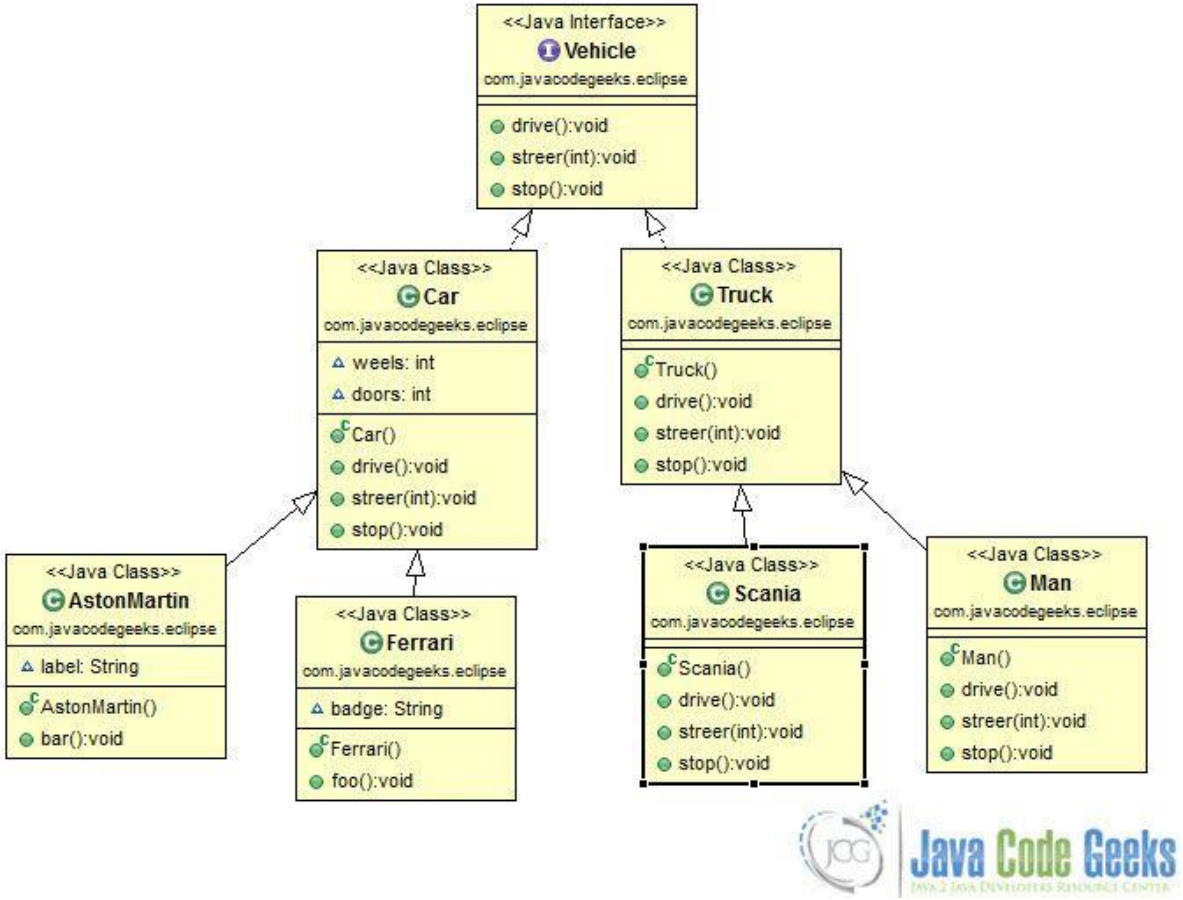
7. The VISA authorisation system forbids any withdrawal.
8. The ATM ejects the smartcard; the use case fails.

