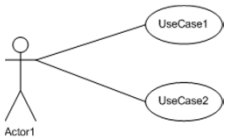
Chapter 3: Use Case Modeling

- Understanding the Use Case Model
  - Purpose of Use Case Model
  - Resources of Use Case Model
- Building Use Case Diagram
  - Elements of Use Case Diagram
  - Steps to Build Use Case Diagram
  - Example of Building Use Case Diagram (POS System)
- Building Use Case Narrative
- Identify Use Case Scenario



Understanding the Use Case Model

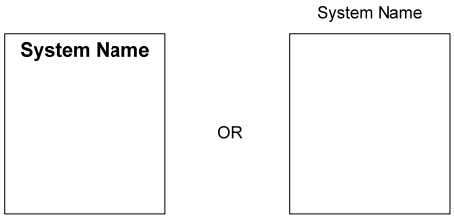
- ***Purpose of Use Case Model***
  - Focus on the target rather than the means of getting to the target (key functions)
  - Focus on the goal of process
  - Focus on who will use the system? And what will they use it to do for them?
- ***Resources of the Use Case Model***
  - Use Case Diagram: the graphical modeling show the communication between actor and use case
  - Use Case Narrative: describe each use case as the text description
  - Use Case Scenario: show the path of process flow for each use case to get the goal. Each path will illustrate in activity diagram.

Building Use Case Diagram

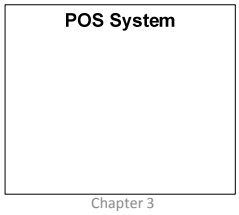
- **Elements of Use Case Diagram**

  There are 6 important elements

  – **System**: the boundary of system being studied



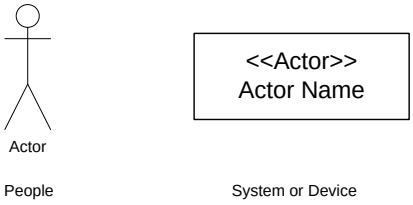
  – Example



Chapter 3 3

Building Use Case Diagram - Elements

– **Actor:** is the people, system (other system), and devices that communicate with system. User placed outside the system boundary.

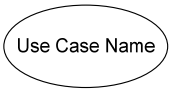


- Example

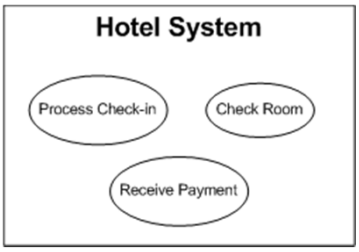
Chapter 3 4

Building Use Case Diagram - Elements

– **Use Case:** referred to the functionalities (key function) or features of system and fulfill by user. Use case placed inside the system boundary.



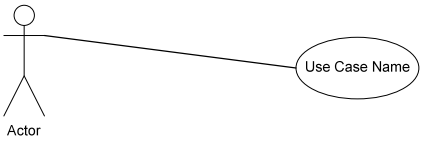
- Example



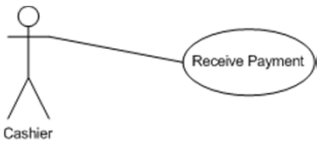
Chapter 3 5

Building Use Case Diagram - Elements

– **Association:** the communication of *actor* and *use case*. The solid line that is connected from *actor* to *use case* called association.



- Example



Chapter 3 6

Building Use Case Diagram - Elements

- **Dependency:** the relationship between *use case* and *use case*. There are two main dependency in use case diagram; that is <<include>> dependency and <<extends>> dependency.
  - <<include>> dependency: the relationship between *use case 1* and *use case 2* in which *use case 1* always need the help from *use case 2*. Note that, some time we use <<use>> dependency instead of <<include>> dependency. The arrow forward from *use case 1* to *use case 2*.
  - <<extends>> dependency: the relationship between *use case 1* and *use case 2* in which *use case 1* might need the helps from *use case 2*. The arrow backward from *use case 2* to *use case 1*.

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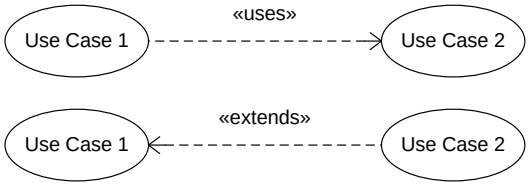
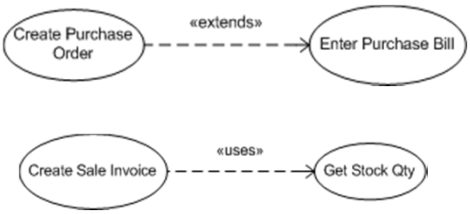
Building Use Case Diagram - Elements



