CS-230 Software Engineering

L08: Storyboarding; Use Case, Activity, and Sequence Diagrams

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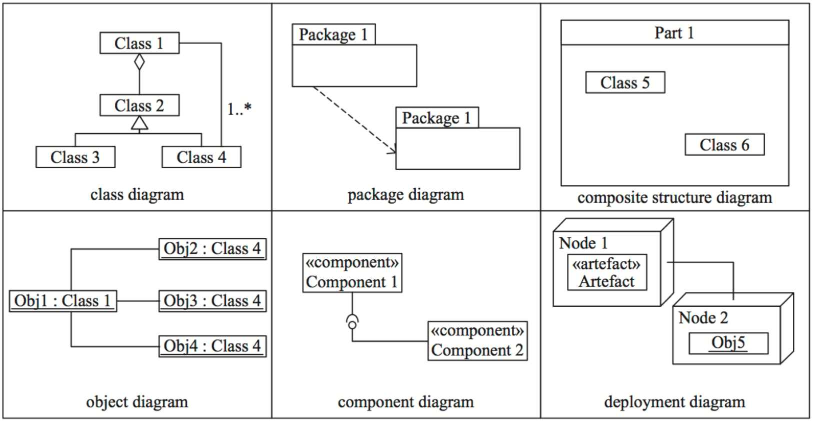
Semester 1 – 2020

Previously in CS 230...



Requirements, Language of Requirements and UML Overview

Previously in CS 230...

- We discussed requirements
- User requirements:
  - Statements in natural language of user expectations of system
  - *"The system should provide an overview of the total purchases made for each weekly time period"*
- System requirements:
  - Descriptions in natural language of functions, services, and operational constraints
  - *"This function should return a correct result is less than 600ms"*

Previously in CS 230... (2)

- Functional Requirements:
    - What the system should do.
    - Reaction to specific scenarios & data specifications.
- Non-Functional Requirements:
    - global statements on the system
    - not directly concerned with specific services to users

Previously in CS 230... (3)

There are many ways to specify. What are some?

- Natural Language.
- Tables and Diagrams.
- UML.
- Logics, e.g., Propositional and Predicate Logic.
- Formal Specification Languages, e.g., CASL.
- Process Algebras, e.g., CSP.
- Many many more.

Previously in CS 230... (4)

UML 2.0. How many diagrams?

- 13 diagram types.

Two categorisation of diagrams:

- Structural.
- Behavioural.

UML: Use Case Diagrams (A Behavioural Diagram)

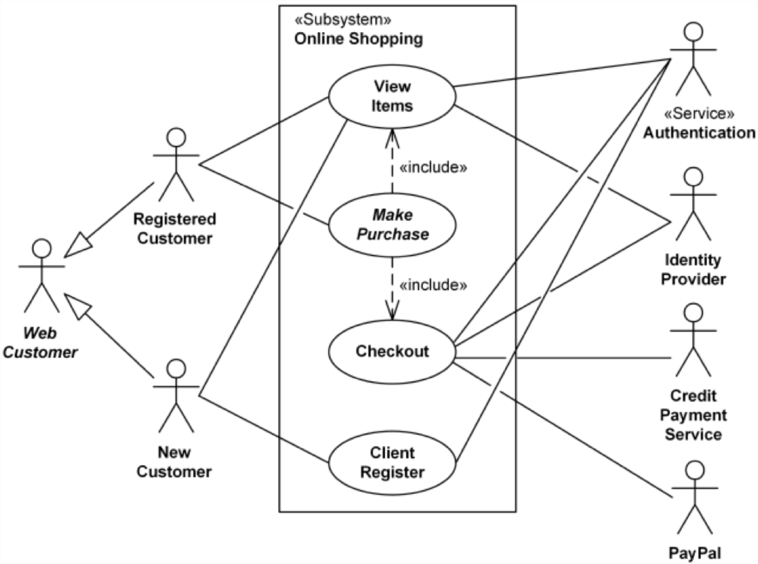
Motivation

- Use case diagrams were developed originally to support requirements elicitation and now incorporated into the UML.
- Each use case represents a discrete task that involves external interaction with a system.
- Actors in a use case may be people or other systems.
- Represented diagrammatically to provide an overview of the use case and in a more detailed textual form.