Example Class Diagrams to Read



https://images.app.goo.gl/ArbdAA3GxEQXm8Kq6

Example Class Diagrams to Read



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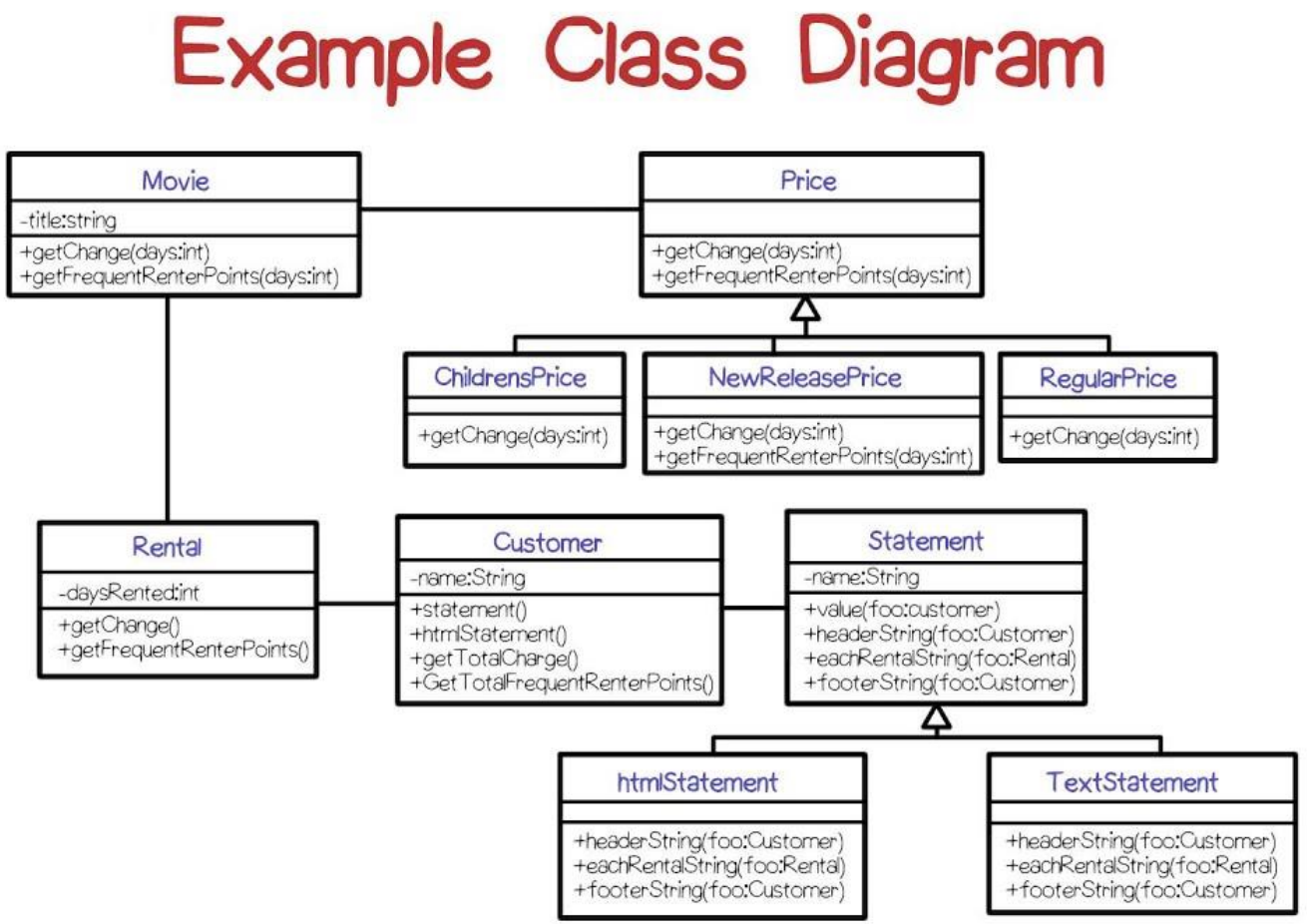
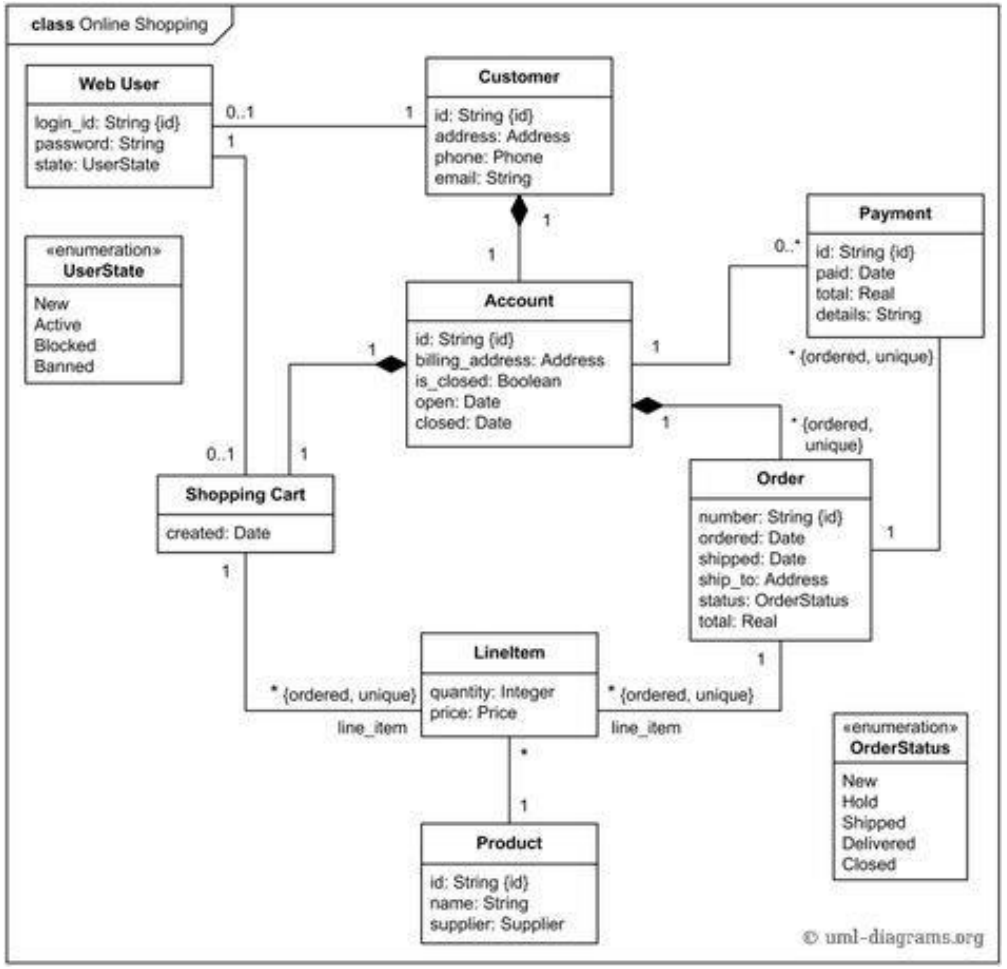
Example Class Diagrams to Read



