

SYSTEMS ANALYSIS & DESIGN

# OBJECT ORIENTED ANALYSIS (UML)

by  
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# Chapter Description

## Expected Outcomes

- To explain on Use Case Diagram and how to model system functionality
- To know how activity diagram represent system logic
- To know how sequence diagram represent system logic

## References

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- Alan Dennis, Barbara Haley Wixom, David Tegarden, "Systems Analysis and Design With UML : An Object-Oriented Approach ", John Wiley, 2010
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# SDLC Object Oriented

Object oriented software development life cycle model namely Unified Process or Rational Unified Process (RUP).

The model was proposed by Booch, Jacobson and Rumbaugh.

It is an iterative process to add or update the components based on feedbacks from the previous iteration.



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# SDLC Object Oriented

RUP has four major phases:

1. Inception
2. Elaboration
3. Construction
4. Transition



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# SDLC Object Oriented

One of the artifact during Inception phase is Primary Use Case Diagram.

In this phase, communication with customers takes place to elicit requirements.

Use Case Diagram captures the functional requirements of the system.



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# SDLC Object Oriented

At the end of Elaboration phase, we can get artefacts such as:

- Use Case Description
- Detailed Use Case Diagram
- Sequence diagram
- Activity Diagram
- State Diagram
- Etc.



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# Class

Class is a logical entity as a template for creating similar kinds of objects. It shares common properties of objects.

Example of real classes such as: car, student, courses etc.



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# Object

An object is an instance of a class that has a well-defined collection of state and behaviours. Each object has a unique identity to distinguish it from all other objects in the same domain.



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# Use Case Diagram

Use Case Diagram is used to gain better understanding the functionality of the system at a very high level.

A use case diagram is drawn when gathering and defining requirements for the system.



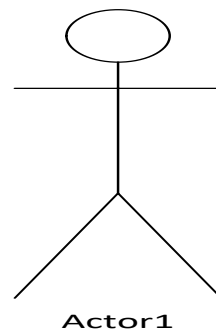
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# Use Case Diagram

## Components of Use Case Diagram:

**Actor** :stick figures represent a role that a user can play while interacting with the system.

It also can represent another system in which the current system interacts.



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# Use Case Diagram

Components of Use Case Diagram:

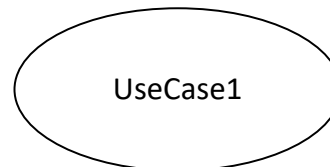
Use Case: represents a system functionality

can extend another use case

can include another use case

Is placed inside the system boundary

Labelled as verb-noun phrase

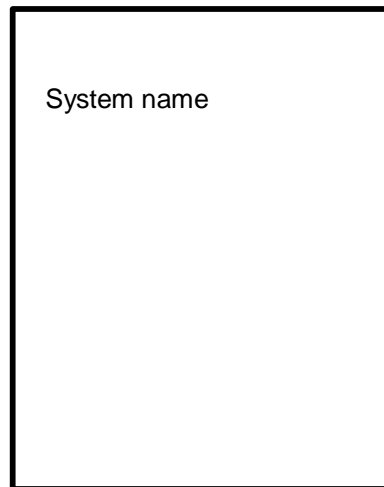


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# Use Case Diagram

Components of Use Case Diagram:

Boundary: Represent the scope of the system.  
Labelled system's name inside or on top.



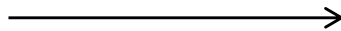
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# Use Case Diagram

Components of Use Case Diagram:

Association relationship:

links an actor with the use case(s)  
with which it interacts



Include relationship :

represents the inclusion of the  
functionality of one use case within  
another



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# Use Case Diagram

## Components of Use Case Diagram:

Include relationship :

represents the inclusion of the functionality of one use case within another

<<include>>



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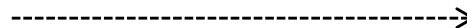
# Use Case Diagram

Components of Use Case Diagram:

Extend relationship :

represents the extension of the use case to include optional behaviour.