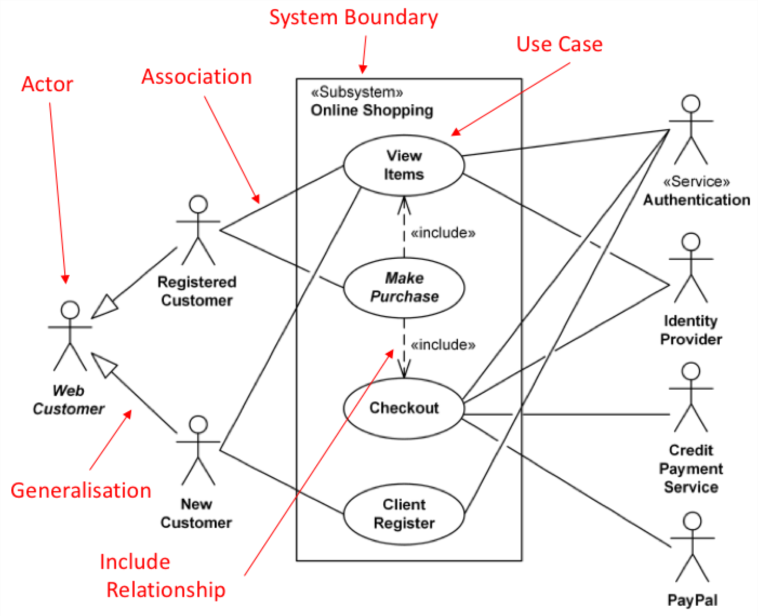
Use Case Diagrams

- Use Case diagrams is a Language for describing scenarios/user requirements.
    - One of the UML behavioural diagram types.
    - Users and possible interactions with the system.
    - System interface features.
    - System subtasks.
    - Interactions between users and system (scenarios).
    - Different types of users (i.e., personas).
- System boundary indicated by a box.

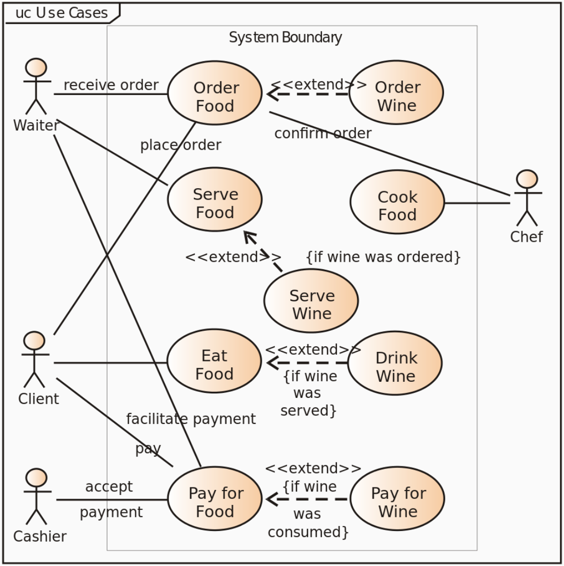
Use Case Diagram Example: Online Shop



Use Case Diagram Example: Online Shop (2)



Use Case Diagram Example: Restaurant



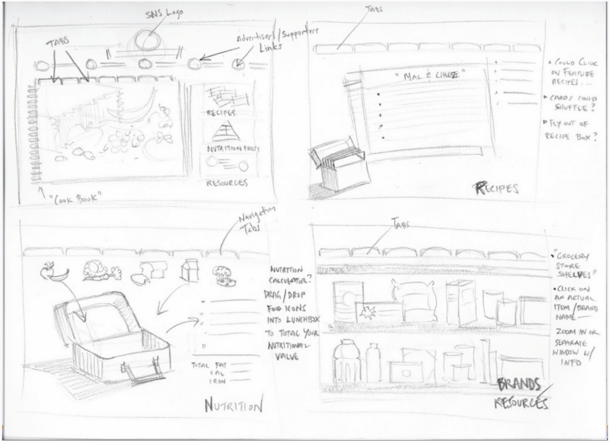
http://en.wikipedia.org/wiki/Use_case_diagram