https://www.youtube.com/watch?v=upTEbKE6epY

Example Class Diagrams to Read



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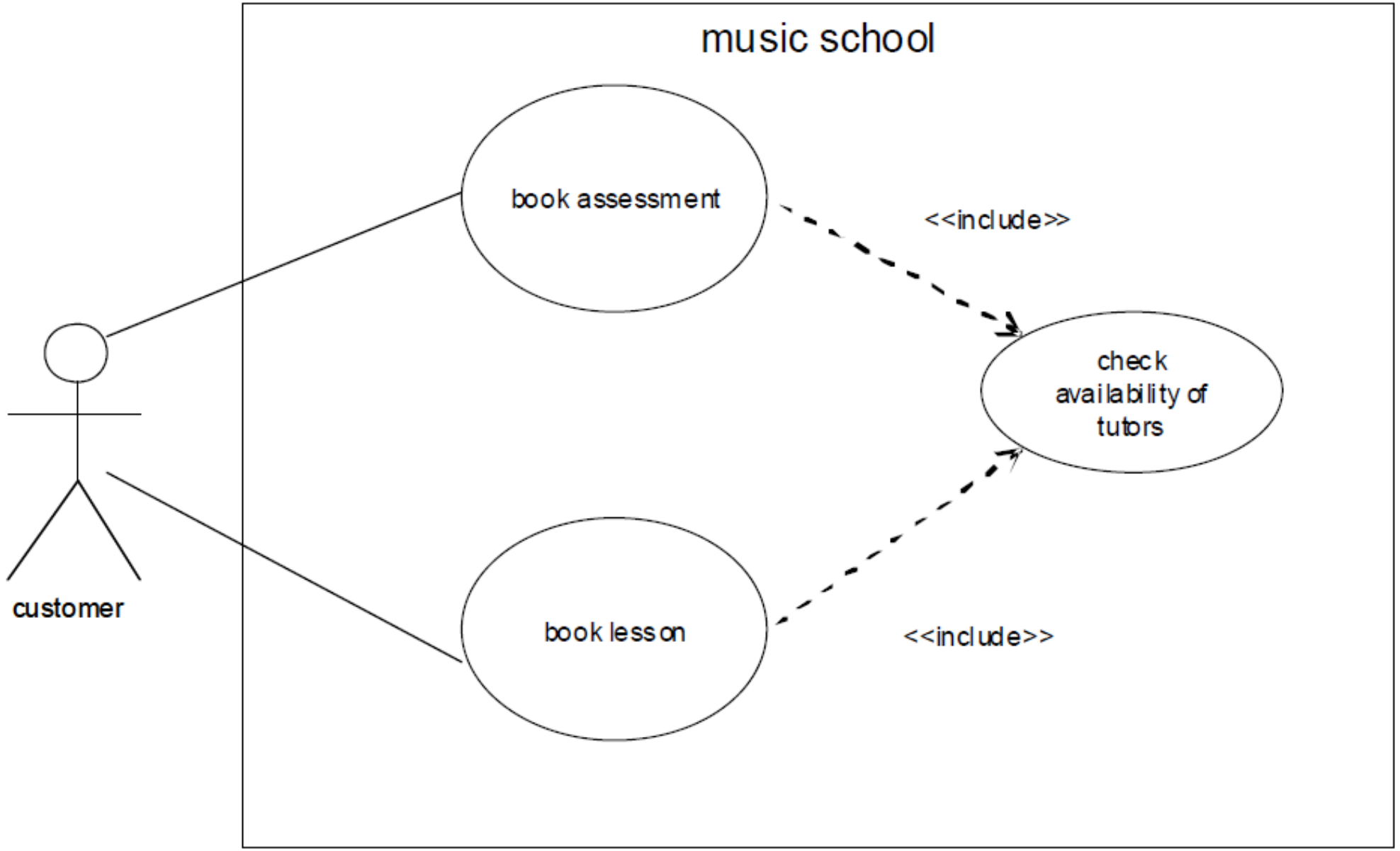


