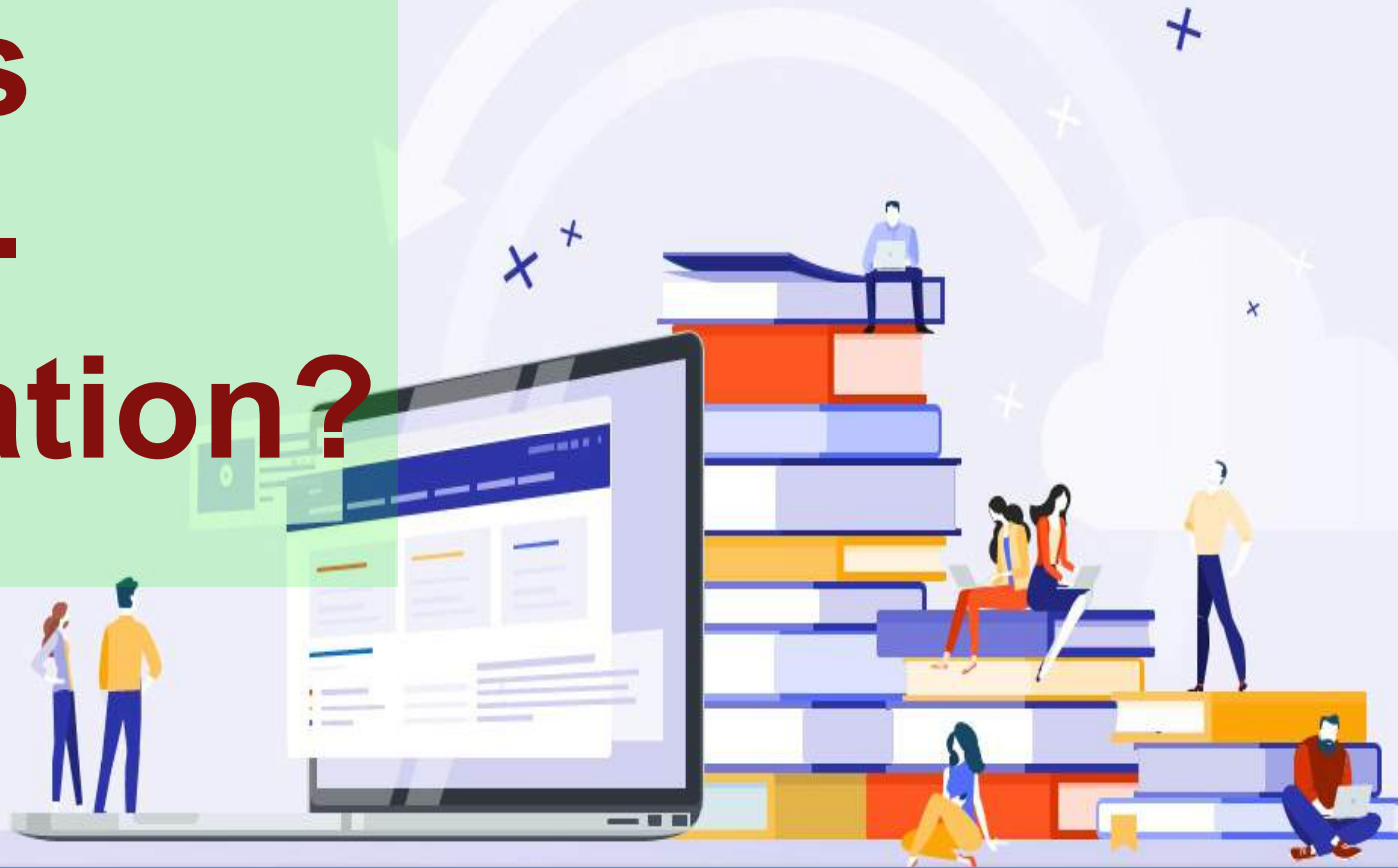


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# What Is Object- Orientation?



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# USE CASE DIAGRAMS

# In This Lecture You Will Learn:

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- ▶ The purpose of use case diagrams
- ▶ The notation of use case diagrams
- ▶ How to draw use case diagrams
- ▶ How to write use case descriptions
- ▶ How prototyping can be used with use case modelling



# Use Case Modeling for Requirements Elicitation

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- ▶ A use case consists of a series of actions that a user must initiate with the system to carry out some useful work and to achieve his/her **goal**.
- ▶ A use case is a sequence of transactions performed by a system that produces a **measurable result** for a **particular actor**.
- ▶ A good use case must represent the point of view of the people who will use or interact with the system.
- ▶ A use case should be considered as a unit of requirement definition or simply a user goal, such as “deposit money”, or “check balance” in an automatic teller machine (ATM) system.
- ▶ A complete set of use cases = system requirements.



# Use Case Modeling Techniques

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- ▶ A use case diagram enables the system designer to discover the requirements of the target system from the user's perspective.
- ▶ If the designer uses use case diagrams in the early stage of system development, the target system is more likely to meet the needs of the user.
- ▶ From both the designer and user's perspectives, the system will also be easier to understand.
- ▶ Furthermore, use case analysis is a very useful tool for the designer to communicate with the client.

# Use Case Model

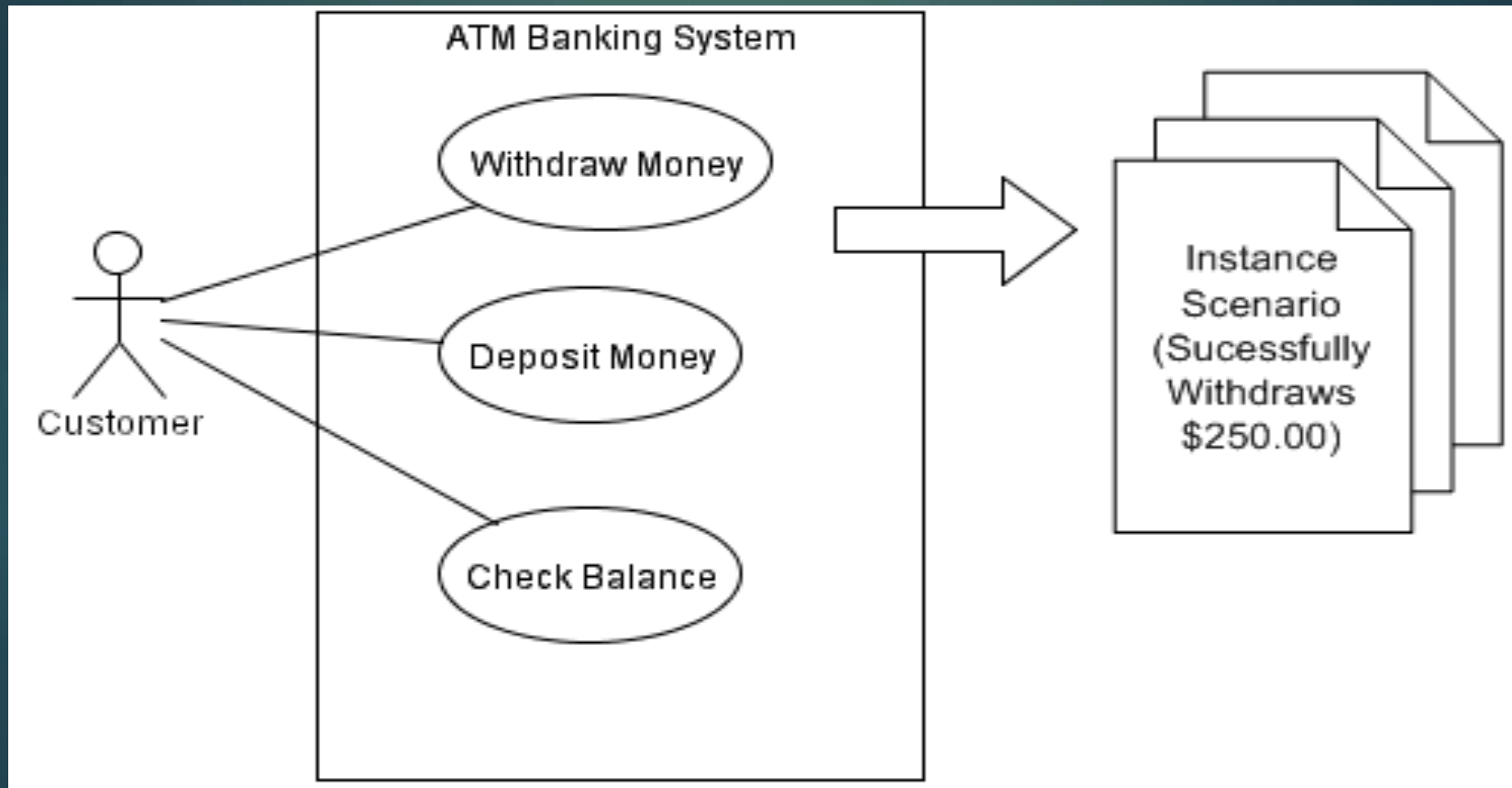
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- ▶ A *use case model* is a diagram or set of diagrams that together with some additional documentation show what the proposed software system is designed to do. A use case diagram consists of three main components:
  - ▶ actors,
  - ▶ use cases, and their communications, and
  - ▶ some additional documentation such as use case descriptions for elaborating use cases and problem statements that are initially used for identifying use cases.
- ▶ In addition, a use case diagram may consist of a system boundary.



# Use Case Model (cont'd)

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# Drawing Use Case Diagrams

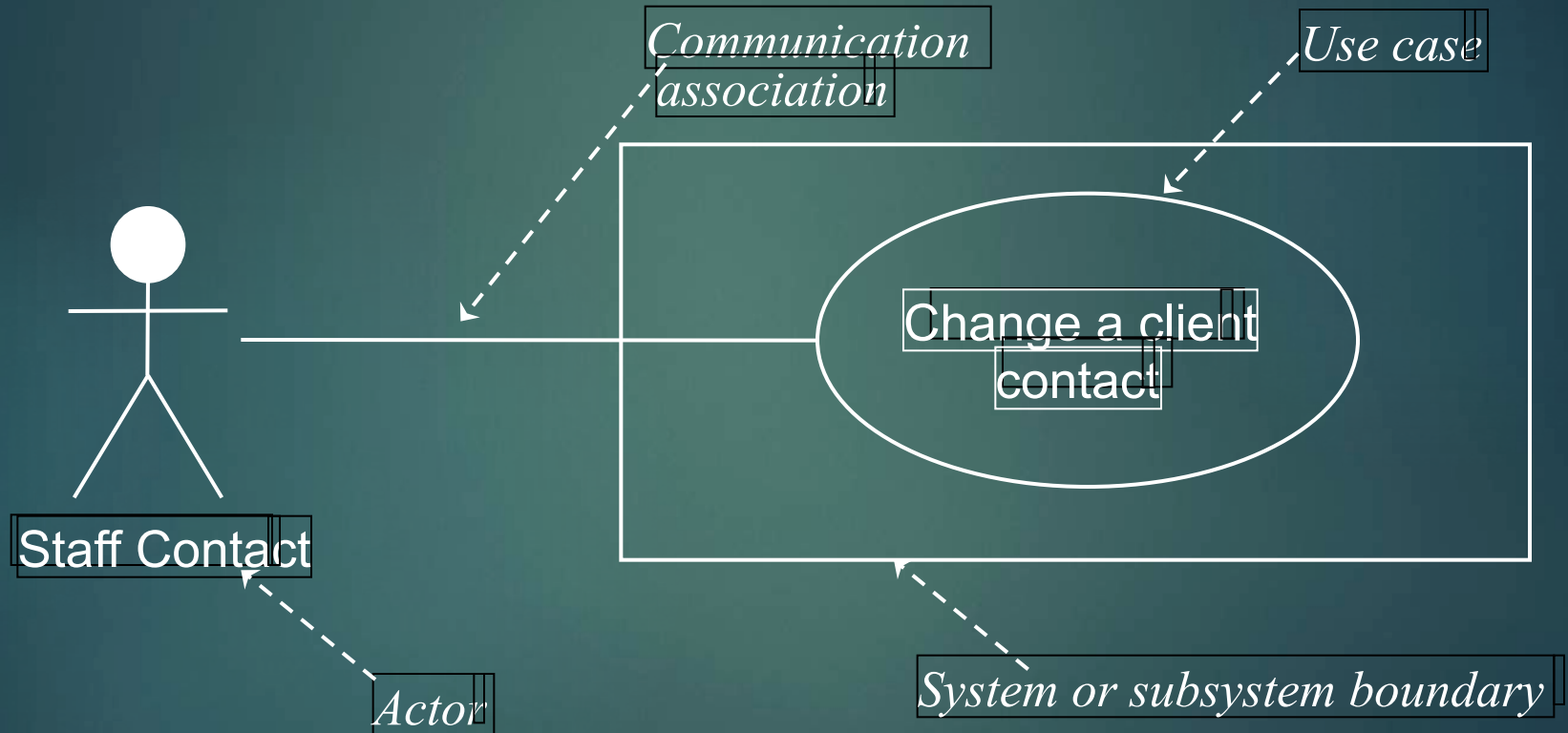
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## ► Purpose

- document the functionality of the system from the users' perspective
- document the scope of the system
- document the interaction between the users and the system using supporting use case descriptions (behaviour specifications)

# Notation of Use Case Diagrams

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# Notation of Use Case Diagrams

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## ▶ Actors

- ▶ drawn as stick people with a name
- ▶ the roles that people, other systems or devices take when communicating with a particular use case or use cases
- ▶ not the same as job titles or people
  - ▶ people with one job title may play the roles of several actors
  - ▶ one actor may represent several job titles

# Actors

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- ▶ Actors are the external entities that interact with the system.
- ▶ An actor may be:
  - ▶ people;
  - ▶ computer hardware and devices; or
  - ▶ external systems.



