Software Engineering

Lecture 8

Mr. Noor Ul Arfeen

Analysis Modeling

Analysis Model is a technical representation of the system. It acts as a link between system description and design model

In Analysis Modelling, information, behavior, and functions of the system are defined and translated into the architecture, component, and interface level design in the design modeling

Elements of Analysis Modeling

Elements of the analysis model

❑ Scenario-based elements

  ▪ **Functional** - processing narratives for software functions

  ▪ **Use-case** - descriptions of the interaction between an "actor" and the system

❑ Class-based elements

  ▪ Implied by scenarios

❑ Behavioral elements

  ▪ State diagram

❑ Flow-oriented elements

  ▪ Data flow diagram

Use Cases

Use cases describe the interaction between the system and external users that leads to achieving particular goals

Each use case includes three main elements:

- ❑ **Actors** These are the users outside the system that interact with the system
- ❑ **System** The system is described by functional requirements that define an intended behavior of the product
- ❑ **Goals** The purposes of the interaction between the users and the system are outlined as goals

There are two formats to represent use cases:

- ❑ Use case specification/description
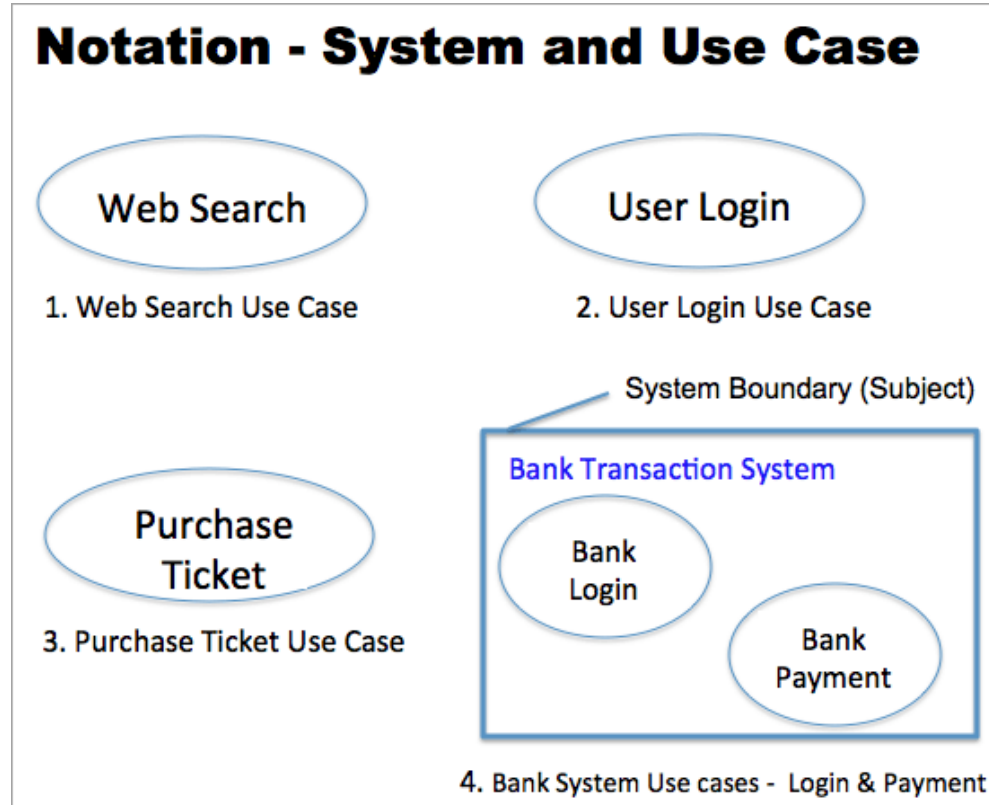- ❑ Use case diagram

