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CSU22041: Information Management I
Information Modeling
Using
The Unified Modelling Language (UML)

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

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UML Use Cases

What are UML **Use Case Diagrams** used for?

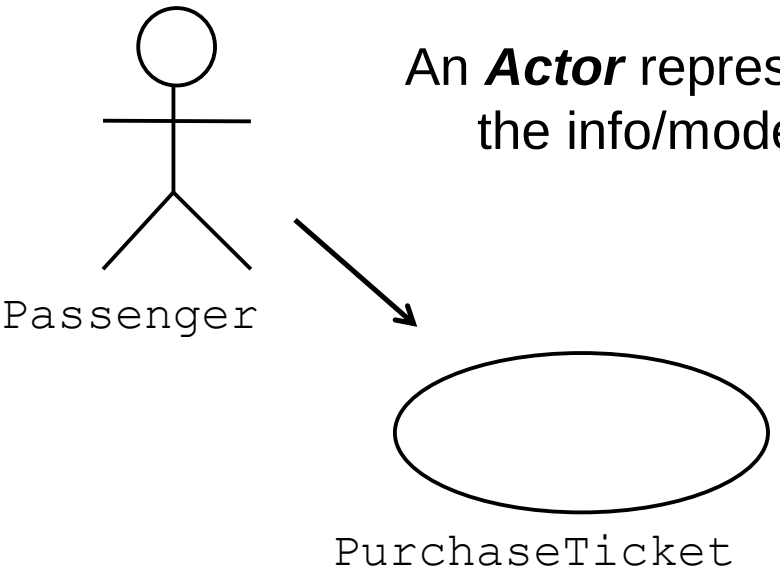
With the help of a use case diagram, you can communicate:

- The scope of the **tasks your information model supports** and **for whom** (people, organizations, or external systems)

UML Use Case Diagrams

Used during requirements elicitation and analysis to represent external behavior ("visible from the outside of the system")

An ***Actor*** represents a role, that is, a type of user of the info/model system



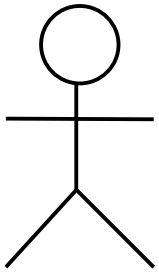
Line/Arrow, who involved in interaction

A single *use case* represents functionality provided by the system

Use case model:

The set of all use cases that completely describe the functionality of the system.

Actors



An actor is a model for an external entity which interacts (communicates) with the info model/system:

- User
- External system (Another system)
- Physical environment (e.g. Weather)

An actor has a unique name and an optional description

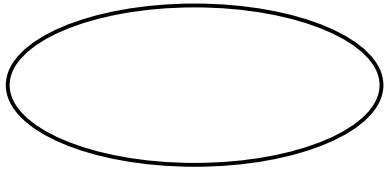
Examples:

- **Passenger**: A person for the train
- **Credit Card System**: An external system that provides the system with financial API