Fig 1.8. UML Use Case diagram showing two use cases including another

Many people get tripped up by <<include>> and <<extend>> relationships between use cases. Here are some tips for getting it right:

1. Make sure you've got the right kind of relationship: <<include>> means "always included", but <<extend>> means "conditionally included".
2. Make sure you've got the arrows going the right way. <<include>> should point towards the use case being included. <<extend>> should point towards the use case(s) being extended (and not the extending use case).

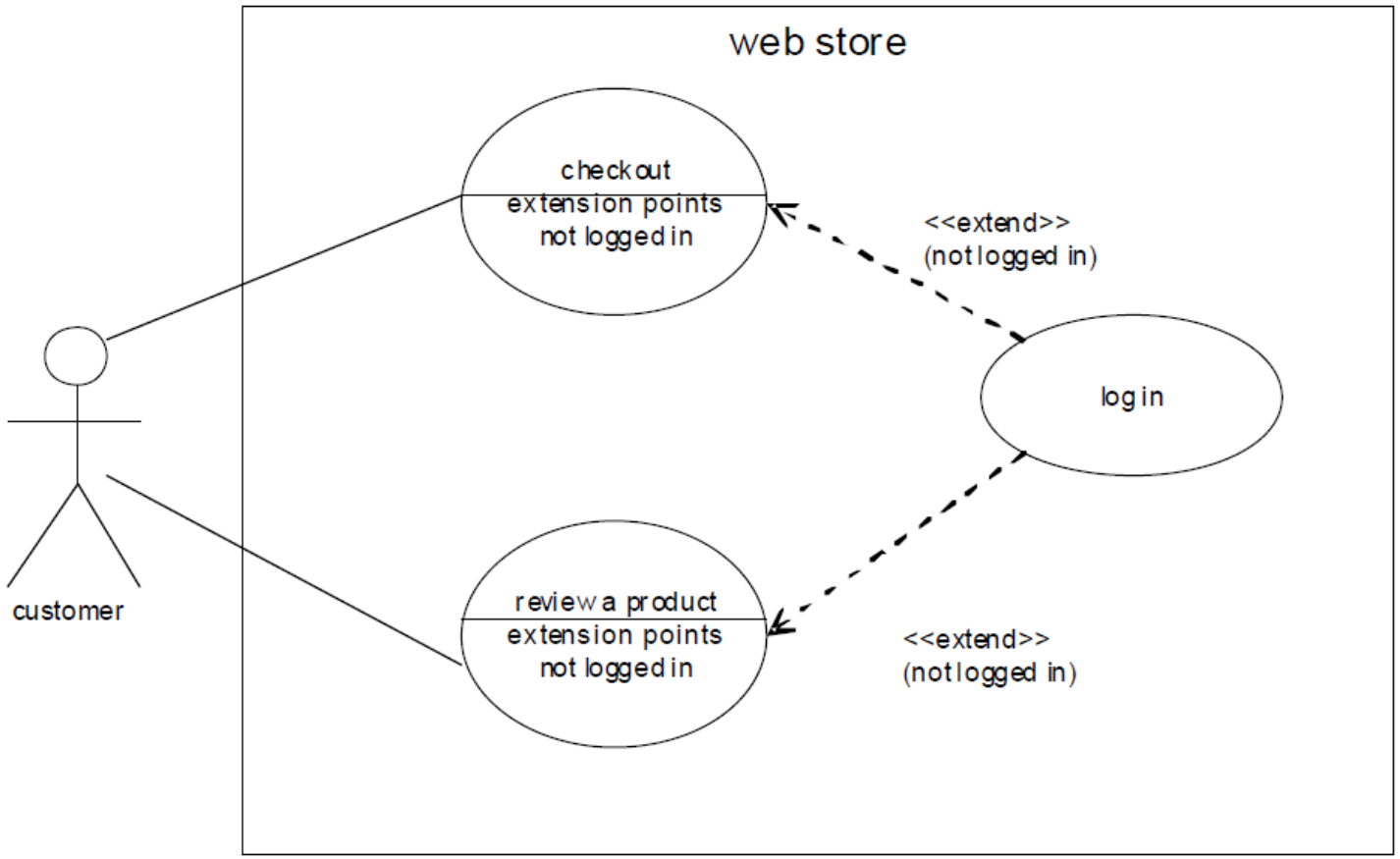
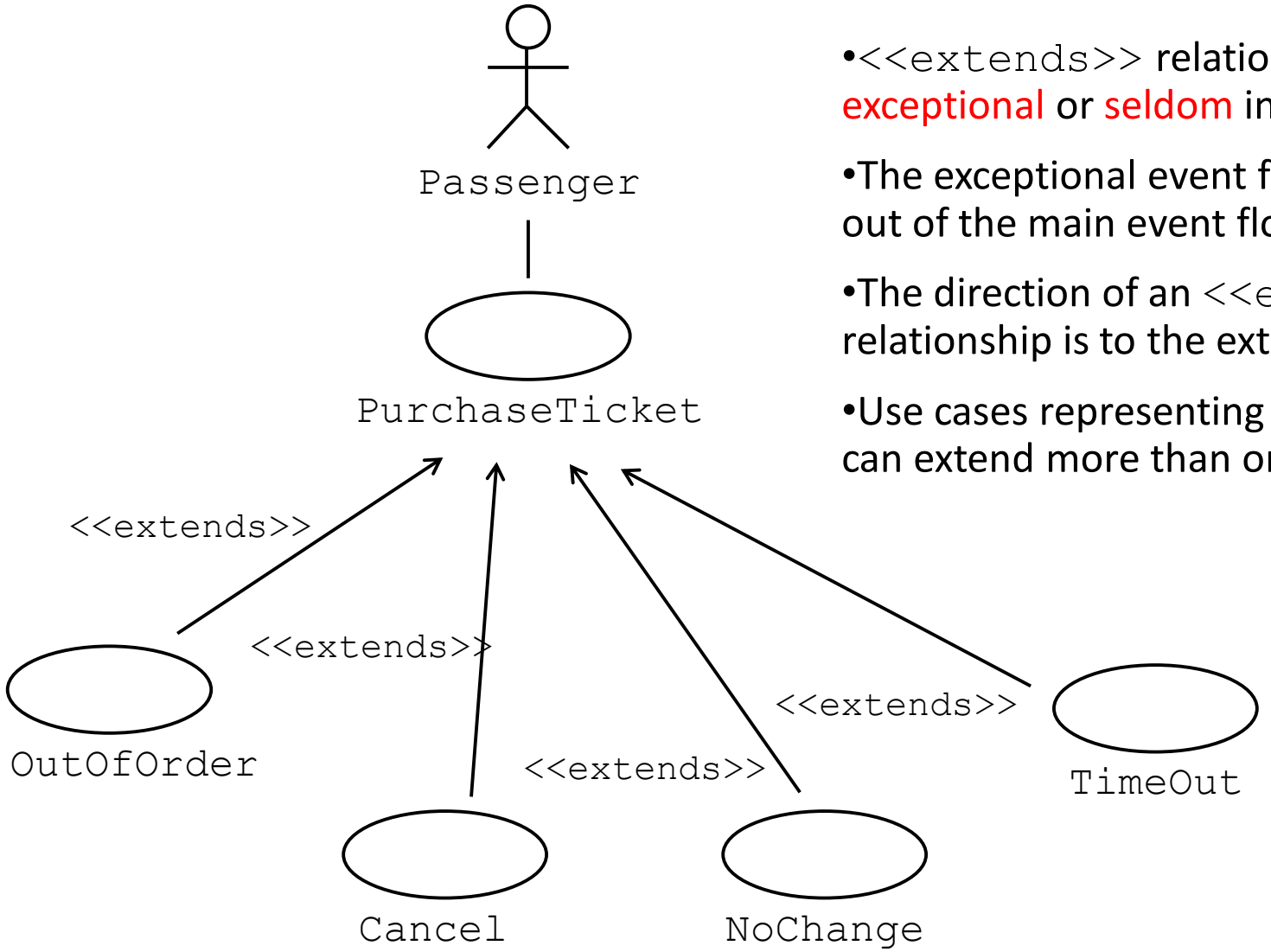