# Actors (cont'd)

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- ▶ An actor represents a role that a user can play, but not a specific user.
- ▶ For example, John and Peter may be consultants, but John may also be a project manager in the company.
- ▶
- ▶ Thus, the same person may be an instance of more than one actor, and conversely several people can play the same role of an actor.



# Actors (cont'd)

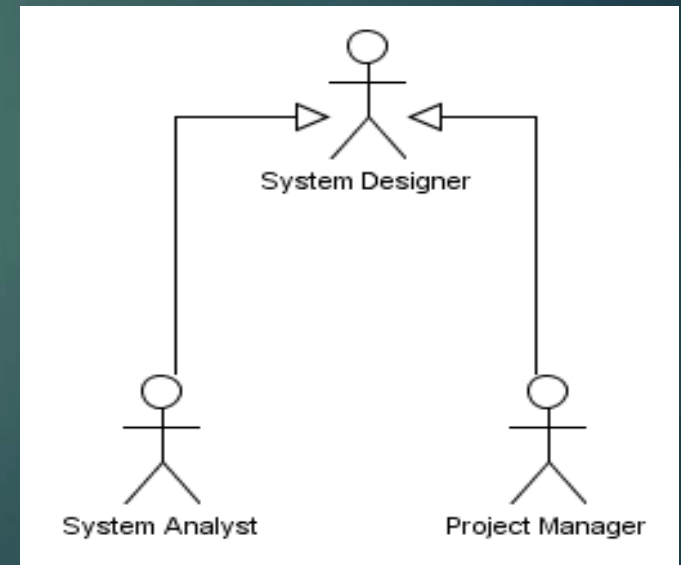
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- ▶ **Primary actors** are those who use the system's main functions, deriving benefits from it directly.
  - ▶ Primary actors are completely outside the system and drive the system requirements.
  - ▶ Primary actors use the system to achieve an observable user goal.
- ▶ **Secondary actors** play a supporting role to facilitate the primary actors to achieve their goals.
  - ▶ Secondary actors often appear to be more inside the system than outside.
  - ▶ Secondary actors are usually allocated many system requirements that are not derived directly from the statement of requirements. Hence, the designer can have more freedom in specifying the roles of these actors.

# Generalization Actors

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- ▶ The fact that actors are classes means that actors can be generalized.
- ▶ Through the generalization process, we can identify the similarities between different actors.



# Notation of Use Case Diagrams

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- ▶ Use cases
  - ▶ drawn as ellipses with a name in or below each ellipse
  - ▶ describe a sequence of actions that the system performs to achieve an observable result of value to an actor
  - ▶ the name is usually an active verb and a noun phrase

# Use Cases

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- ▶ A use case describes a sequence of actions a system performs to yield an **observable result** or **value** to a particular actor.
- ▶ Naming convention = verb + noun or verb + noun phrase, e.g. withdraw cash.
- ▶ A good use case should:
  - ▶ describe a sequence of transactions performed by a system that produces a measurable result (goal) for a particular actor;
  - ▶ describe the behavior expected of a system from a user's perspective;
  - ▶ enable the system analyst to understand and model a system from a high-level business viewpoint; and
  - ▶ represent the interfaces that a system makes visible to the external entities and the interrelationships between the actors and the system.

# Notation of Use Case Diagrams

E-course

- ▶ Communication associations
  - ▶ line drawn between an actor and a use case
  - ▶ can have arrow heads to show where the communication is initiated (arrow points away from the initiator)
  - ▶ represent communication link between an instance of the use case and an instance of the actor

# Notation of Use Case Diagrams

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- ▶ Sub-systems
  - ▶ drawn as a rectangle around a group of use cases that belong to the same sub-system
  - ▶ in a CASE tool, use cases for different sub-system are usually placed in separate use case diagrams, and the rectangle is redundant

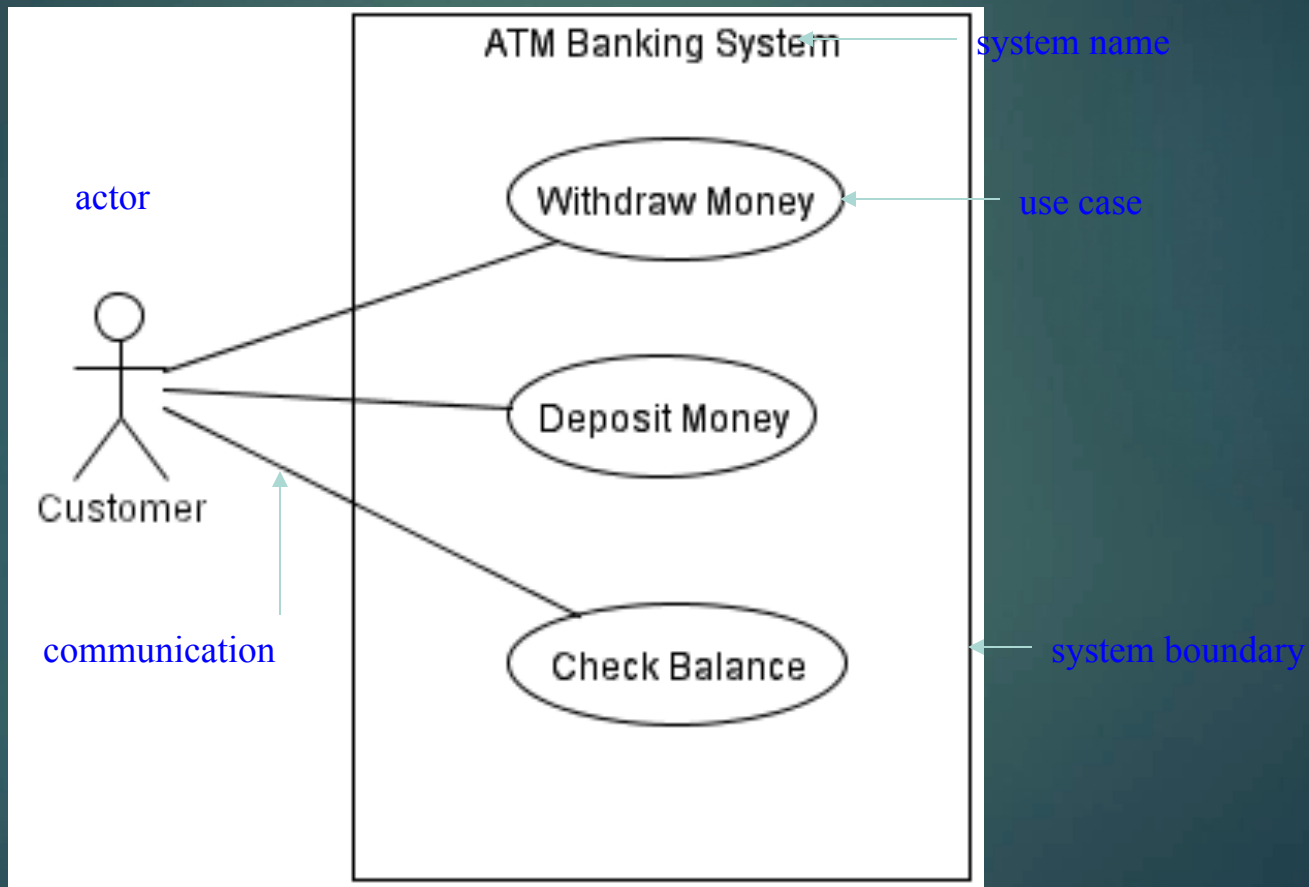
# Example - ATM

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- ▶ An automatic teller machine (ATM) system is typically used by different types of users (actors).
- ▶ One type of user, the customer, operates the ATM to perform transactions with his/her accounts through a computerized banking network.
- ▶ The banking network consists of a central computer connecting to all ATM machines and bank computers owned by individual banks.
- ▶ Each bank computer is used to process the transaction requested by its customers.

# Example – ATM (cont'd)

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# Example – Hotel Information System

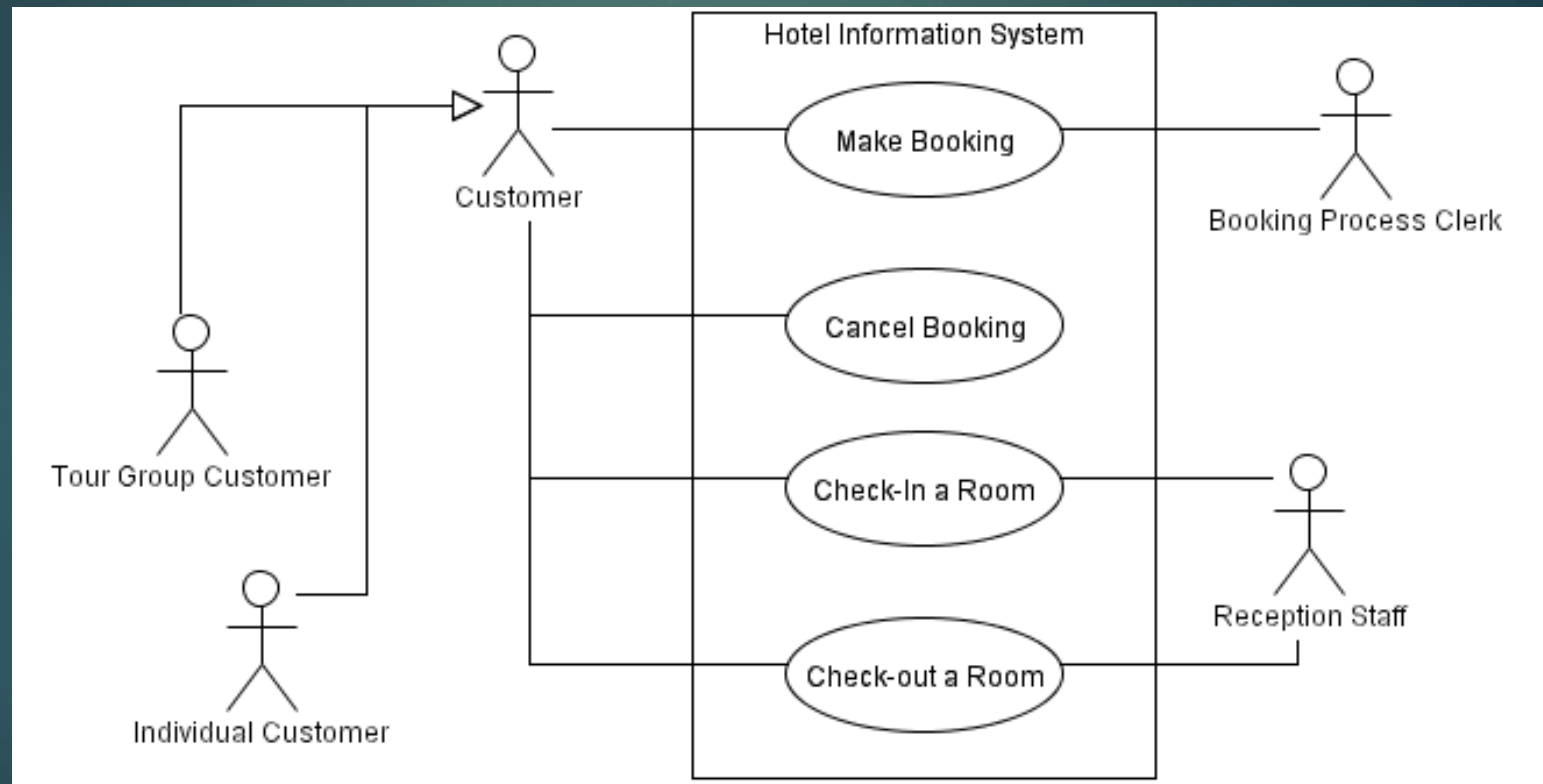
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- ▶ We will consider a simple hotel information system for two types of customers:
  - ▶ Tour Group customers and Individual customers.
  - ▶ Tour Group customers are those who have made reservations through a tour operator in advance while Individual customers make their reservations directly with the hotel.
  - ▶ Both types of customers can book, cancel, check-in and check-out of a room by phone or via the Internet.