<<extend>>



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# Use Case Diagram

Components of Use Case Diagram:

Generalization relationship:

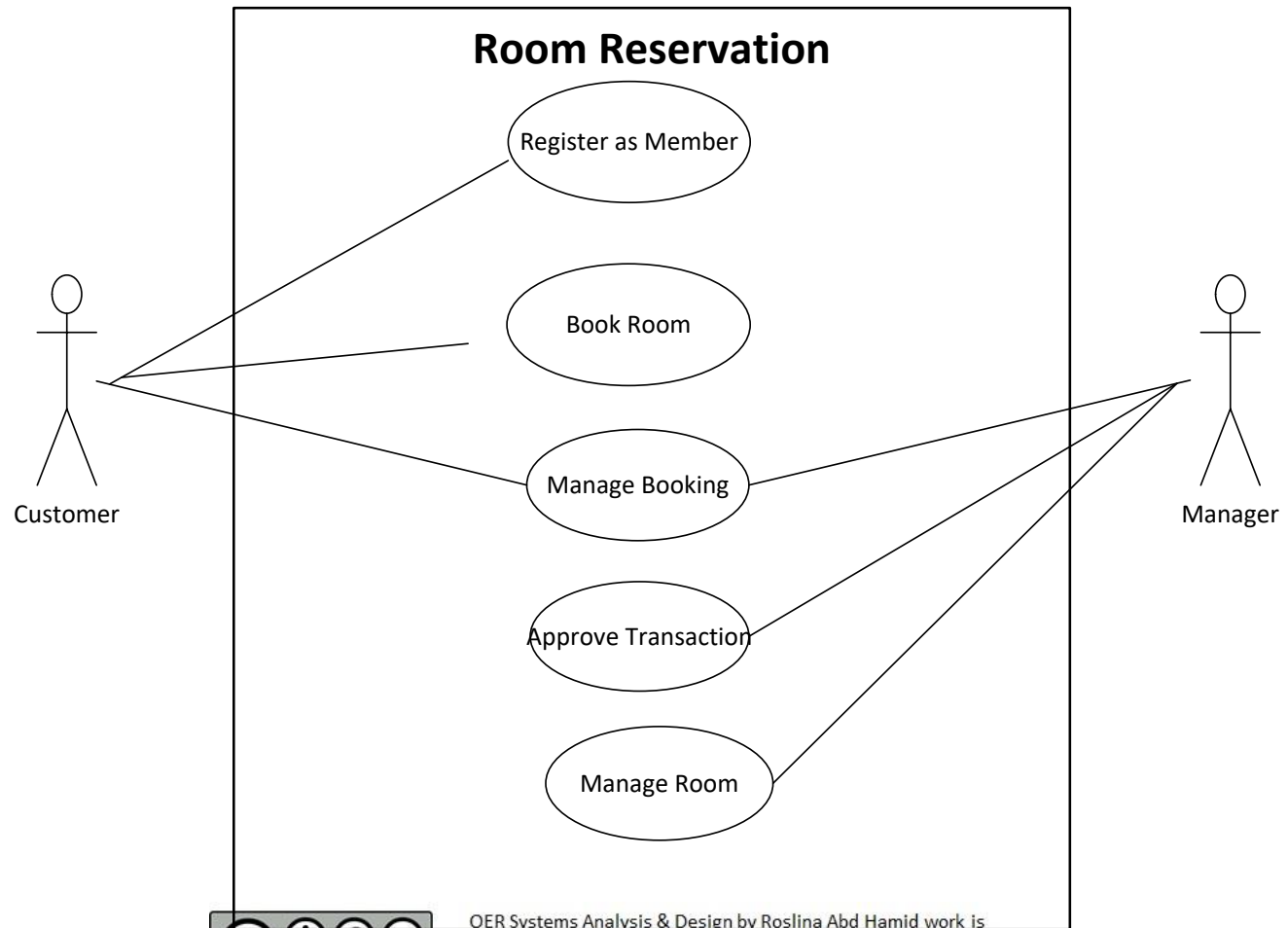
represents a specialized use case to a more generalized one.



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# Use Case Diagram



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# Activity Diagram

Activity diagram show the conditional logic for the sequence of system activities in order to complete a business process.

Also show the logic of a use case.

Model work flow and business processes.

Model the sequential and concurrent steps in a computation process.