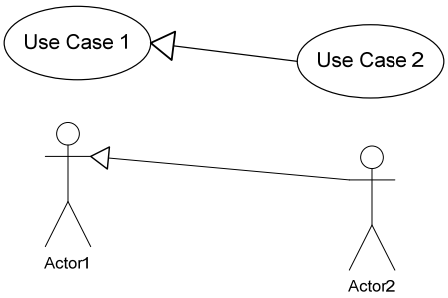
- Example



Chapter 3 8

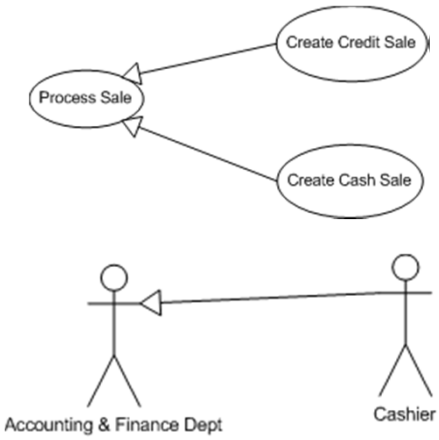
Building Use Case Diagram - Elements

– Generalization: the relationship between *actor* and *actor* or the relationship between *use case* and *use case*. Below is talking about *use case 2* inherits from *use case 1*.



Building Use Case Diagram - Elements

- Example



Building Use Case Diagram - Steps

- **Set the context of the target system**
- **Identify the actors**
  - Who will be the primary actor for the system?
  - Who will be supported?
  - Who will maintain, administrate the system?
  - Which other system does it interact with?
  - Who or what has an interest in the results that the system produces?

Building Use Case Diagram - Steps

- **Identify the use cases and associations between actors and use cases**
  - What does the system produce for the actors? (Output)
  - What does the actor help the system do? (input)
- **Evaluate the actors and use cases to find opportunities for refinement**
  - Merge Actor
  - Rename Actor or Use Case
  - Split Actor
- **Evaluate the Use Cases for dependencies**
- **Evaluate the actors and Use Cases for generalization**

Example of Building Use Case Diagram (POS)

- **<u>Example 1</u>: Point of Sale System in Minimart**

(Study the system requirements by using Use Case Model)

– Set context of system

- This POS system will use in a Minimart at the front desk in order to manage sale transactions. We have one cashier using the system to print receipt for customers when they buy products. From this system, we can produce sale reports effectively and efficiently. This system will communicate with Inventory Control System in order to get stock quantity and update stock balance automatically.

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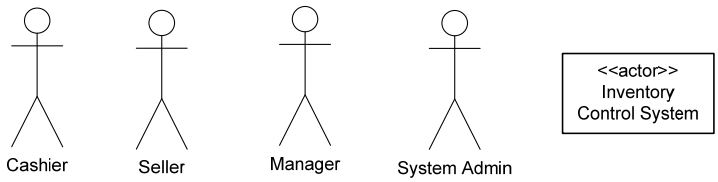
Example of Building Use Case Diagram (POS)

– Identify actors: who will use the system?

- People: Cashier, Seller, System Admin, Manager
- System: Inventory Control System



– Identify use case and define association between actors (users) and use case

- Key functions for cashier or seller
  - Create Receipt
  - Print Receipt

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Example of Building Use Case Diagram (POS)

- Key functions for System Admin or Manager
  - Change product price
  - Setup user (to use the system)
  - Define user privileges
  - View audit trail
  - Backup database
  - Restore database
  - Produce sale reports
- Key functions for Inventory Control System
  - Get stock quantity
  - Update stock balance
  - Get product list

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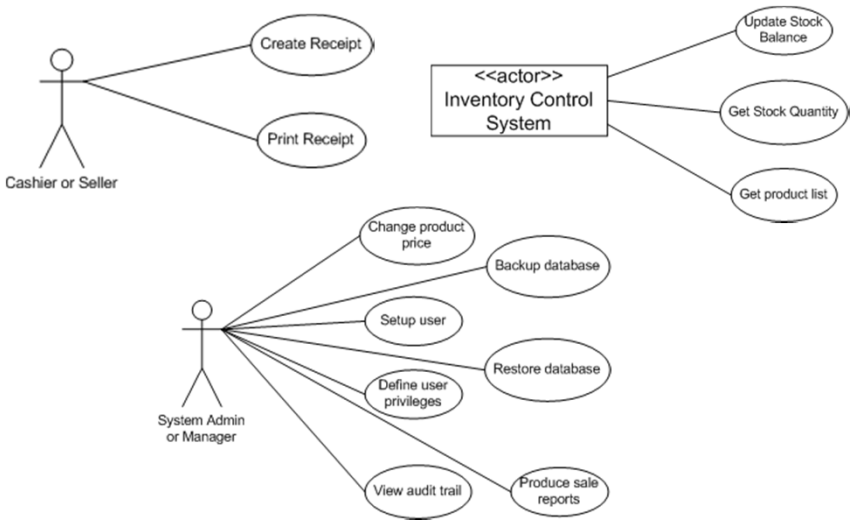
Example of Building Use Case Diagram (POS)