# Example – Hotel Information System (cont'd)

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# Notation of Use Case Diagrams

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- ▶ Dependencies
  - ▶ Extend and Include relationships between use cases
  - ▶ shown as stereotyped dependencies
  - ▶ stereotypes are written as text strings in guillemets:
  - ▶ «extend» and «include»



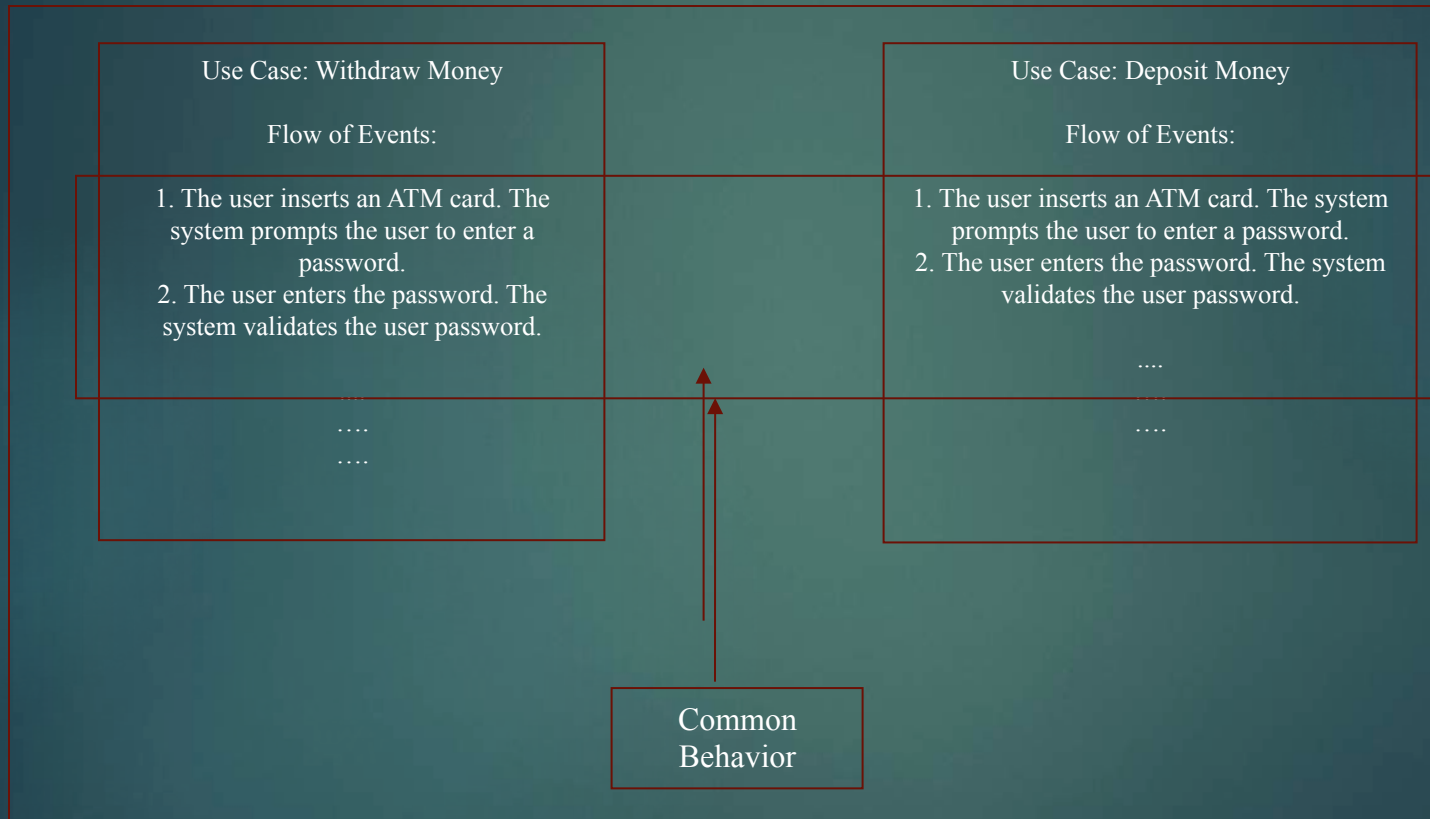
# Structuring Use Cases with Relationships

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- ▶ In the process of developing a use case model, we may discover that some use cases share common behaviors.
- ▶
- ▶ There are also situations where some use cases are very similar but they have some additional behaviors.
- ▶ For example, in Figure 3.6, Withdraw Money and Deposit Money both require the user to log on to the ATM system.

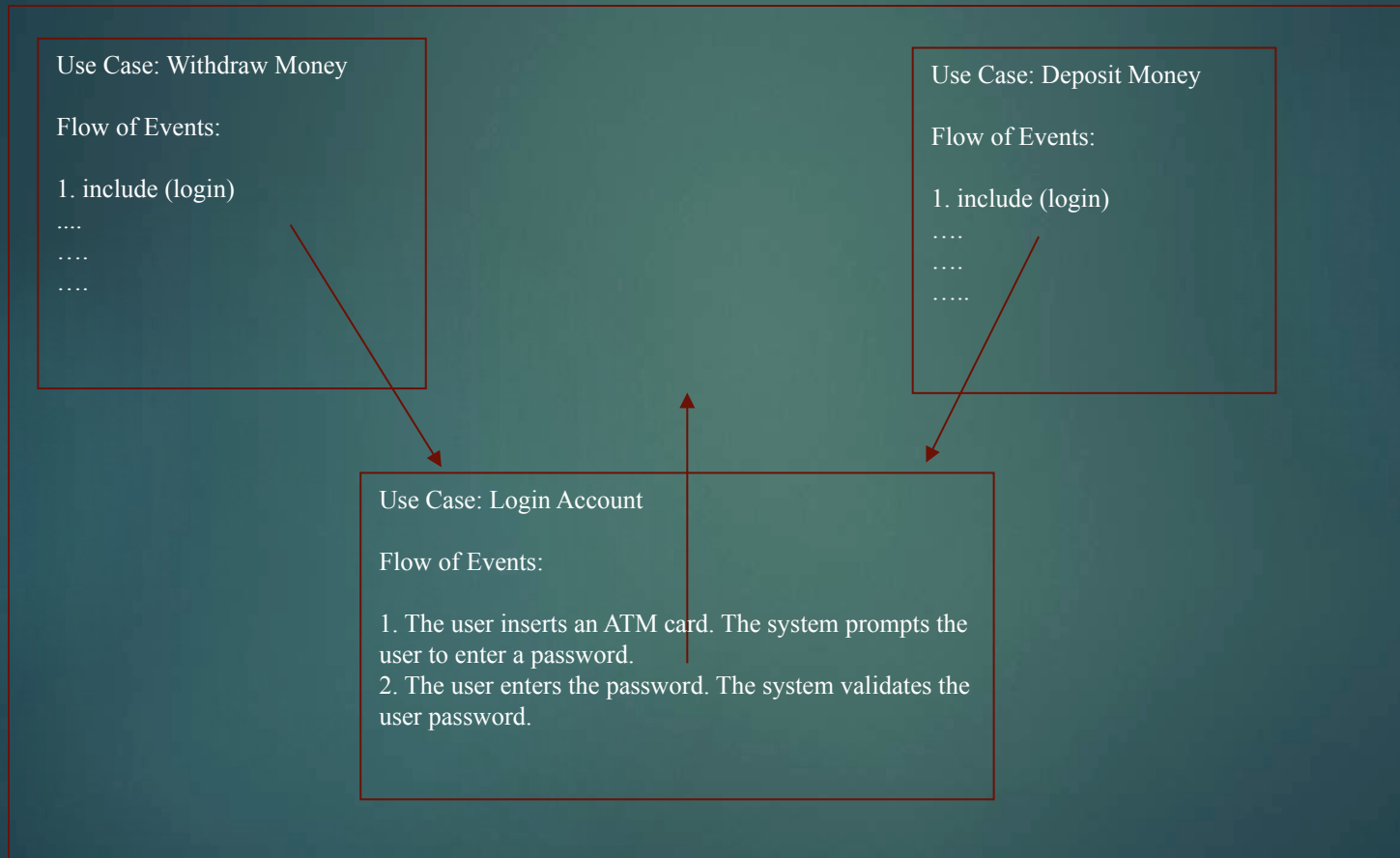
# Structuring Use Cases with Relationships (cont'd)

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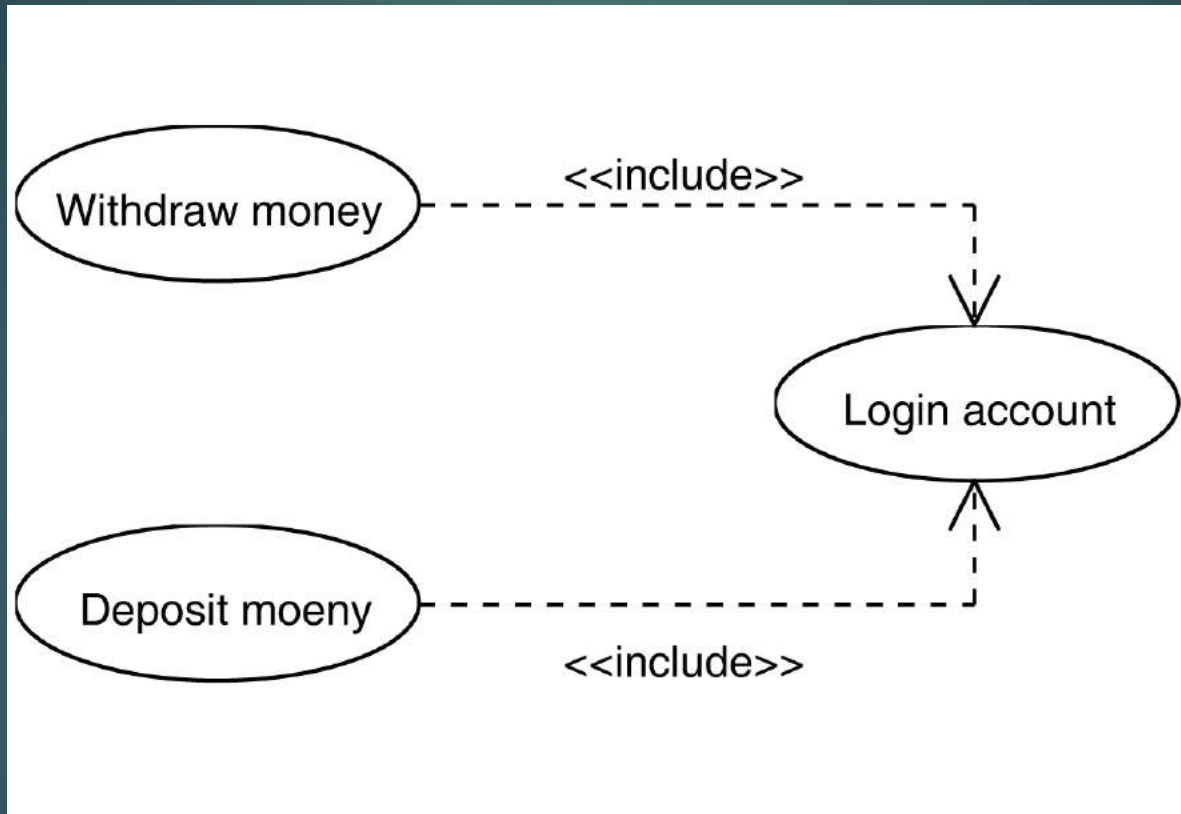
# Structuring Use Cases with Relationships (cont'd)

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# Structuring Use Cases with Relationships (cont'd)

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# The <<include>> Relationship

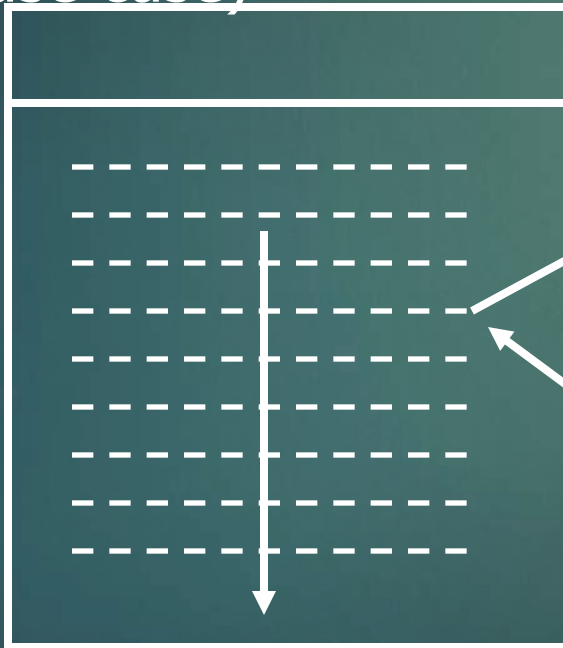
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- ▶ Include relationships are used when two or more use cases share some common portion in a flow of events.
- ▶ This common portion is then grouped and extracted to form an inclusion use case for sharing among two or more use cases.
- ▶ Most use cases in the ATM system example, such as Withdraw Money, Deposit Money or Check Balance, share the inclusion use case Login Account.

# The <<include>> Relationship (cont'd)

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Withdraw Money  
(Base use case)



Login Account  
(Included use case)

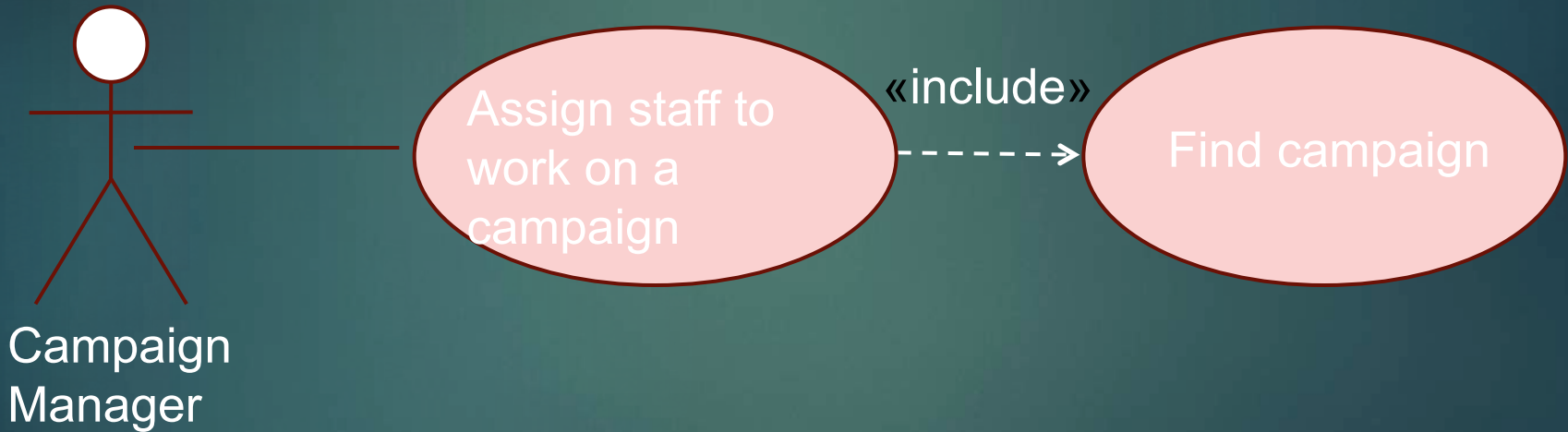
# Notation of Use Case Diagrams

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- ▶ Include relationship
  - ▶ one use case **always** includes the functionality of another use case
  - ▶ a use case may include more than one other
  - ▶ can be used to separate out a sequence of behaviour that is used in many use cases
  - ▶ should not be used to create a hierarchical functional decomposition of the system