Description

Name

Use Case



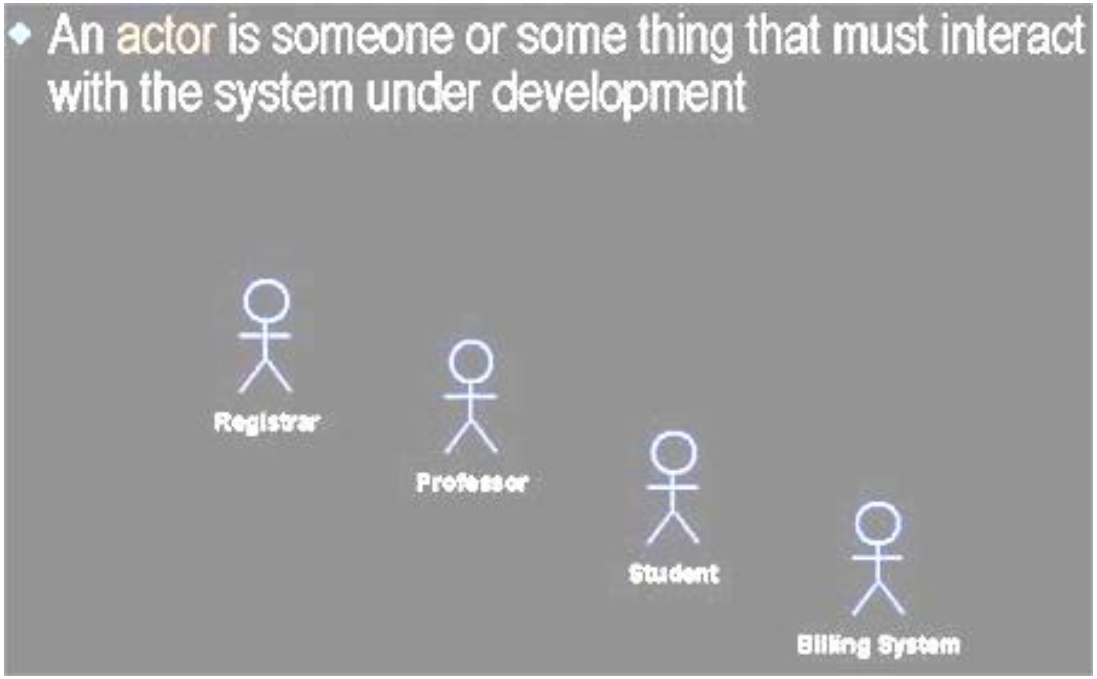
PurchaseTicket

- A use case represents functionality provided by the system
- Use cases are also described textually, with a focus on the event flow between actor and system
- The textual use case description consists of at least 6 parts:
  1. Unique name
  2. Participating actors
  3. Entry conditions
  4. Exit conditions
  5. Flow of events
  6. Special requirements.
- Note that a rectangle is used to show what use cases are in the scope/boundary of system/info model