Uses and Extends Arrows

- Include arrow:
  - Action invokes a sub-function of the system.
  - e.g., *an airline reservation system may use a subroutine to book seats*.
  - Direction of dashed arrow towards used function.
- Extend arrow:
  - Use Case is a special version of another Use Case :
  - e.g., *order wine is a special case of order food as the chef is not involved*
  - Direction of dashed arrow away from special case.
- Label edge with <<include>> or <<extend>> to indicate relationship.

Storyboarding

Storyboarding



- Sequence of sketches illustrating a scenario.
- Illustrates paths of the use case diagram concretely.
    - What does the interface look like?
- Concept borrowed from film industry.

Task Analysis

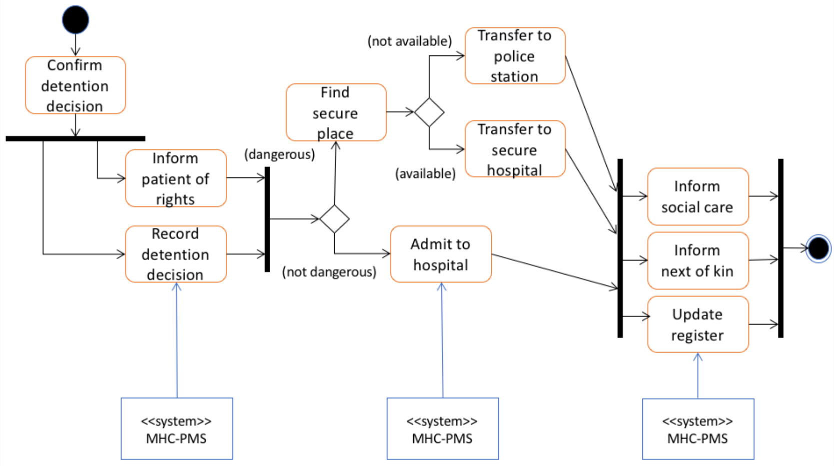
- Storyboards can be used for task analysis.
- Are important tasks covered?
  - What you've learned about the tasks?
- Which usability aspects matter most?
  - What you've learned about the user classes and the tasks?
- How large does the data get?
  - What you've learned about the domain?

UML: Activity Diagrams (A Behavioural Diagram)

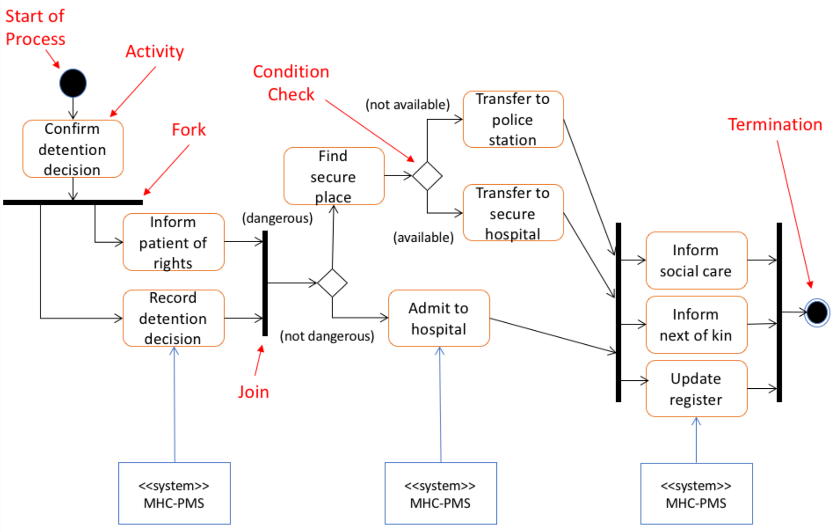
Activity Diagrams

- Basically a flow chart.
- But with a standard and fixed set of symbols.
- Used to model a process in a system.