# Include Relationship

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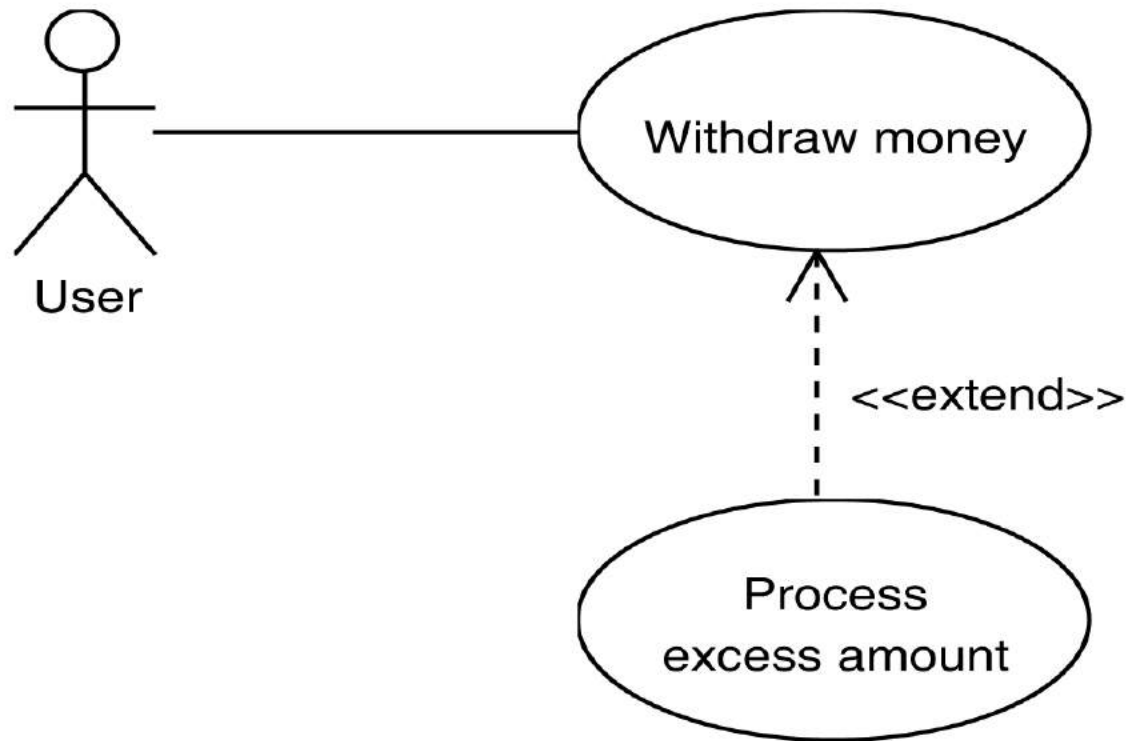
# The <<extend>> Relationship

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- ▶ Extend relationships are used when two use cases are similar, but one does a bit more than the other.
- ▶ For example, you may have a use case that captures the typical case (the base use case) and use extensions to describe variations.
- ▶ A base use case may therefore conditionally invoke an alternative use case.

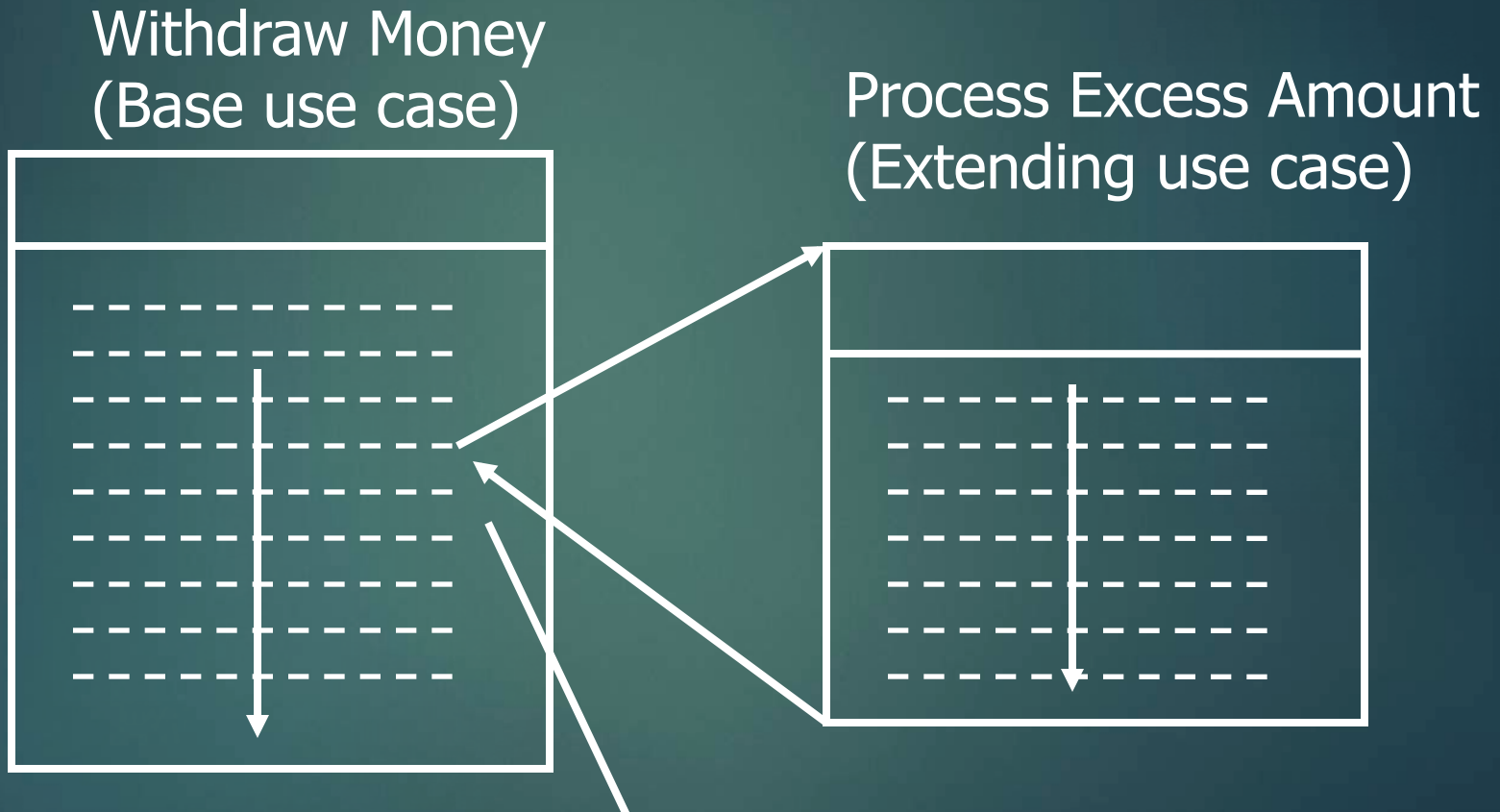
# The <<extend>> Relationship (cont'd)

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# The <<extend>> Relationship (cont'd)

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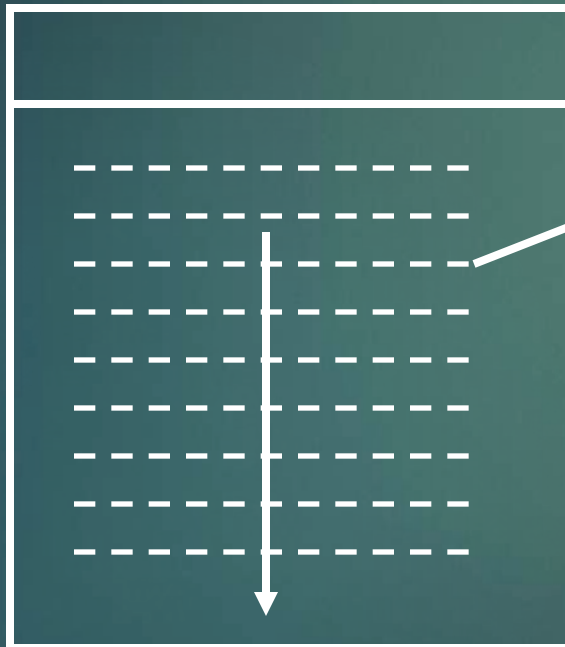


If conditional guard is true, extending flow is executed.

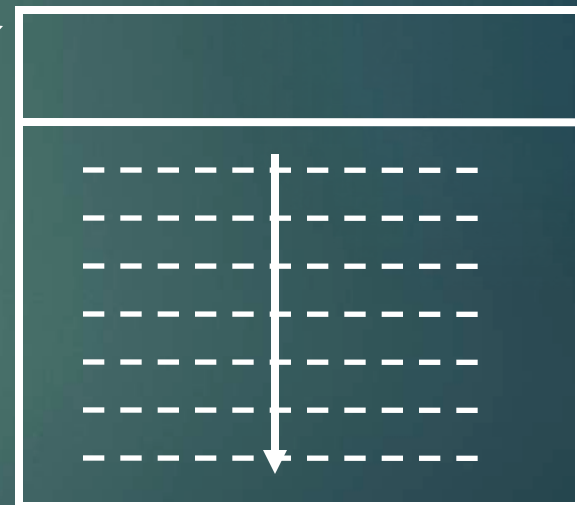
# The <<extend>> Relationship (cont'd)

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Base use case flow  
of events



Alternative flow of  
events



Alternative flow does not return to the point at which it is inserted.

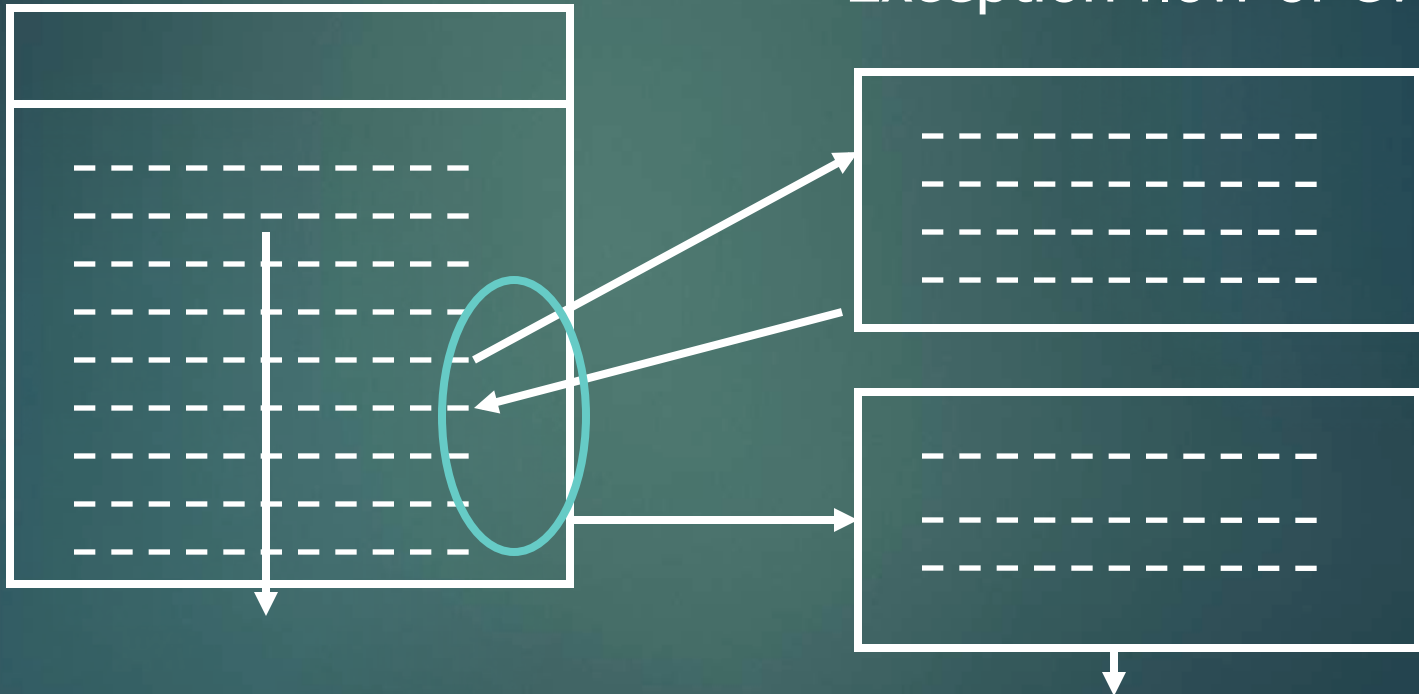
<<extend>> relationship is for modeling alternative flow!