Modelling what the system will do: Use Case Diagram Step 1

Identify each actor

- Drawn as “stick person”
- For example in a University Info System



Modelling what the system will do: Use Case Diagram Step 2

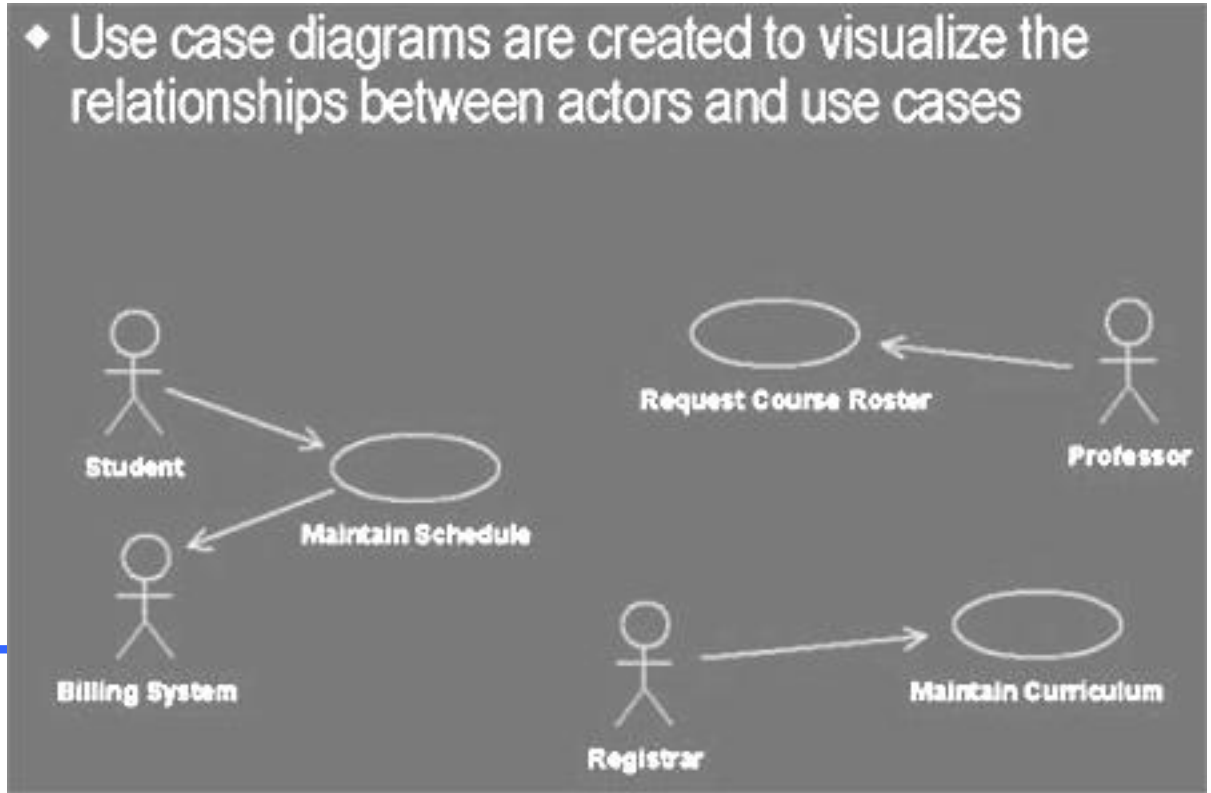
Identify each Use Case

- Drawn as Oval
- A transaction performed by the system for the actor
  - something that provides value to the actor.
- How to find them?
  - Ask yourself why would the actor want to use the system
  - Examples
    - *Professor wants to have list of students*
    - *Student wants to enrol in a module*
    - *Billing system wants to issue appropriate fees to student*
- Be careful naming them: Use ACTION verbs- Look for verbs in text/conversation about the domain

Modelling what the system will do: Use Case Diagram Step 3

Draw use case diagram

- Link actors to use cases through relationship arrows
- **Direction of arrow** indicates who can initiate the interaction, no arrow indicates either can initiate



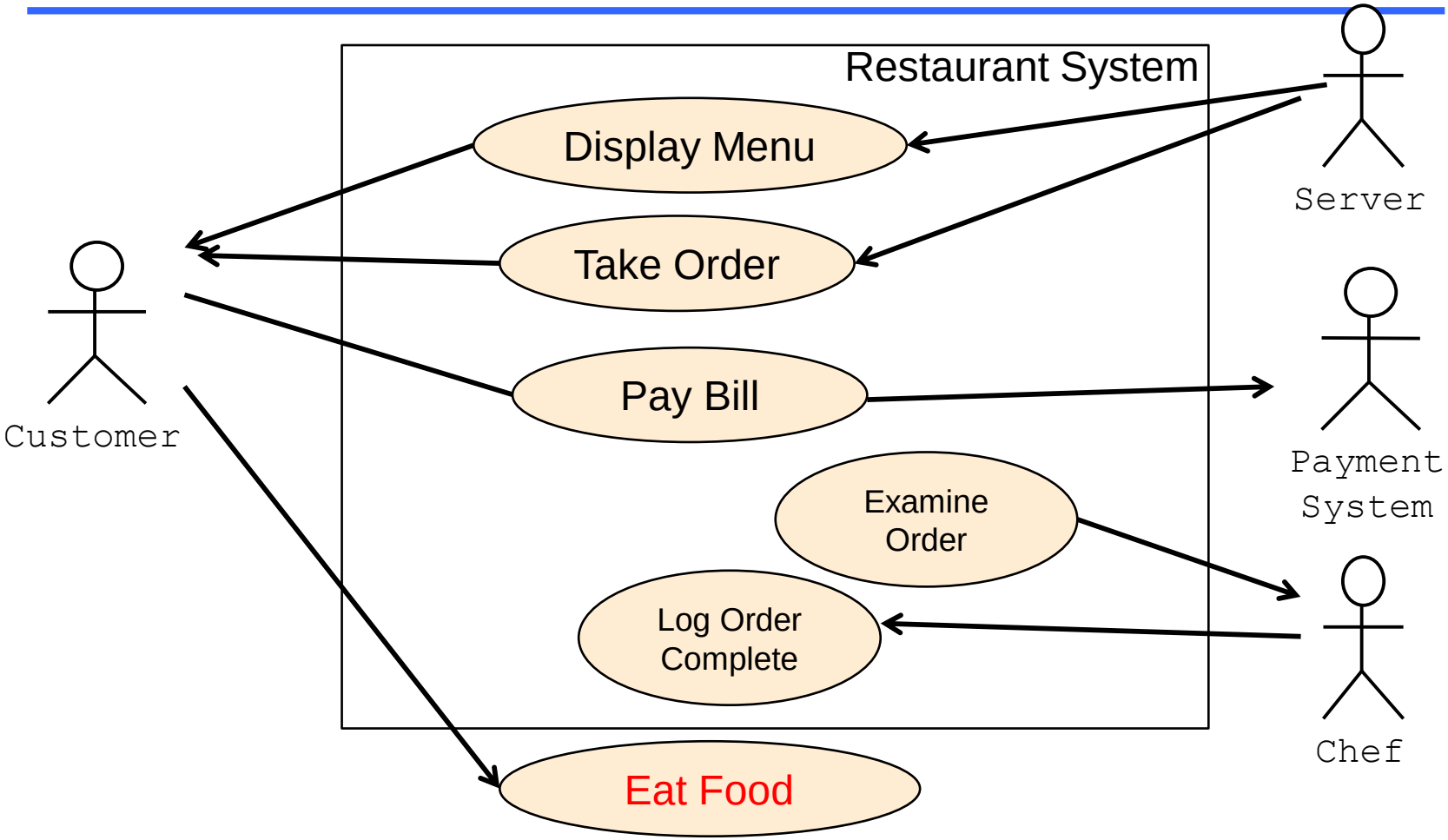
PUTTING IT INTO ACTION !