Use Case Diagram

Use Cases Elements
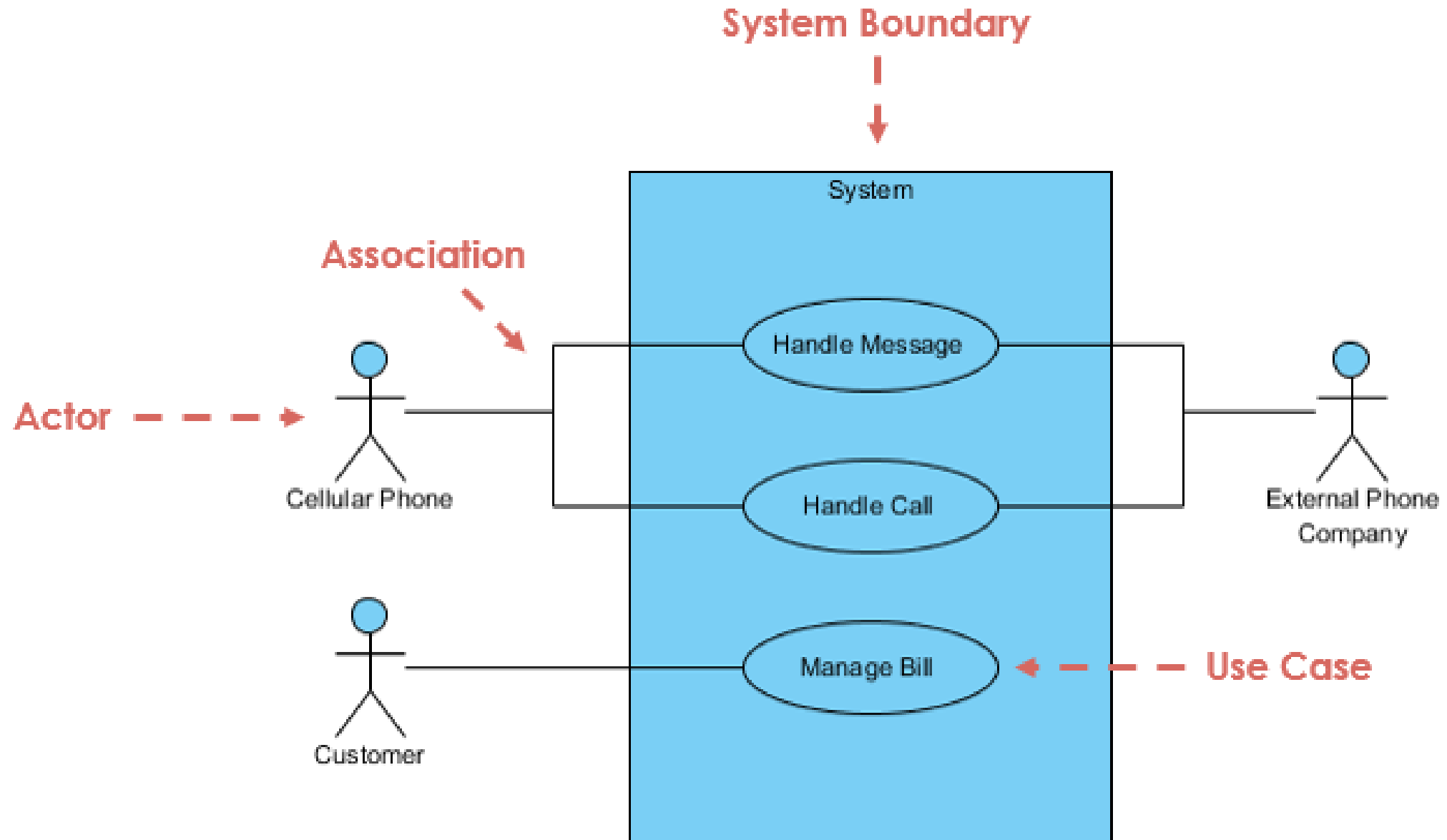
System

❑ It is referred to as scenario or functionality. It details a set of actions between actors & data consumed & produced if any

❑ Notation of System Boundary is rectangle with the System's name on top of the rectangle

Use Case

❑ It represents a functional unit of a system. Notation is horizontally shaped oval and is located inside the System boundary rectangle indicating that the use case applies to the mentioned subject