# The <<extend>> Relationship (cont'd)

E-course

Base use case flow of events

Exception flow of events



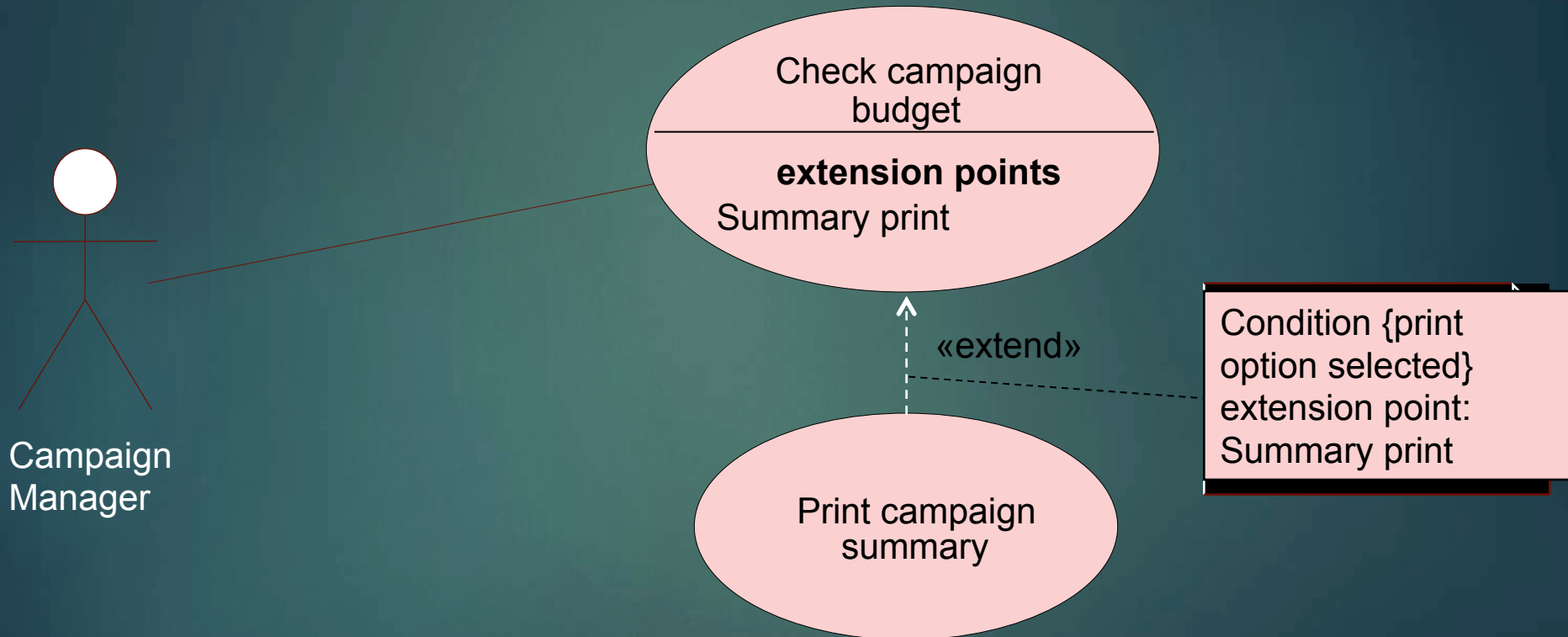
Exception flow may or may not return to a base use case flow. <<extend>> relationship is not for modeling exceptions.

# Notation of Use Case Diagrams

- ▶ Extend relationship
  - ▶ one use case provides additional functionality that **may** be required in another use case
  - ▶ there may be multiple ways of extending a use case, which represent variations in the way that actors interact with the use case
  - ▶ extension points show when the extension occurs
  - ▶ a condition can be placed in a note joined to the dependency arrow (Note that it is not put in square brackets, unlike conditions in other diagrams.)

# Extend relationship

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# The Generalization Relationship

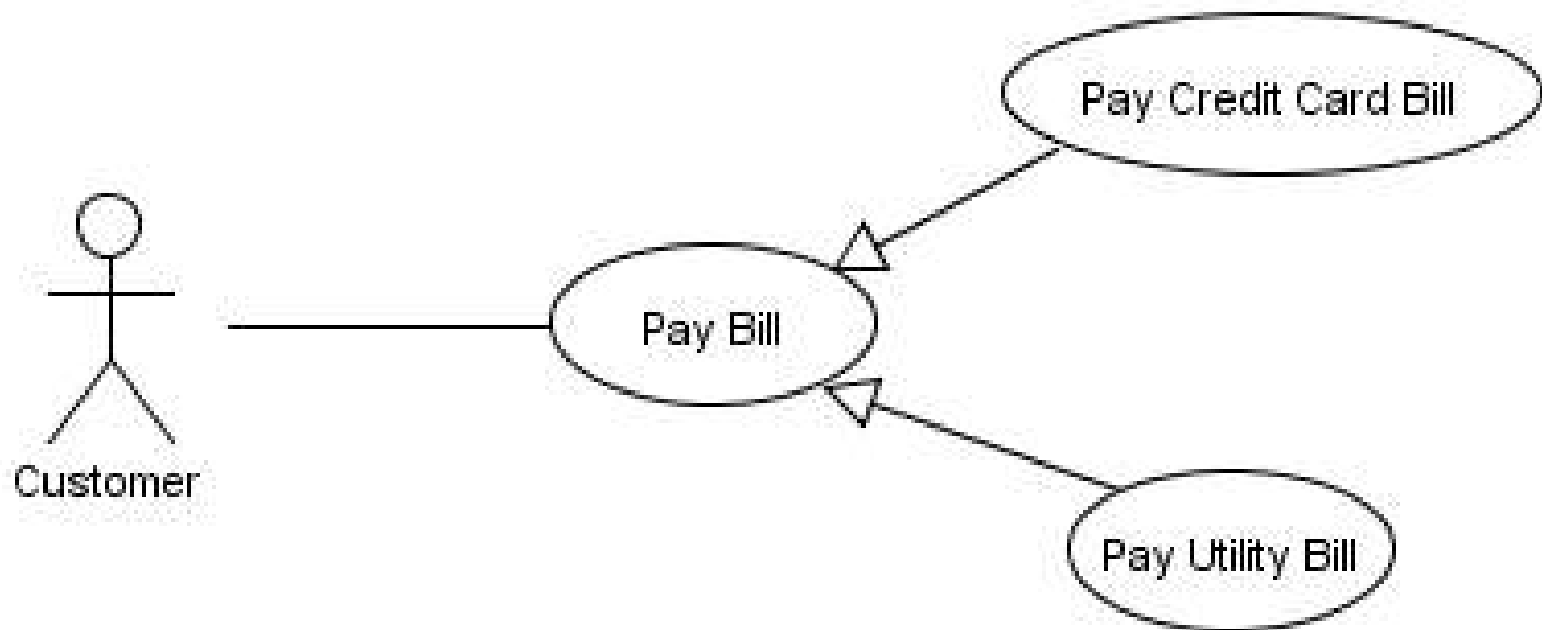
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- ▶ A child use case can inherit the behaviors, relationships and communication links of a parent use case.
- ▶ In other words, it is valid to put the child use case at a place wherever a parent use case appears.
- ▶ The relationship between the child use case and the parent use case is the generalization relationship.
- ▶ For example, suppose the ATM system can be used to pay bills. Pay Bill has two child use cases: Pay Credit Card Bill and Pay Utility Bill (see Figure 3.10).



# The Generalization Relationship (cont'd)

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# Base Use Case versus Abstract Use Case

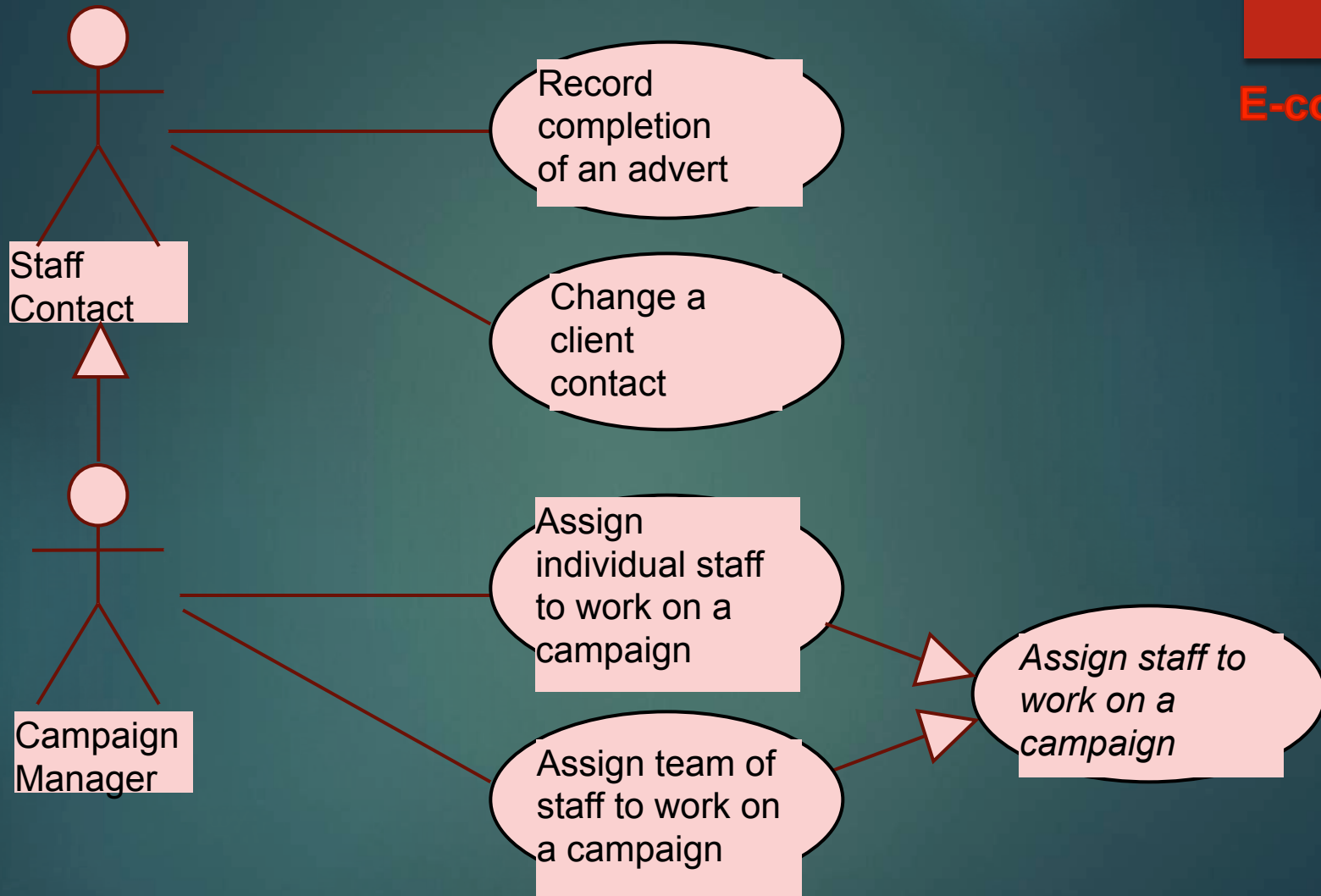
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- ▶ Base use case – invoked directly by actor to achieve an observable goal.
- ▶ Abstract use case – invoked by other use cases and is not a complete goal from user's perspective.
- ▶ e.g. withdraw cash (concrete use case) vs login (abstract use case)

# Notation of Use Case Diagrams

## ► Generalization

- shows that one use case provides all the functionality of the more specific use case and some additional functionality
- shows that one actor can participate in all the associations with use cases that the more specific actor can plus some additional use cases



# Documenting Use Cases

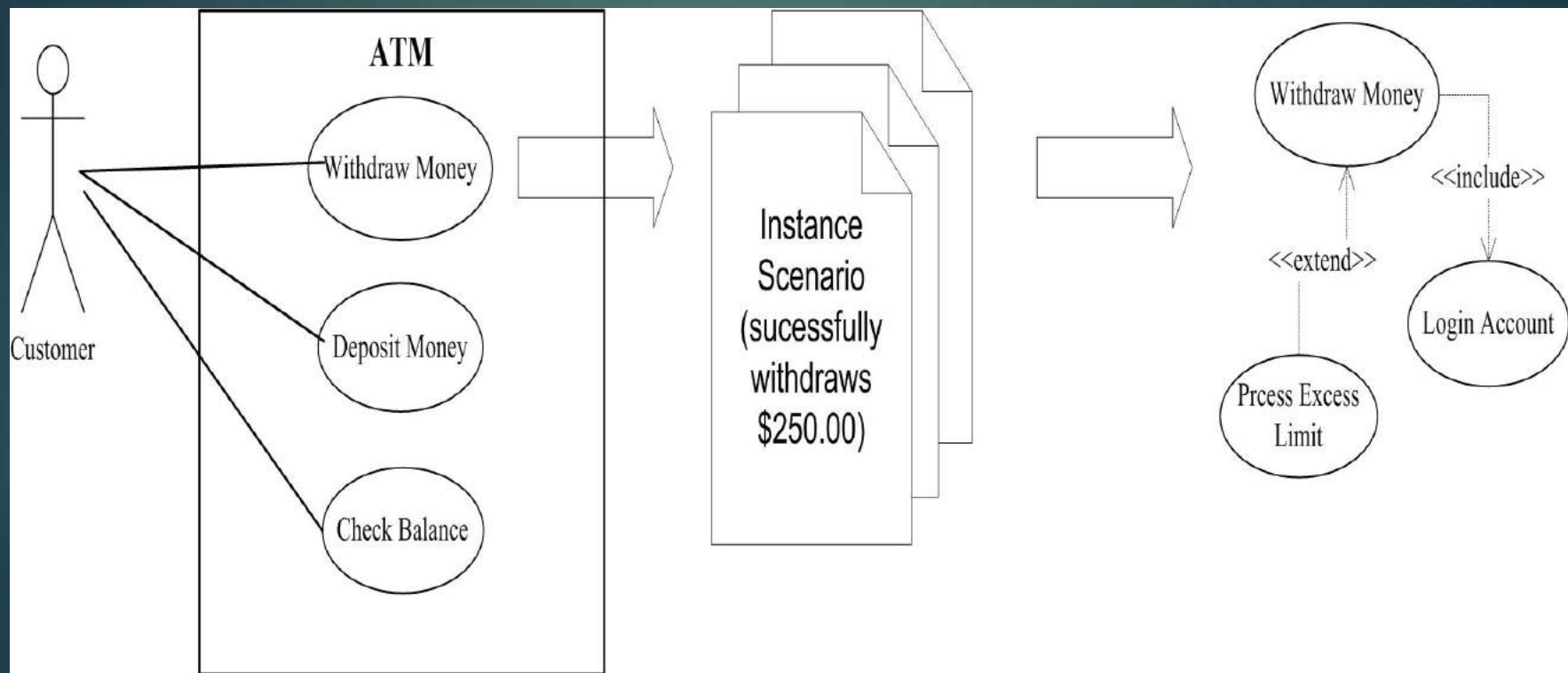
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- ▶ A use case is a description of what a system is used for, and who uses it, without providing details of how it performs its functions.
- ▶ A use case description serves as an agreed description between the user and the system designer on the flow of events that would happen when a use case is invoked.
- ▶ A use case description is explained and elaborated through scenarios (a set of sequences of actions).
- ▶ Each of these scenarios is simply an instance of the use case.