Imagine that you need to create an Information Model to support a waiter with an iPad app in a **Restaurant**

1. Identify a couple of the actors
2. Identify a couple of the use cases

(Remember each use case represents a functionality/service that the **system** provides/supports for the actor)

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

Modelling what the system will do: Use Case Diagram Step 4

Consider relationships between use cases

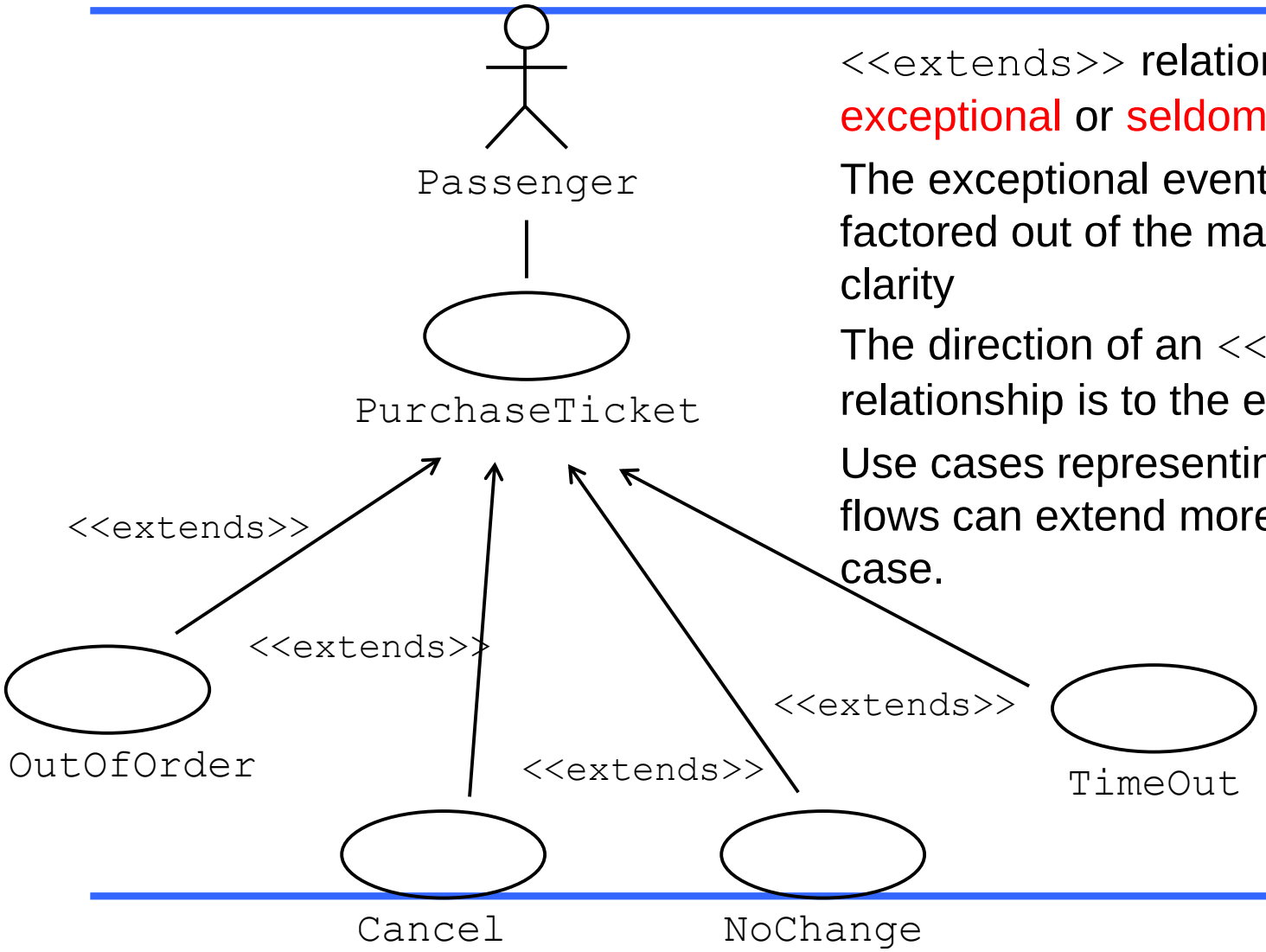
Extends Relationship <<extends>>

- To represent seldom invoked use cases or exceptional functionality

Includes Relationship <<includes>>

- To represent functional behavior common to more than one use case.

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



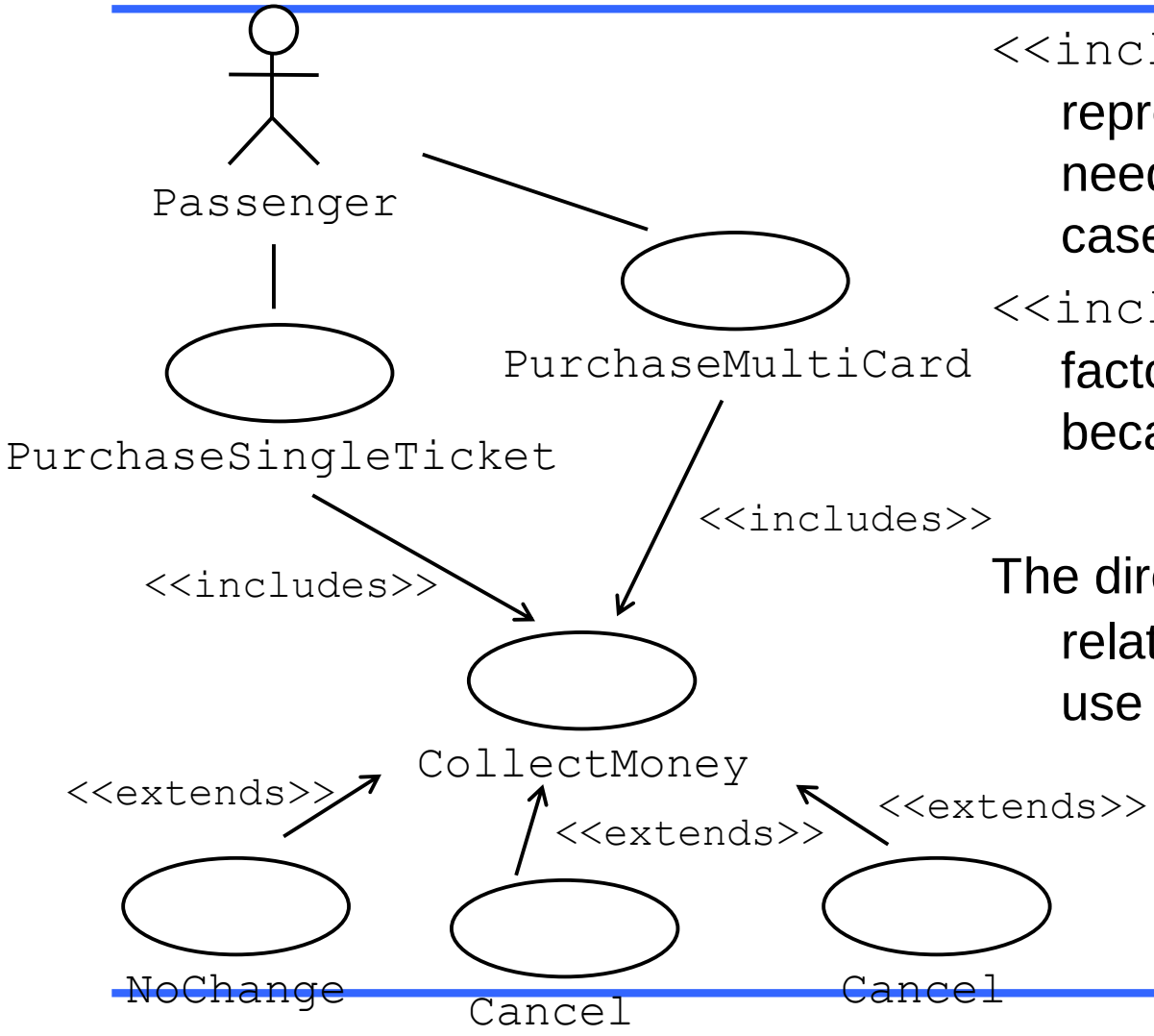
<<extends>> relationships model exceptional or seldom invoked cases