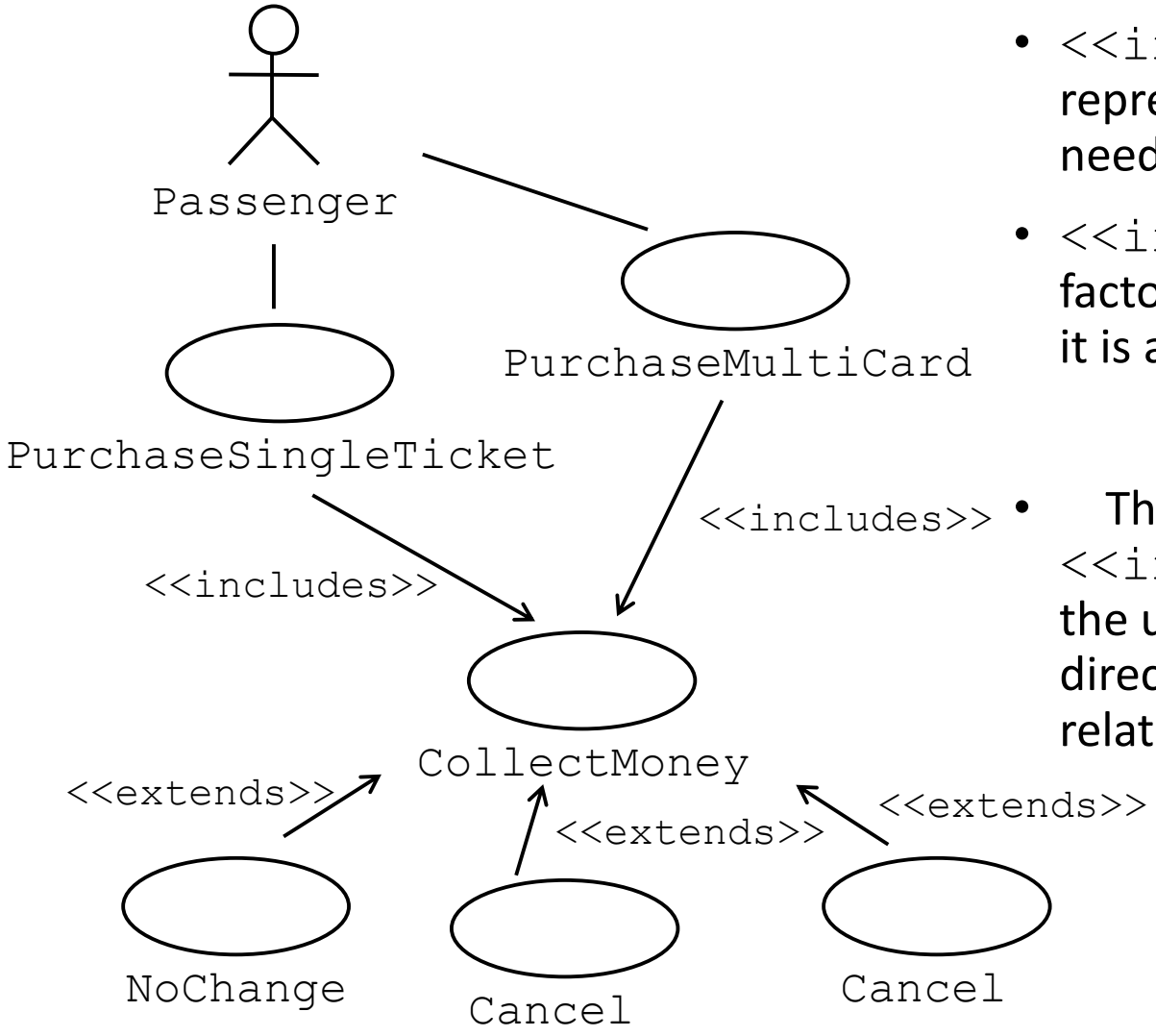
Fig 1.10. A UML Use Case diagram showing two use cases being extended by another

The <<extends>> Relationship- Buying a train ticket



- <<extends>> relationships model exceptional or seldom invoked cases
- The exceptional event flows are factored out of the main event flow for clarity
- The direction of an <<extends>> relationship is to the extended use case
- Use cases representing exceptional flows can extend more than one use case.