# Documenting Use Cases (cont'd)

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# Use Case Descriptions

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- ▶ Can be a simple paragraph  
**Assign staff to work on a campaign**
  - ▶ *The campaign manager wishes to record which staff are working on a particular campaign. This information is used to validate timesheets and to calculate staff year-end bonuses.*

# Use Case Descriptions

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- Can be a step-by-step breakdown of interaction between actor and system

## Assign staff to work on a campaign

### Actor Action

1. The actor enters the client name.
3. Selects the relevant campaign.  
already allocated
5. Highlights the staff members  
to be assigned to this campaign.

### System Response

2. Lists all campaigns for that client.
4. Displays a list of all staff  
members not  
to this campaign.
6. Presents a message confirming  
that staff have been allocated.

### Alternative Courses

Steps 1–3. The actor knows the campaign name and enters it directly.

# Use Case Descriptions

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- ▶ Many projects use templates
  - ▶ name of use case
  - ▶ pre-conditions
  - ▶ post-conditions
  - ▶ purpose
  - ▶ description
  - ▶ alternative courses
  - ▶ errors



# Use Case Template

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|                   |                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use case name     | Name of the use case                                                                                                                                                 |
| Use case ID       | ID of the use case                                                                                                                                                   |
| Super use case    | The name of the generalized use case to which this use case belongs                                                                                                  |
| Actor(s)          | The name of the actor(s) who participates in the use case                                                                                                            |
| Brief description | A description showing how this use case adds value to the organization, that is, what the purpose or role of this use case is in enabling the actors to do their job |
| Preconditions     | The conditions that must be satisfied before this use case can be invoked                                                                                            |
| Post-conditions   | The conditions that will be established as a result of invoking this use case                                                                                        |

# Use Case Template (cont'd)

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|                                  |                                                                                                                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow of events                   | A step-by-step description of the interactions between the actor(s) and the system, and the functions that must be performed in the specified sequence to achieve a user goal |
| Alternative flows and exceptions | Major alternatives or exceptions that may occur in the flow of events                                                                                                         |
| Priority                         | The development priority of this use case                                                                                                                                     |
| Non-behavioral requirements      | The non-functional requirements of the system such as hardware and software platform requirements, performance, security, etc.                                                |
| Assumptions                      | All the assumptions made about the use case                                                                                                                                   |
| Issues                           | All outstanding issues regarding the use case                                                                                                                                 |
| Source                           | Reference materials relevant to the use case                                                                                                                                  |

# Describing the Use Case

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An Initial Use Case Description of the Schedule Delivery Use Case:

Use case: Schedule Delivery

Use case ID: UC-300

Actor: Order Processing Clerk

Description: The Order Processing Clerk selects an order from the list of filled sales orders. The system displays the sales order details, and the member's telephone number and address are displayed. The Order Processing Clerk enters the delivery date and time after talking with the member over the phone. The system records the delivery date and time in a dispatch request to the delivery team.



# Describing the Use Case (cont'd)

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An Initial Use Case Description of the Schedule Delivery Use Case:

Use case: Check Order Status

Use case ID: UC-400

Actor: Customer Service Assistant

Description: The Customer Service Assistant enters the ID of the member. The Customer Service Assistant selects a sales order of the member. The system displays the status of the sales order.

# Performing a Textual Analysis

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- ▶ To identify the objects and classes, perform a textual analysis to extract all nouns and noun phrases from the problem statement.
- ▶ The following categories are more likely to represent objects:
  - ▶ Tangible things (e.g. classroom, playground)
  - ▶ Conceptual things (e.g. course, module)
  - ▶ Events (e.g. test, examination, seminar)
  - ▶ Outside organizations (e.g. publisher, supplier)
  - ▶ Roles played (e.g. student, teacher, principal)
  - ▶ Other systems (e.g. admission system, grade reporting system)



# Performing a Textual Analysis (cont'd)

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Use case: Schedule Delivery

Use case ID: UC-300

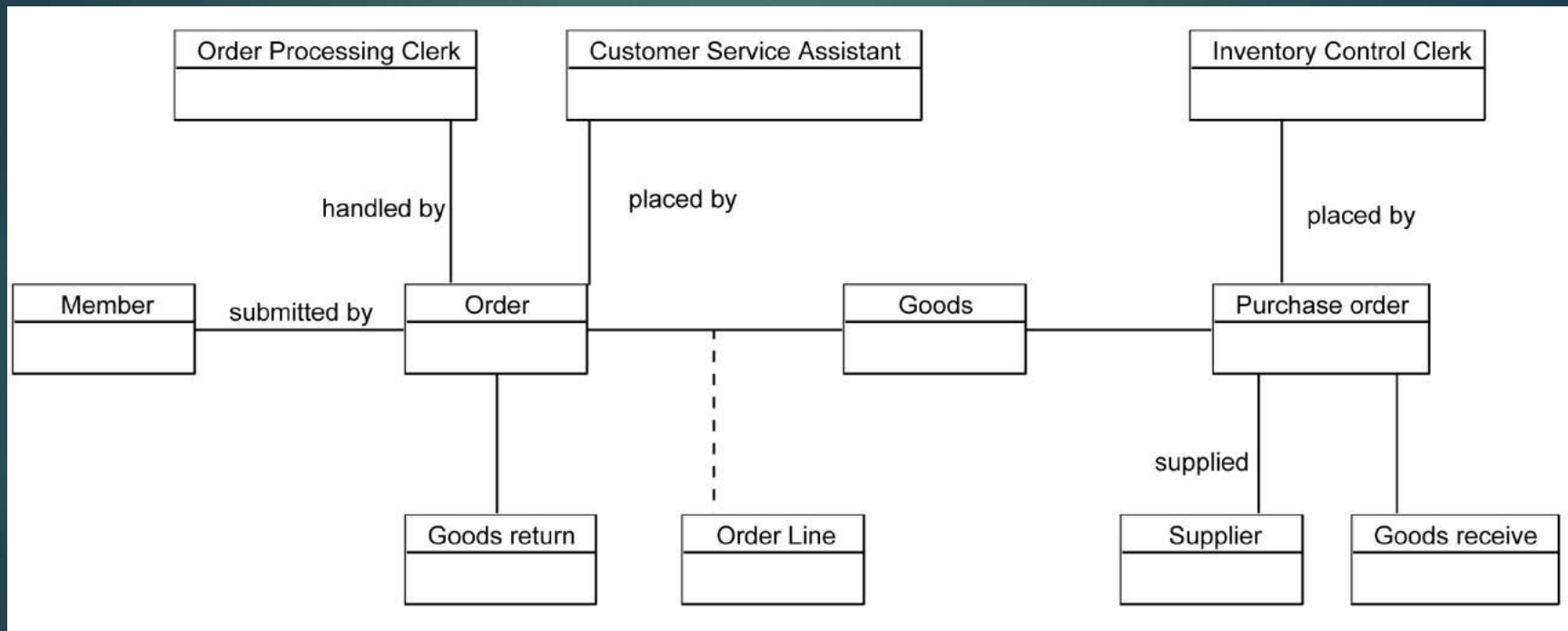
Actor: Order Processing Clerk

Description: The Order Processing Clerk selects an order from the list of filled sales orders. The system displays the sales order details, member's telephone number and address. The Order Processing Clerk enters the delivery date and time after talking with the member over the phone. The system records the delivery date and time in a dispatch request to the delivery team.



# Performing a Textual Analysis (cont'd)

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# Developing Base Use Case Descriptions

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|                   |                                                                                          |
|-------------------|------------------------------------------------------------------------------------------|
| Use case name     | Place Order                                                                              |
| Use case ID       | UC-100                                                                                   |
| Super use case    | The name of the generalized use case to which this use case belongs.                     |
| Actor(s)          | Customer Service Assistant                                                               |
| Brief description | A Customer Service Assistant places an order and then submits it for processing.         |
| Preconditions     | The member must have registered with the system.                                         |
| Post-conditions   | The Customer's order will be directed to the order processing department for processing. |

# Developing Base Use Case Descriptions (cont'd)

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## Flow of events

- 1.The Customer Service Assistant finds the member's record by entering the member's ID or name. The system displays a list of members which match the information entered by the Customer Service Assistant.
- 2.The Customer Service Assistant selects the required member record. The system displays the details of the member.
- 3.The Customer Service Assistant selects "Place Order". A new order form and order ID are then generated and displayed.
- 4.The Customer Service Assistant selects items from the catalog and adds them to the order.
- 5.The Customer Service Assistant submits the order for processing. The system records the order and forwards it to the Order Processing Clerk.

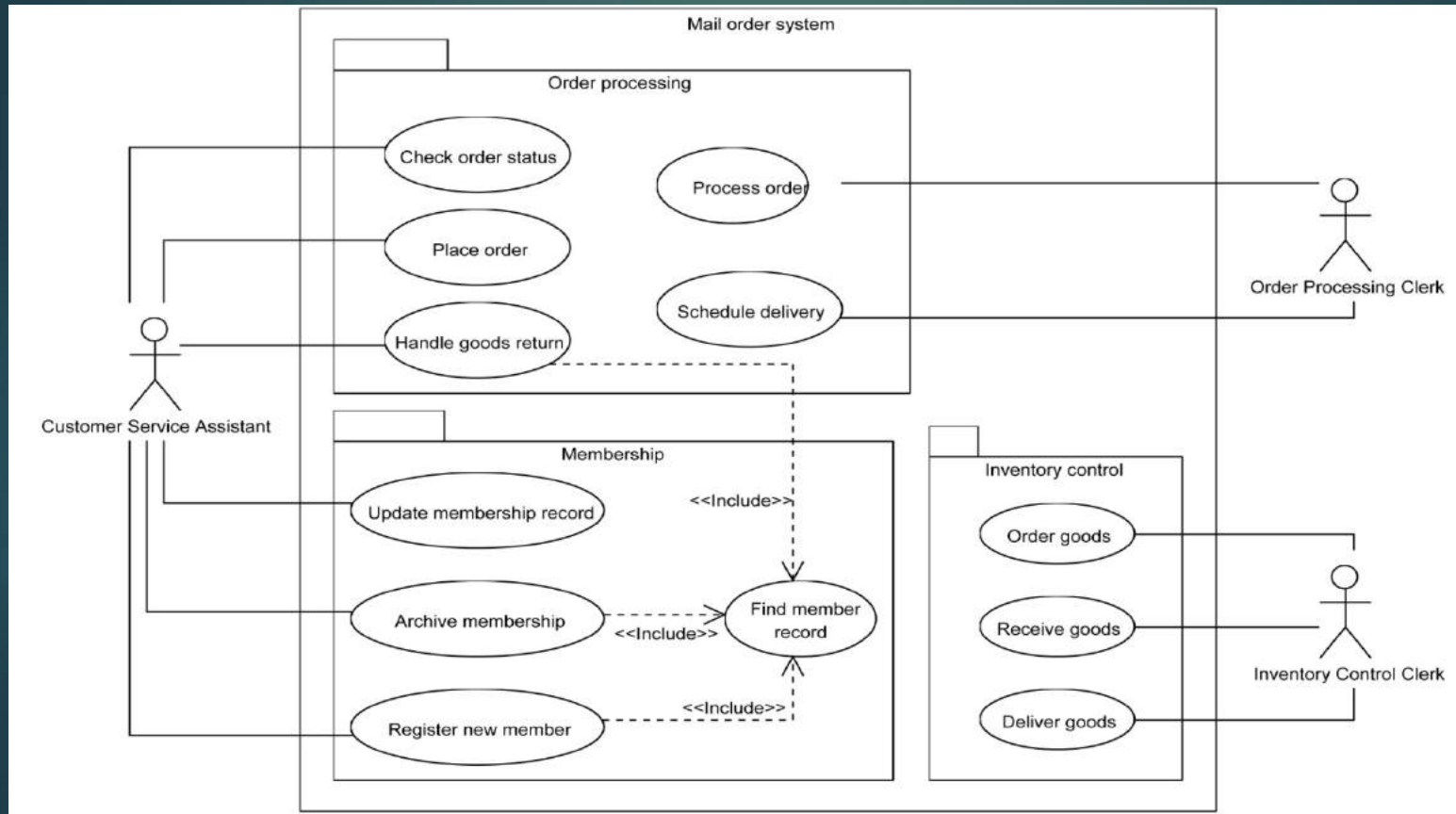


# Developing Base Use Case Descriptions (cont'd)

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|                                  |                                                                                                                                          |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Alternative flows and exceptions | At any time the Customer Service Assistant can decide to suspend the ordering process and come back to it later, or to cancel the order. |
| Priority                         | High                                                                                                                                     |
| Non-behavioral requirements      | The system should be able to handle 20,000 new orders per day.                                                                           |
| Assumptions                      |                                                                                                                                          |
| Issues                           | Is there any limit on the amount of an order?                                                                                            |
| Source                           | User Interview Memo 21, 8/9/01                                                                                                           |

# Structuring Use Cases



# Structuring Use Cases (cont'd)

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|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use case name     | Place Order                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Use case ID       | UC -100                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Super use case    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Actor(s)          | Customer Service Assistant                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Brief description | A Customer Service Assistant places an order and then submits it for processing.                                                                                                                                                                                                                                                                                                                                                                                           |
| Preconditions     | The member must have registered with the system.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Post-conditions   | The Customer's order will be directed to the order processing department for processing.                                                                                                                                                                                                                                                                                                                                                                                   |
| Flow of events    | <ol style="list-style-type: none"><li>1.Include (Find Member Record).</li><li>2.The Customer Service Assistant selects "Place Order". A new order form and order ID are then generated and displayed.</li><li>3.The Customer Service Assistant selects items from the catalog and adds them to the order.</li><li>4.The Customer Service Assistant submits the order for processing. The system records the order and forwards it to the Order Processing Clerk.</li></ol> |

# Structuring Use Cases (cont'd)

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|                                  |                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use case name                    | Find Member Record                                                                                                                                                                                                                                                                                                                                                                           |
| Use case ID                      | UC-10                                                                                                                                                                                                                                                                                                                                                                                        |
| Brief description                | A member record is requested.                                                                                                                                                                                                                                                                                                                                                                |
| Post-conditions                  | A membership record is returned.                                                                                                                                                                                                                                                                                                                                                             |
| Flow of events                   | <ol style="list-style-type: none"><li>1.The Customer Service Assistant finds the member record by entering the member's ID or name. The system displays a list of members which match the information entered by the Customer Service Assistant.</li><li>2.The Customer Service Assistant selects the required member record. The system then displays the details of that member.</li></ol> |
| Alternative flows and exceptions | No member record is found for the customer.                                                                                                                                                                                                                                                                                                                                                  |

# Behaviour Specifications

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- ▶ Rather than (or as well as) using text, a use case can be linked to another diagram that specifies its behaviour
- ▶ Typically a Communication Diagram, a Sequence Diagram, a State Machine or more than one of these

# Prioritizing Use Cases

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- ▶ The use case model is not only useful for requirements specification but also for planning the work in different phases of the system development life cycle.
- ▶ Since the use case model should be understandable by both the system developer and the user, it is quite natural to plan the development of the system by scheduling the completion dates of the use cases in the use case model.