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# Activity Diagram

Components of activity diagram:

Activity : a behavior that an object carries out

Transition : a movement from one activity to another

Branch : a diamond symbol containing transitions to different paths of activities.



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# Activity Diagram

Synchronization bar: horizontal or vertical bars denoting parallel or concurrent paths of activities

Fork: the beginning of parallel activities

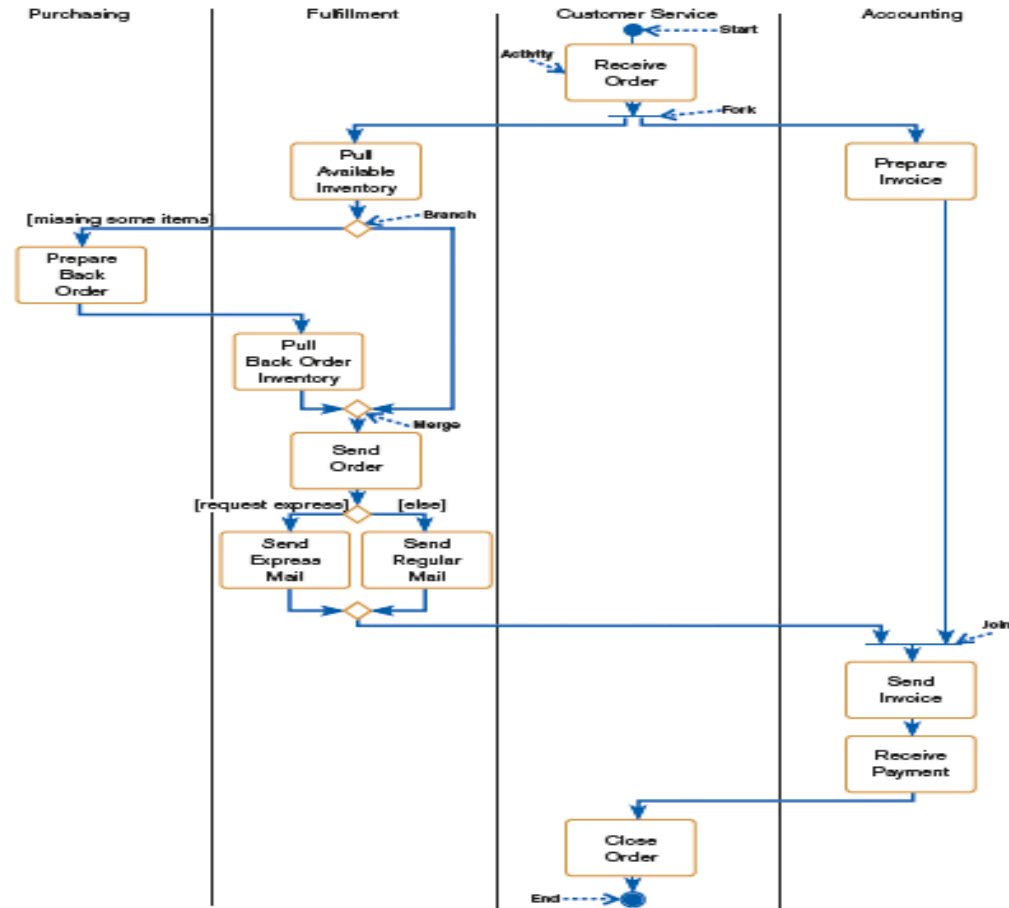
Join: the end of parallel activities

Swimlanes : columns representing different organizational units of the system



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# Activity Diagram



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# Sequence Diagram

Sequence Diagram is a dynamic modelling. It captures the time sequence of message flow from one object to another.

- Generic form displays all possible sequences of interactions – sequences corresponding to all the scenarios of a use case.
- Instance form displays the sequence for only one scenario.



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# Sequence Diagram

## Components of Sequence Diagram:

- Actor** : a person or system (external) that derives benefit from system
- Objects** : placed across the top of the diagram
- Lifeline** : the life of an object during a sequence.
- Messages** : convey message from one object to another.