Activity Diagram Example: Involuntary Detention



Activity Diagram Example: Involuntary Detention (2)

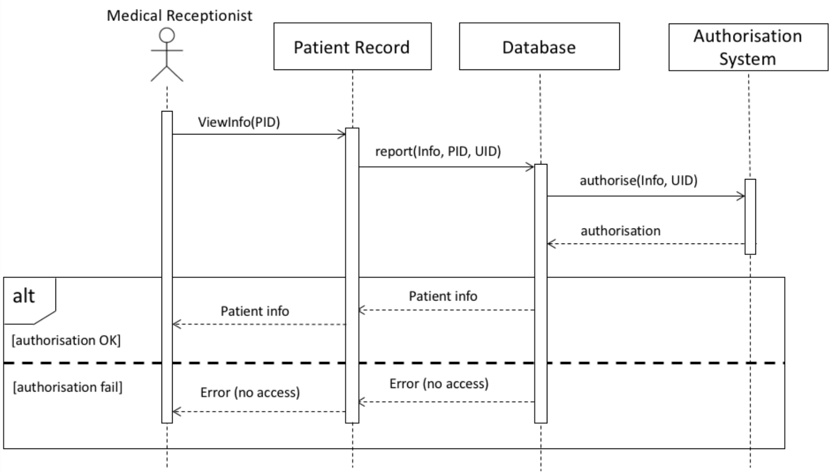


UML: Sequence Diagrams (A Behavioural Diagram)

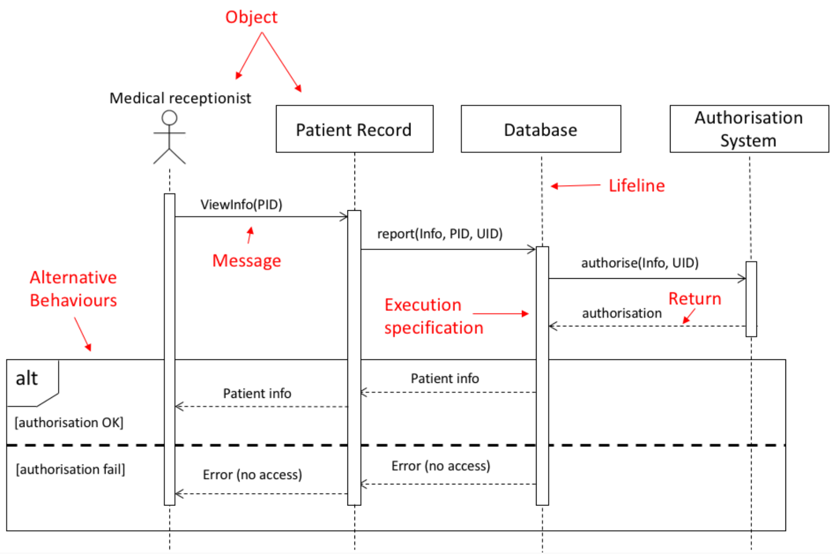
Sequence Diagrams

- Sequence Diagrams are part of the UML and are used to model the interactions between the actors and the objects within a system.
- A Sequence Diagram shows the sequence of interactions that may take place during a particular use case or use case instance. It is sort of example run.
- The objects and actors involved are listed along the top of the diagram, with a dotted line drawn vertically from these (known as a lifeline).
- Interactions between objects are indicated by annotated arrows.

Sequence Diagram Example: Accessing Patient Record

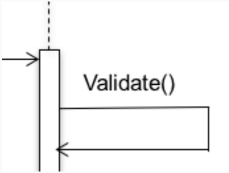


Sequence Diagram Example: Accessing Patient Record (2)



Calls to the Same Object

It is perfectly legal to have calls/messages to the same object – self calls/messages.



Summary

- Storyboards show how a scenario would be executed with the system, helping to design the user interface
- Use Cases can be derived from scenarios.
- Activity Diagrams can be used to capture and model processes.
- Sequence Diagrams sequence of interactions that may take place during a particular run of the system.
- All of these diagrams contain a lot more syntax – we have covered the common syntax that is used approx 80% of the time.