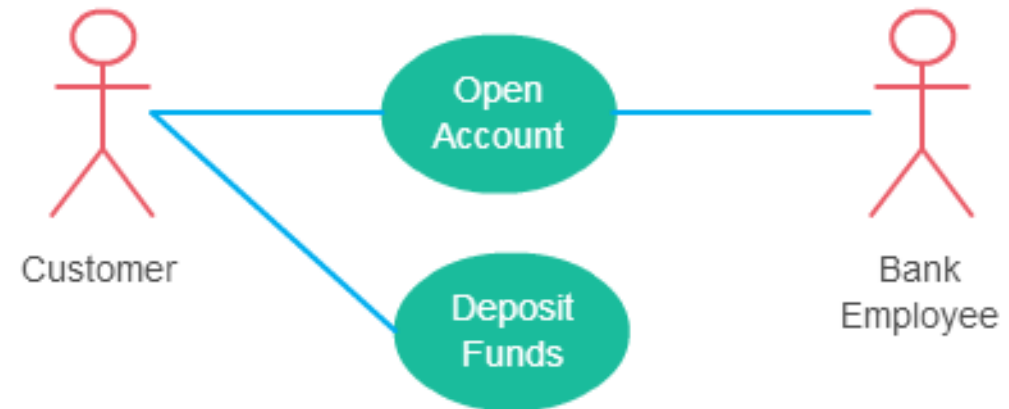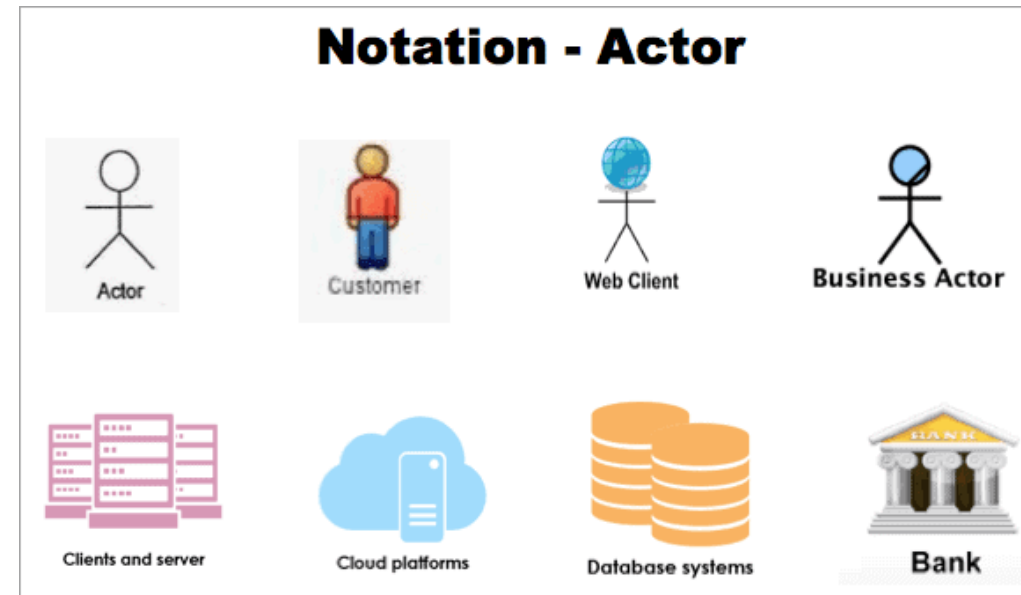❑ Each Actor must be linked to a use case, while some use cases may not be linked to actors

Notation - System and Use Case

Web Search

1. Web Search Use Case

User Login

2. User Login Use Case

Purchase Ticket

3. Purchase Ticket Use Case

System Boundary (Subject)

Bank Transaction System

Bank Login

Bank Payment

4. Bank System Use cases - Login & Payment

Use Cases Elements

Actor

❏ Entity that interacts with use case. The actor is external to the subject and hence lies outside the system's boundary

❏ Actors' naming should represent the role they play in the system, e.g., Customer, Student, Web-User, etc