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# Sequence Diagram

Activation: the time period during which an object performs an operation

Synchronous message: a type of message in which the caller has to wait for the receiving object to finish executing the called operation before it can resume execution itself

Simple message: a message that transfers control from the sender to the recipient without describing the details of the communication



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# Sequence Diagram

Asynchronous message: a message in which the sender does not have to wait for the recipient to handle the message

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# Sequence Diagram



Basic Course

1: Customer

2: Search Page

3: Search Results Page

4: Catalog

5: Search Results

The Customer specifies an author on the Search Page and then presses the Search button.

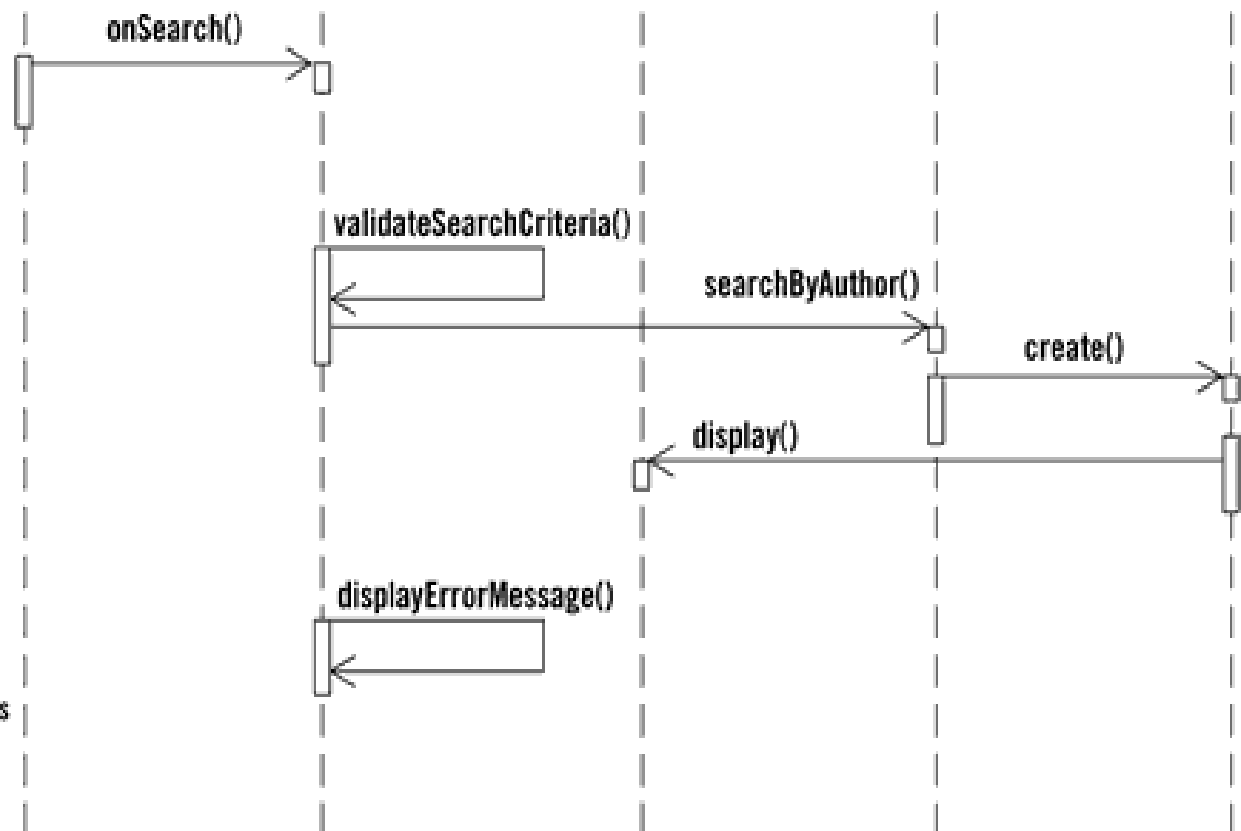
The system validates the Customer's search criteria.

The system searches the Catalog for books associated with the specified author.

When the search is complete, the system displays the search results on the Search Results Page.

Alternate Course

If the Customer did not enter the name of an author before pressing the Search button, the system displays an error message to that effect and prompts the Customer to re-enter an author name.



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