The <<includes>> and <<extends>> Relationships

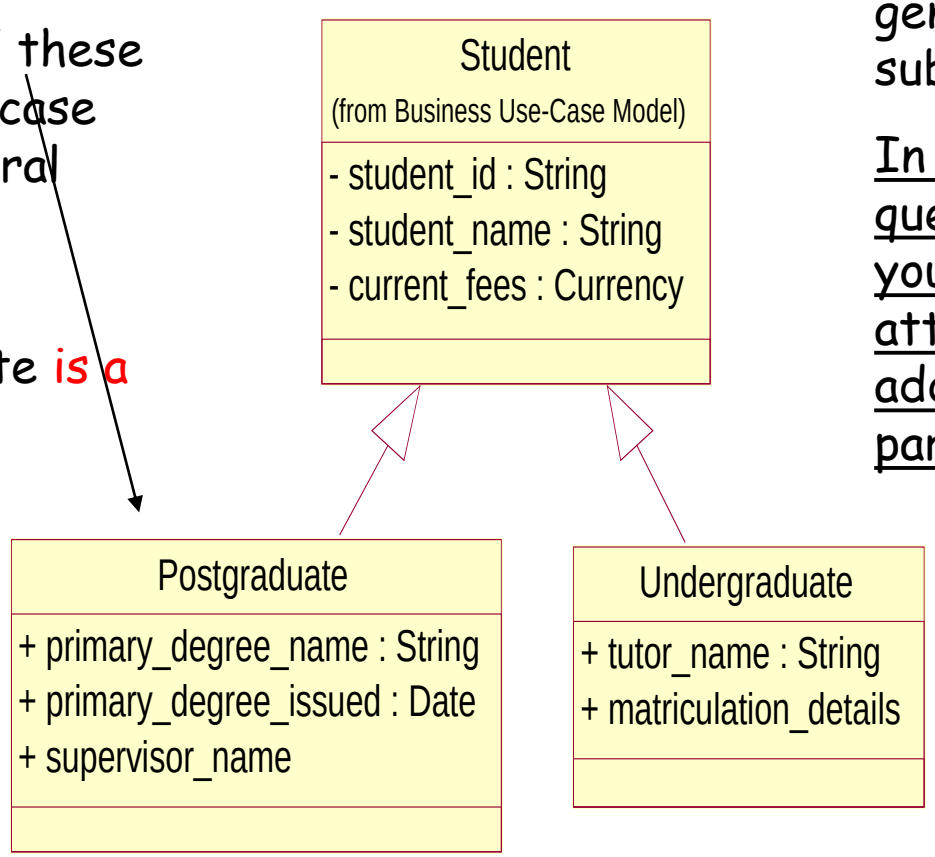


- <<includes>> relationship represents common functionality needed in more than one use case
- <<includes>> behavior is factored out for reuse, not because it is an exception
- The direction of a <<includes>> relationship is to the using use case (unlike the direction of the <<extends>> relationship).

Class association - generalisation

e.g. Each of these is a special case of the general class

"Every Postgraduate is a Student"