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.

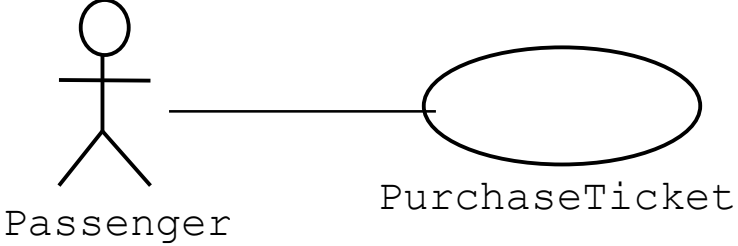
The <<includes>> Relationship



<<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 included use case.



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.

Note about Naming when Modelling

Use terms relevant to the domain of interest

Avoid abbreviations, computer terms or acronyms

Avoid spaces in names

Use underscores (preferred) or capitalisation to show multiple words (e.g. Academic_Record or AcademicRecord)

Extract from Assignment Sheet Relating to Use Cases

Eight fully described UML Use Cases (ovals).
Including for each UC/oval text descriptions for normal scenario and an error scenario

Identify Actors

When looking for actors, ask the following questions:

- Who or what provides inputs to the system?
- Who or what receives outputs from the system?
- Are interfaces required to other systems?
- Are there events that are automatically triggered at a predetermined time?
- Who will maintain information in the system?

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	……..

Identify Use Cases

Strive to identify and document only the most critical, complex, and important use cases, often called *essential* use cases.

When looking for use cases, ask the following questions:

- What are the main tasks of the actor?
- What information does the actor need form the system?
- What information does the actor provide to the system?
- Does the system need to inform the actor of any changes or events that have occurred?
- Does the actor need to inform the system of any changes or events that have occurred?

Requirements documents

- Trawling through “the system shall… “ statements

Story based scenario analysis

- Analysing day to day existing or expected activity of an organisation

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

More on Use-Case Textual Description

Document first at high level to quickly obtain an understanding of the events and magnitude of the system.

Then expand to a fully-documented use case textual description.

- Include the use case's typical course of events and its alternate courses.

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**
Use-Case ID:	MSS-BUC002.00 ⑥	**Business Requirements:** ☑ ⑤
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**
Use-Case ID:	MSS-BUC002.00	**Business Requirements:** ☑
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.

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.

That's All Folks Thank You for Listening

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