# Prioritizing Use Cases (cont'd)

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- ▶ The following factors typically increase the priority ranking of a use case:
  - ▶ Architectural significance of the use case;
  - ▶ Use of new and untested technologies;
  - ▶ Problems which require substantial research effort;
  - ▶ Great improvement in efficiency (or revenue) of the business process; and
  - ▶ Use cases that support major business processes.



# Drawing Use Case Diagrams

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- ▶ Identify the actors and the use cases
- ▶ Prioritize the use cases
- ▶ Develop each use case, starting with the priority ones, writing a description for each
- ▶ Add structure to the use case model: generalization, include and extend relationships and subsystems



# Prototyping

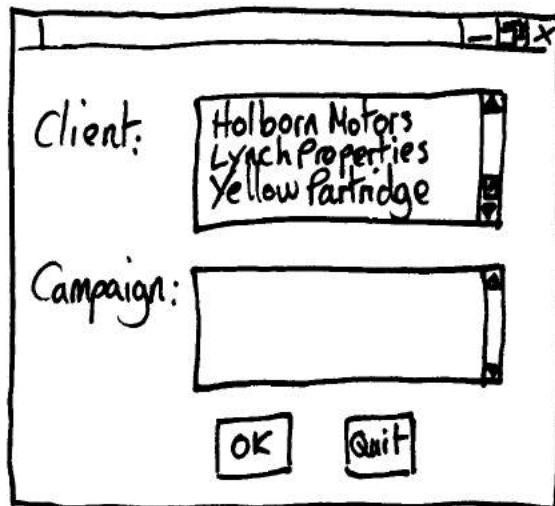
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- ▶ Use case modelling can be supported with prototyping
- ▶ Prototypes can be used to help elicit requirements
- ▶ Prototypes can be used to test out system architectures based on the use cases in order to meet the non-functional requirements

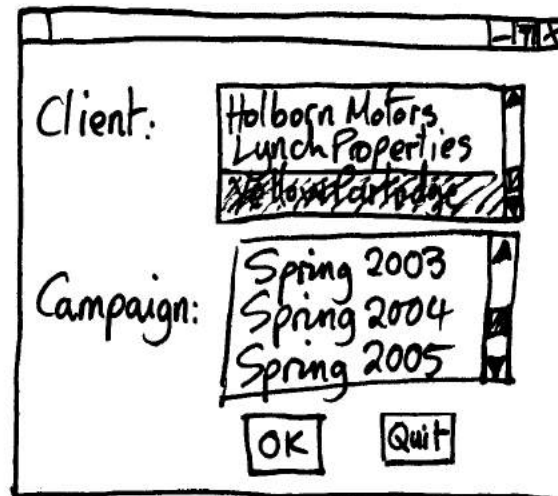
# Prototyping

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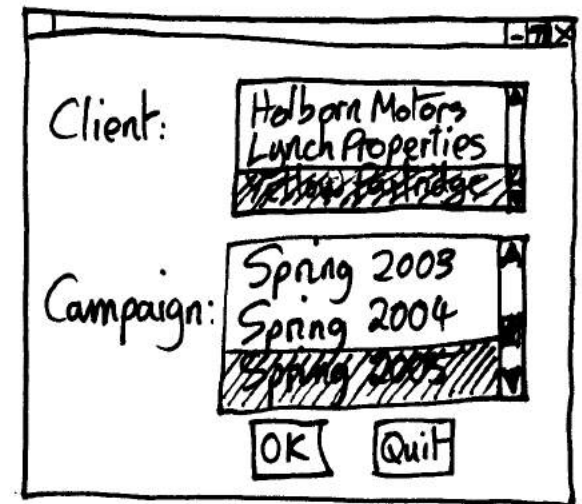
- For user interface prototypes, storyboarding can be used with hand-drawn designs



Dialogue initialized.



User selects Client. Campaigns listed.

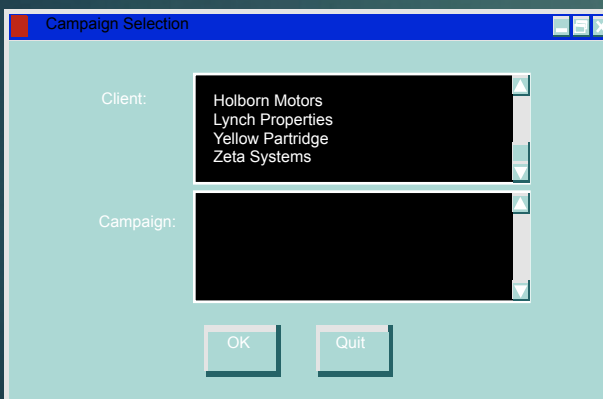


User selects Campaign.

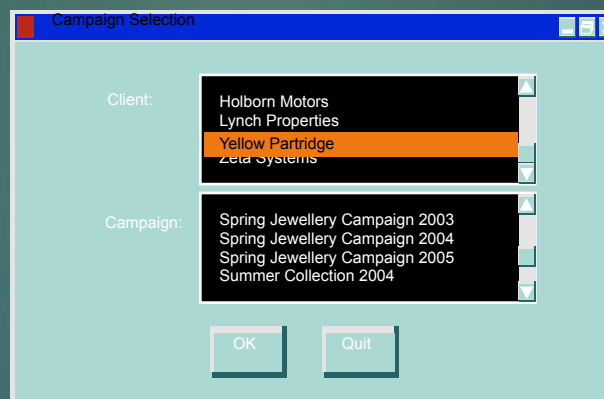
# Prototyping

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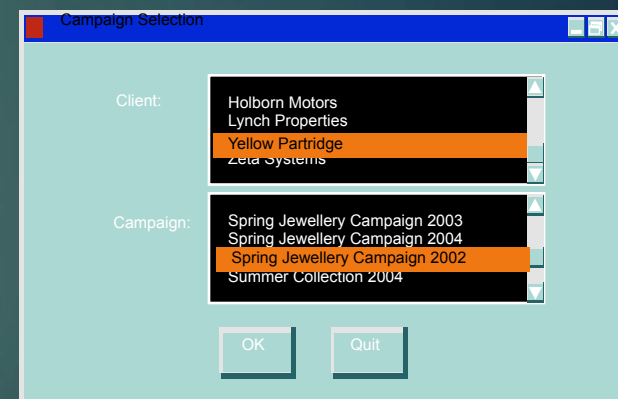
- ▶ User interface prototypes can be implemented using languages other than the one that the system will be developed in



Dialogue initialized.



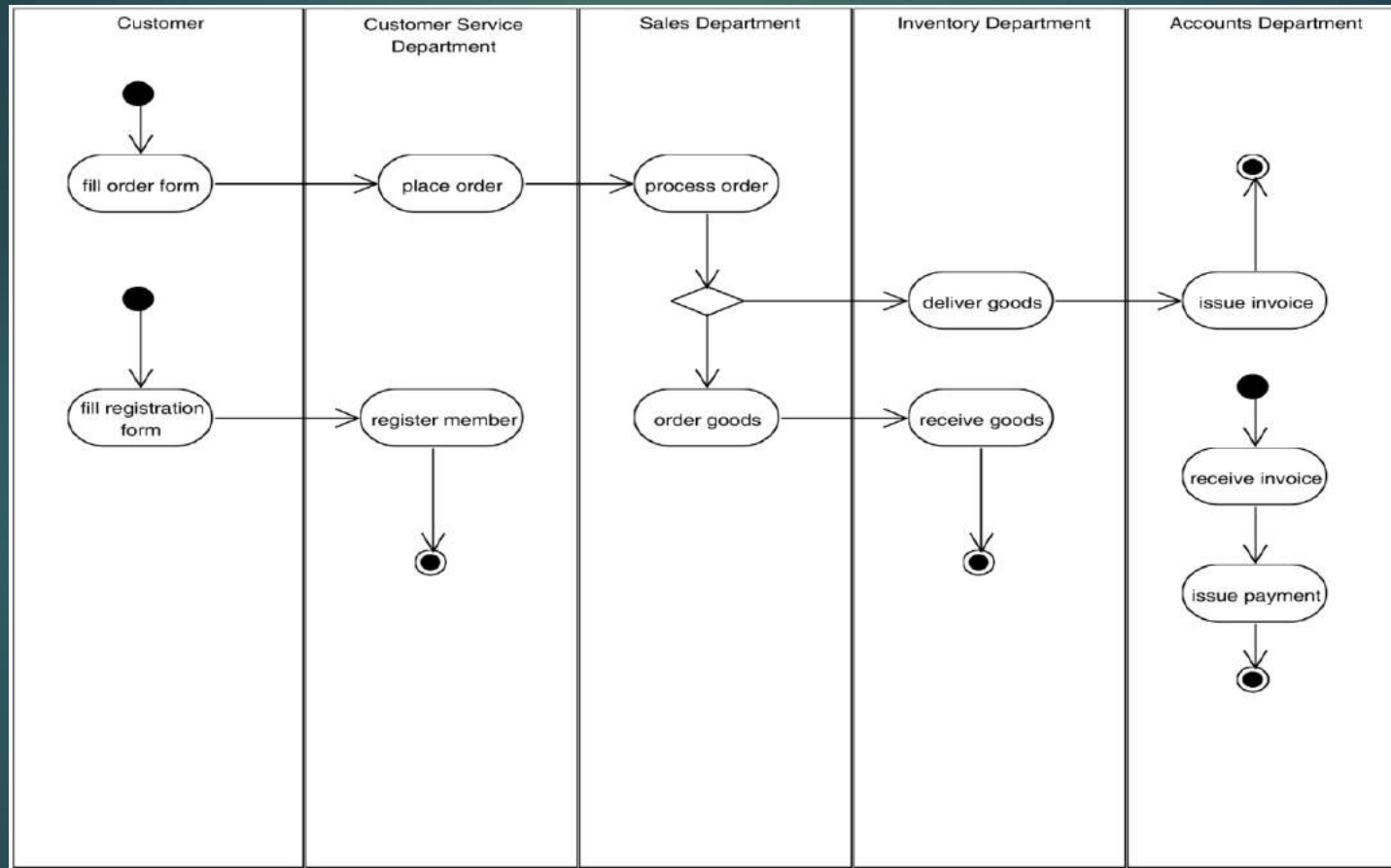
User selects Client. Campaigns listed.



User selects Campaign.

# Business Modeling - Business Process Analysis (cont'd)

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# Business Modeling - Determining the System Scope

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- ▶ The developer can then discuss with the stakeholders of the system and decide on the business activities that are required to be computerized.
- ▶ Let's assume that the developer and the stakeholders have agreed to computerize the business activities related to membership, sales, ordering and inventory control of the mail order company.
- ▶ We can now proceed with the requirements workflow (the next workflow of the Activity Analysis Approach).



# Requirements

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- ▶ In this workflow, we start with a set of activities that we wish to computerize and prepare a more detailed (use case level) problem statement.
- ▶ We then conduct a textual analysis on this problem statement to identify the actors and use cases. By elaborating on the use cases, the use case descriptions can be used as the input to the analysis workflow.

# Requirements - Domain Analysis (Use Case Level)

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- ▶ After determining the scope of the system, we can prepare a (use case level) problem statement to describe the required activities.
- ▶ The problem statement should give enough details for identifying the responsibilities of individual users, and describe the procedure for them to perform their tasks.

# Requirements - Domain Analysis (Use Case Level) (cont'd)

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## Problem Statement (Use Case Level)

- ▶ A customer registers to become a member by filling the membership form and mailing it back to the company. A member who has not been active (i.e. no transactions) for a period of one year will be removed from the membership list and needs to apply for reinstatement of the lapsed membership.
- ▶ A member should inform the company of any change in personal details, such as home address, telephone numbers, etc.
- ▶ A member makes an order by filling out a sales order form and faxing it to the company. Alternatively, the Customer Service Assistant can handle the order over the phone.
- ▶ The Customer Service Assistant always checks the validity of membership before entering the sales order information into the system.

# Requirements - Domain Analysis (Use Case Level) (cont'd)

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- ▶ The Order Processing Clerk checks the availability of the ordered items and holds them for the order. If all the items are available, the Order Processing Clerk will schedule delivery.
- ▶ The Inventory Control Clerk controls and maintains an appropriate level of stock and is also responsible for reordering new items.
- ▶ If there is a problem with an order, members can phone the Customer Service Assistant who will follow up the sales order.
- ▶ Members may return defective goods within 30 days and get their money back.
- ▶ Each task carried out by the system will have the name and ID of the staff member concerned recorded into the system.