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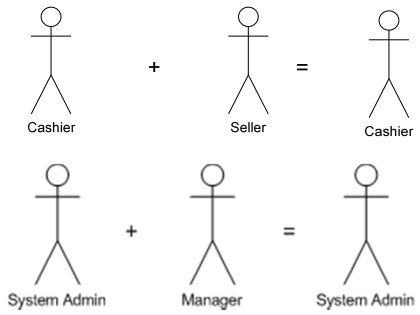
Example of Building Use Case Diagram (POS)

– Evaluate the actors and use cases to find opportunities for refinement (if exists): In this case, cashier and seller should emerge together because we have only one in the system. Also the manager act as the system admin.



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Example of Building Use Case Diagram (POS)

– Evaluate the Use Cases for dependencies: just want to find the related use cases.

– Evaluate the actors and Use Cases for generalization: N/A

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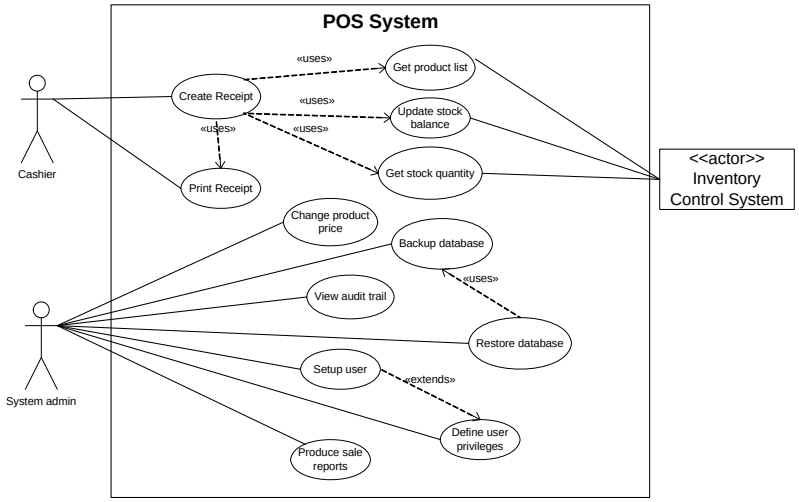
Example of Building Use Case Diagram (POS)

– POS System Use Case Diagram



Chapter 3 19

Example of Building Use Case Diagram

- **<u>Example 2</u>: Inventory Control System in Minimart**
  - **Context:** Inventory Control System will integrate with Point of Sale System which is described in Example 1 above. The purpose of this system is to calculate stock balance. It is importance when sale transactions created, because if there is not enough stock then POS system cannot process sale transactions. The way to calculate stock balance we need some relevant transactions such as enter product import, make purchase return and create stock adjustment.

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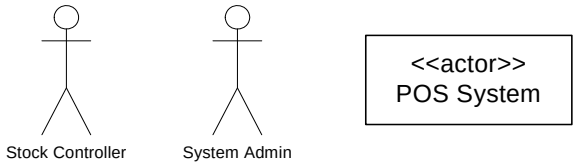
Example of Building Use Case Diagram – Inventory Control System

- Identify Actor: Who will use this system?
  - Stock Controller
  - System Admin
  - POS System

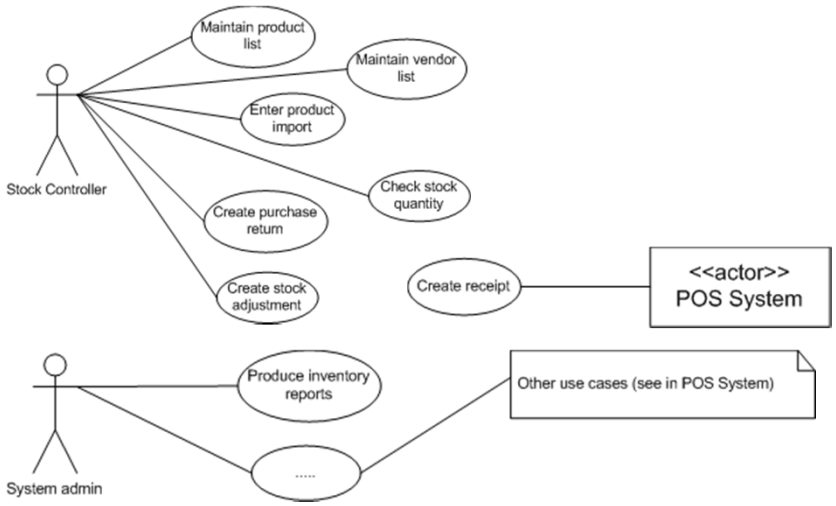


- Identify Use Case and Association
  - Stock Controller
    - Maintain product list