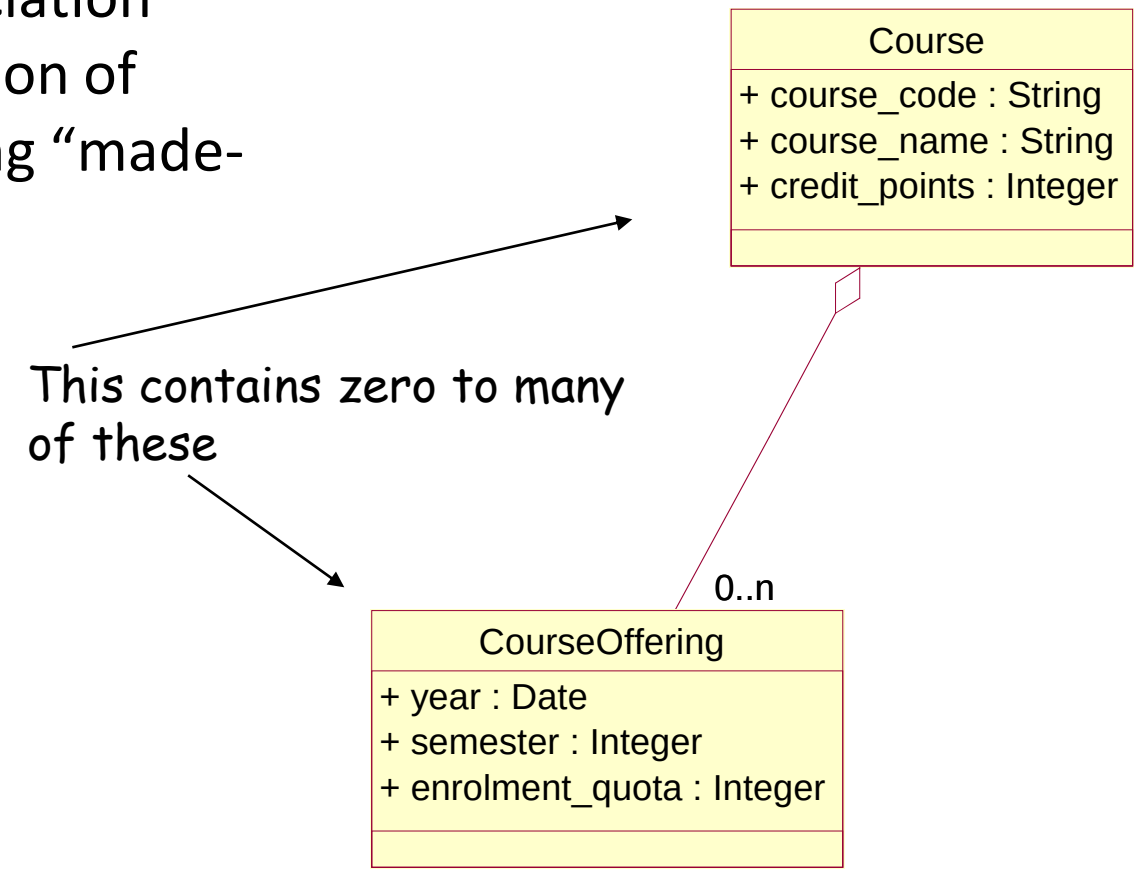


Define sub-classes of the general abstraction –like Java sub-classing

In Information Modelling; key question you should ask yourself is what new attributes does a subclass add that differentiates from parent class?

Class association - aggregation

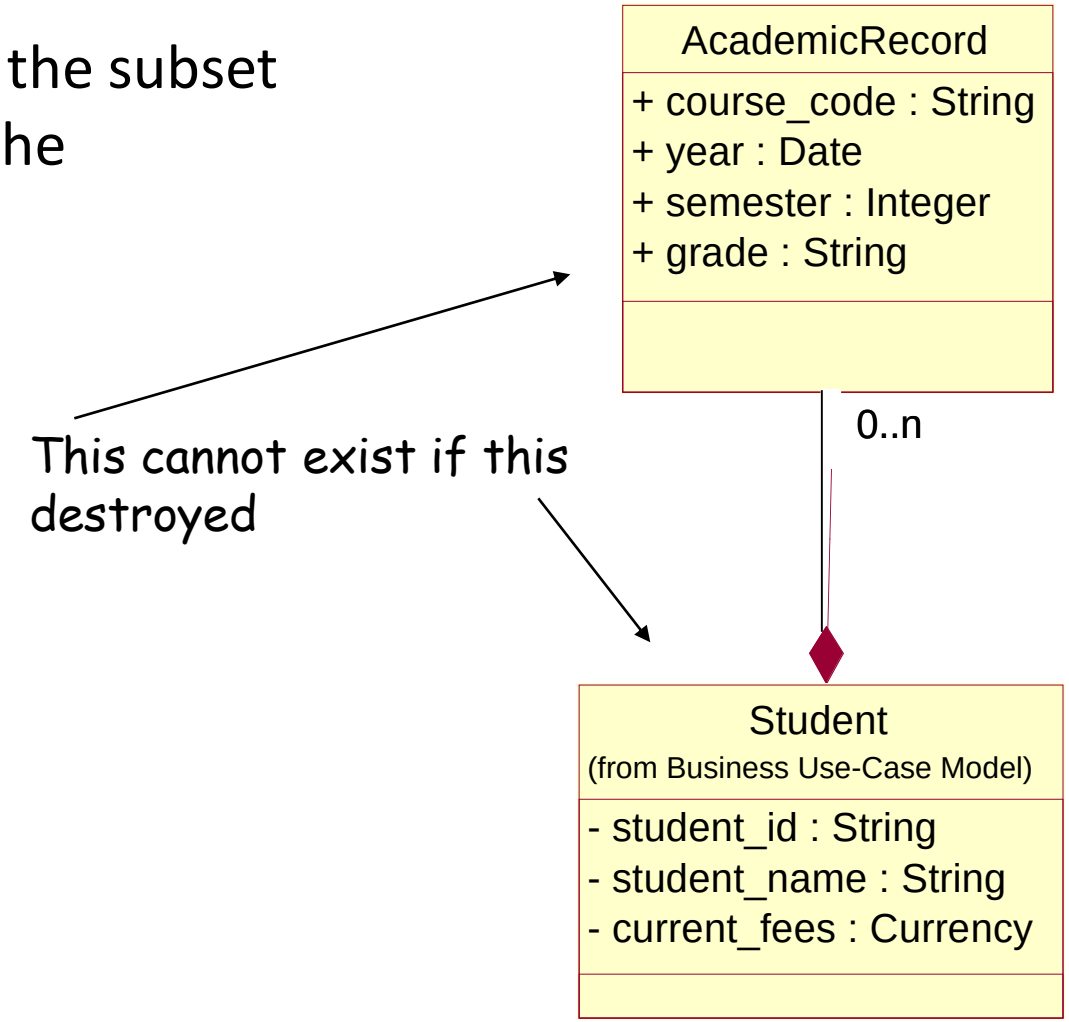
A stronger form of association where there's some notion of objects of one class being "made-up of" those of another



Known as "Aggregation by Reference"

Class association - composition

Aggregation except that the subset classes can only exist if the composed class exists



Known as
“Aggregation by Value”

That’s All Folks Thank You for Listening

"Please don't ask me to remind you to do anything else for awhile."