Association

❏ An actor must be associated with at least one use case

❏ An actor can be associated with multiple use cases

❏ Multiple actors can be associated with a single use case

Notation - Actor

Actor | Customer | Web Client | Business Actor

Clients and server | Cloud platforms | Database systems | Bank

Customer — Open Account — Bank Employee

Customer — Deposit Funds

Use Cases Elements

Generalization

❑ A generalization relationship is parent-child relationship between use cases
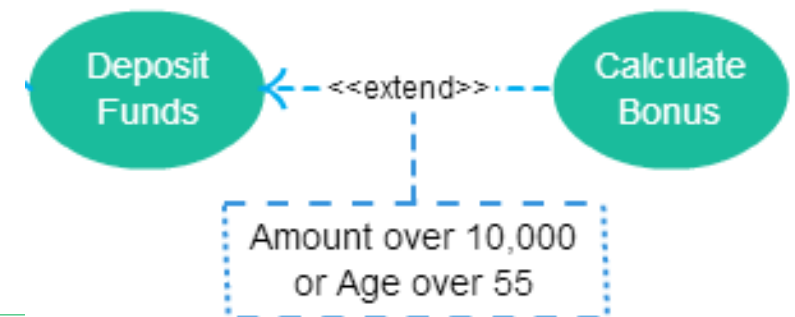
❑ One actor can inherit the role of the other actor
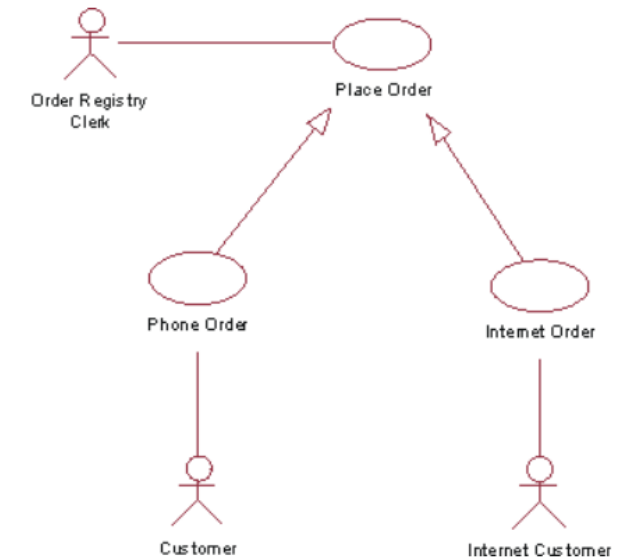
Include

❑ Behavior of the included use case is part of base use case

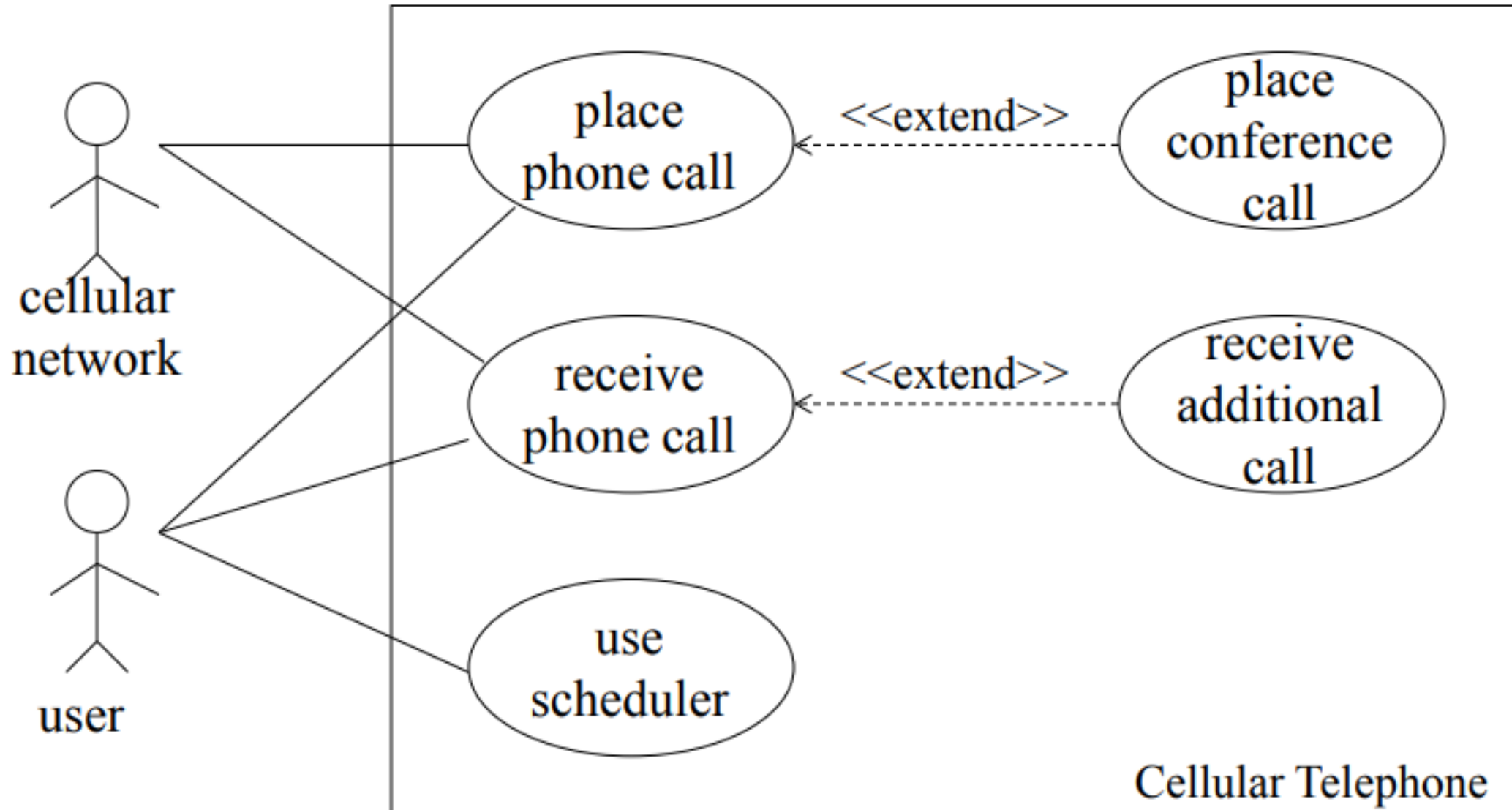❑ Reason: To reuse common actions across multiple use cases
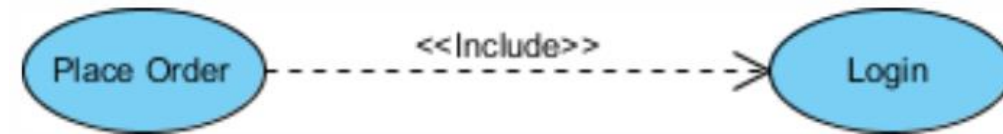
Extend