# Requirements - Use Case Analysis: Finding Actor and Use Cases

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- ▶ Apply the Transitor(Problem\_Statement [use case level], Actor\_List) manipulator to identify all the actors.
  - ▶ *Customer Service Assistant* (Membership registration, placement of order)
  - ▶ *Order Processing Clerk* (Process order)
  - ▶ *Inventory Control Clerk* (Inventory control)



# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

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Actor Name: Customer Service Assistant

Description: The Customer Service Assistant is responsible for the maintenance of membership records, handling of goods returns, creating sales orders, monitoring sales order status and validating membership status.

# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

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Actor Name: Order Processing Clerk

Description: The Order Processing Clerk is responsible for processing sales orders, submitting reorder requests, requesting necessary deposits from members and scheduling delivery of goods to the members.



# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

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Actor Name: Inventory Control Clerk

Description: The Inventory Control Clerk is responsible for ordering and reordering of goods. The Inventory Control Clerk uses the system to update the stock level when goods have been received.



# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

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- ▶ Apply the Transitor(Problem\_Statement[use case level], Use\_Case\_List) manipulator to identify all use cases.
- ▶ The following are the use cases of the mail order system:
  - ▶ Check order status
  - ▶ Place order
  - ▶ Handle goods return
  - ▶ Update membership record
  - ▶ Archive membership



# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

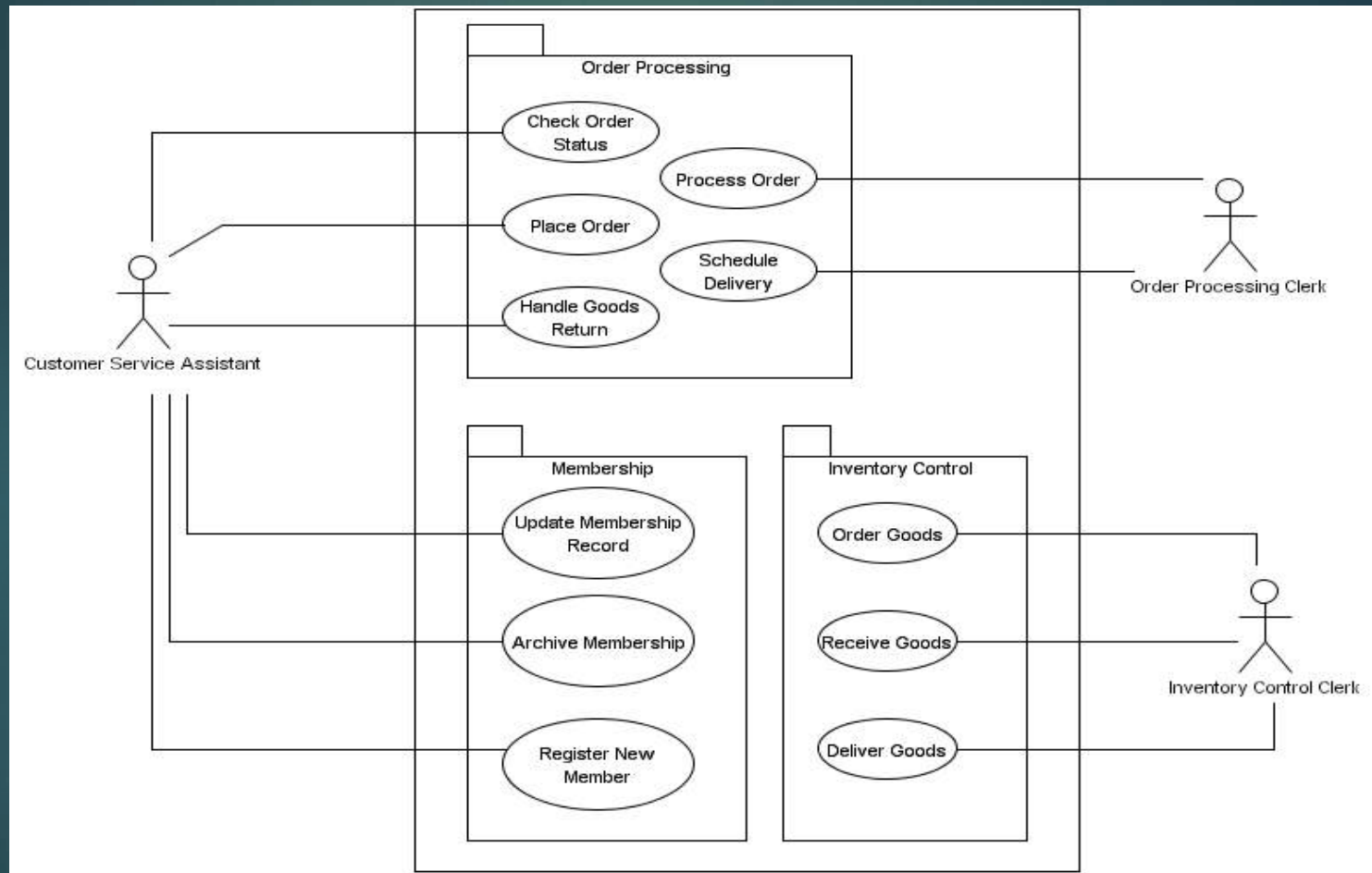
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- ▶ Register new member
- ▶ Process order
- ▶ Schedule delivery
- ▶ Order goods
- ▶ Receive goods
- ▶ Deliver goods



# Requirements - Use Case Analysis: Finding Actor and Use Cases(cont'd)

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# Requirements - Use Case Analysis: Prioritizing Use Cases

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- ▶ The use cases are prioritized according to their relative importance in the system.
- ▶ The developer evaluates the risks and the significance of the use cases to the stakeholders of the system.
- ▶ The developer and stakeholders of the system can meet to decide on the priority of the use cases.

# Requirements - Use Case Analysis: Prioritizing Use Cases (cont'd)

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| Priority Rank | Use Case           | Reason                                                                                              |
|---------------|--------------------|-----------------------------------------------------------------------------------------------------|
| High          | Process order      | Directly improves the efficiency of the business process and affects the system architecture        |
| High          | Place order        | Same as above                                                                                       |
| High          | Check order status | Improve efficiency and quality of customer service                                                  |
| Medium        | Order goods        | Ordering goods is less often than processing order but still is one of the major business processes |
| Medium        | Deliver goods      | Improve the control of stock level                                                                  |

# Requirements - Use Case Analysis: Prioritizing Use Cases (cont'd)

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| Priority Rank | Use Case                 | Reason                                            |
|---------------|--------------------------|---------------------------------------------------|
| Medium        | Schedule delivery        | Improve the efficiency of the goods delivery team |
| Medium        | Receive goods            | Improve the control of stock level                |
| Medium        | Handle goods return      | Same as above                                     |
| Low           | Update membership record | Small impact on the system architecture           |
| Low           | Register new member      | Same as above                                     |
| Low           | Archive membership       | Same as above                                     |

# Requirements - Use Case Analysis: Describing Use Cases

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- ▶ Apply the Elaborator(Use\_Case, Use\_Case\_Description) manipulator to develop the use case description.
- ▶ The purpose of this manipulator is to give a detailed description of the use cases which can then be used for constructing other diagrams, such as the interaction diagrams, state diagrams, class diagrams, etc.

# Requirements - Use Case Analysis: Describing Use Cases (cont'd)

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|                           |                                                                                                                                                                                                                                                                                                 |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Use case name</b>      | <b>Process Order</b>                                                                                                                                                                                                                                                                            |
| <b>Use case ID</b>        | <b>UC-200</b>                                                                                                                                                                                                                                                                                   |
| <b>Primary actor(s)</b>   | <b>Order Processing Clerk</b>                                                                                                                                                                                                                                                                   |
| <b>Secondary actor(s)</b> |                                                                                                                                                                                                                                                                                                 |
| <b>Brief description</b>  | <b>The Order Processing Clerk selects a sales order from the system. He/she then checks each line item in the sales order for the availability of stock before finding the stock for each line item. The system records the name of the Order Processing Clerk who handles the sales order.</b> |
| <b>Preconditions</b>      | <b>The sales order is stored in the system.</b>                                                                                                                                                                                                                                                 |

# Requirements - Use Case Analysis: Describing Use Cases (cont'd)

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|                 |                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow of events  | <ol style="list-style-type: none"><li>1. The Order Processing Clerk selects a sales order. The system displays the items and quantities of the order.</li><li>2. The Order Processing Clerk checks the availability of each item.</li><li>3. The Order Processing Clerk holds the stock items for the sales order. The system changes the order status to “filled”.</li></ol> |
| Post-conditions | The sales order status is changed to “filled” and the stock items are held for the sale.                                                                                                                                                                                                                                                                                      |

# Requirements - Use Case Analysis: Describing Use Cases (cont'd)

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|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Alternative flows and exceptions</b> | <b>If an item is not available from stock, the sales order status of the item is changed to “hold”. If the number of reorder item exceeds the reorder limit of the member, the clerk will print out a “request deposit” letter to the member, and the sales order is marked as “deposit pending”. When the deposit is received or if the reorder amount does not exceed the reorder limit of the member, the system then forwards a reorder request to the inventory control clerk. The sales order status is changed to “filled” when the stock items have been received, and the system will notify the order processing clerk.</b> |
| <b>Non-behavioral requirements</b>      | <b>The system should be able to handle 2,000 sales orders per day.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

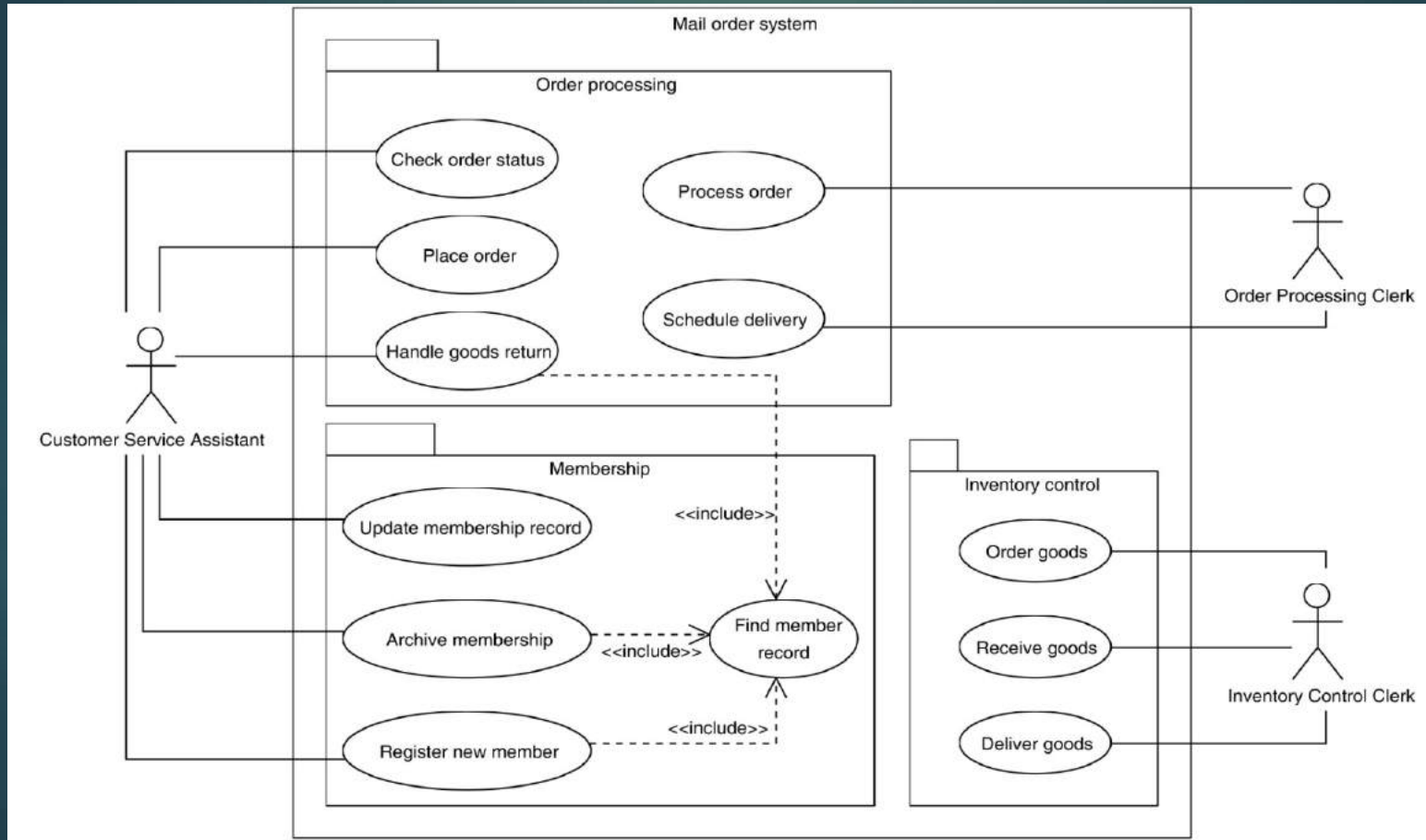
# Requirements - Use Case Analysis: Describing Use Cases (cont'd)

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|             |                                             |
|-------------|---------------------------------------------|
| Assumptions |                                             |
| Issues      | Can the available items be delivered first? |
| Source      | User Interview Memo 21, 8/9/01              |

# Requirements - Use Case Analysis: Structuring Use Case Model

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# References

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- ▶ Jacobson et al. (1992)
- ▶ Rosenberg and Scott (1999)
- ▶ Cockburn (2000)

(For full bibliographic details, see Bennett, McRobb and Farmer)

- ▶ Object-Oriented Technology - From Diagram to Code with Visual Paradigm for UML, Curtis H.K. Tsang, Clarence S.W. Lau and Y.K. Leung, McGraw-Hill Education (Asia), 2005



## WE FOCUS ON KNOWLEDGE-BASED ON EDUCATION

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