Example of Building Use Case Diagram – Inventory Control System

    - Enter product import
    - Create purchase return
    - Create stock adjustment
    - Maintain vendor list
    - Check stock quantity
  - System admin
    - (See use case in POS System above)
    - Produce inventory reports
  - POS System
    - Create receipt (decrease stock)
  - Automatic use case by owner system
    - Update stock balance

Example of Building Use Case Diagram – Inventory Control System



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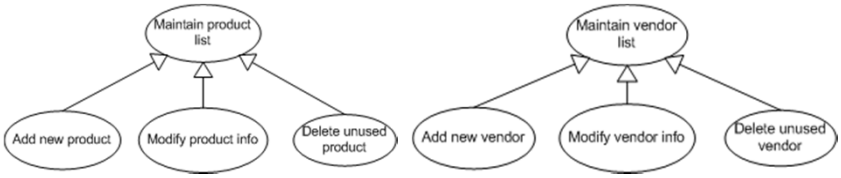
Example of Building Use Case Diagram – Inventory Control System

- Evaluate the Use Cases for dependencies: just want to find the related use cases

- Evaluate the actors and Use Cases for generalization



Chapter 3 24

Use Case Narrative

– Use Case Narrative is a text description of each use case (one-by-one) that talking about communication between use case and user (actor). Elements of use case narrative are

- **Pre-conditions**: the conditions that we must pass before starting to process use case.
- **Use Case Initiation**: describe how to start a Use Case.
- **Process or Dialog**: describe how the user interacts with the system during execution of the use case.
- **Use Case Termination**: define different mechanisms that can cause the Use Case to stop execution.
- **Post-conditions**: define the state of the system that must be true when the use case ends.

Use Case Narrative

– **Example:** Use Case: Create Receipt (in POS System)

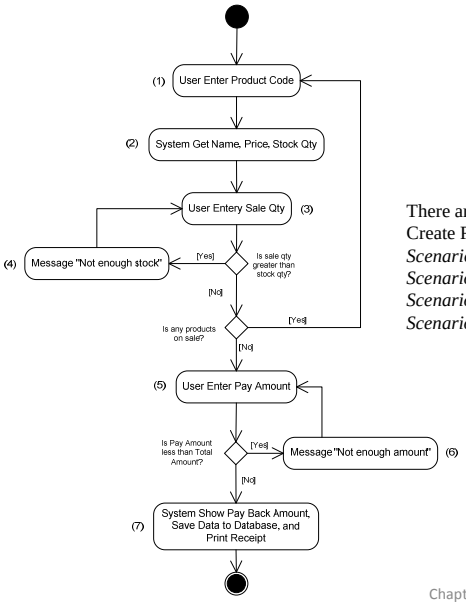
Field Name	Field Description
Name	Create Receipt
Number	1
Author	Mr. Me
Last update	13/12/08
Pre-conditions	N/A
Use Case Initiation	This use case start when customer request to buy goods
Dialog	- The system waiting user to enter product code - User enter product code - System show product name, price - System get stock qty of product (from Check Stock Qty Use Case) - System request product quantity from user - User enter product quantity - If sale quantity greater than stock quantity then System show message "Not enough stock." User re-enter product qty again and system re-check - else User continue enter product code - Until the user indicates that he/she is done on entering product code requested from customer - System show total and request user to enter pay amount - User enter amount paid after requested from customer - If Amount Paid less than Total Amount then System show message "Pay amount not enough." User re-enter pay amount again and re-check by system - else System show pay back amount System print receipt
Use Case Termination	- The user may cancel (click button close without saving cancel from customer) - The use case may timeout by system stuck - The user can indicate that he/she is done
Post-condition	- Data save to database correctly

Identifying Use Case Scenario

- Each outcome of the Use Case goal is **scenario**.
- A **scenario** is a **single path** through a Use Case.
- We can identify Use Case scenario from the dialog of Use Case Narrative.
- Activity diagram is the one common tool use to find scenario visually.

- The below activity diagram show the process flow of **Create Receipt** Use Case in order to find the scenarios

Identifying Use Case Scenario



There are 4 scenarios in this activity diagram which represented to Create Receipt Dialog Use Case.

Scenario 1: (1) -> (2) -> (3) -> (5) -> (7)
Scenario 2: (1) -> (2) -> (3) -> (4) -> (3) -> (5) -> (7)
Scenario 3: (1) -> (2) -> (3) -> (5) -> (6) -> (5) -> (7)
Scenario 4: (1) -> (2) -> (3) -> (4) -> (3) -> (5) -> (6) -> (5) -> (7)