❑ Extends base use case and adds more functionality to system

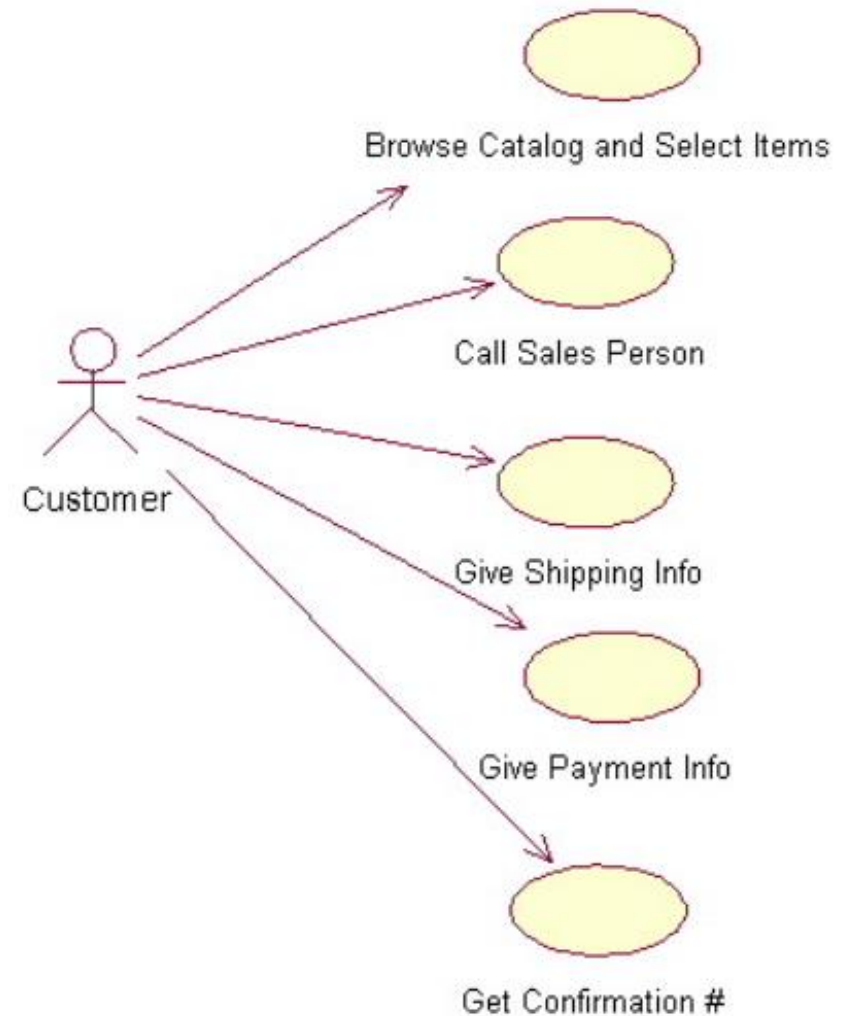❑ Reason: To reuse common actions across multiple use cases

Example 1

A user placing an order with a sales company might follow these steps :

1. Browse catalog and select items

2. Call sales representative

3. Supply shipping information

4. Supply payment information
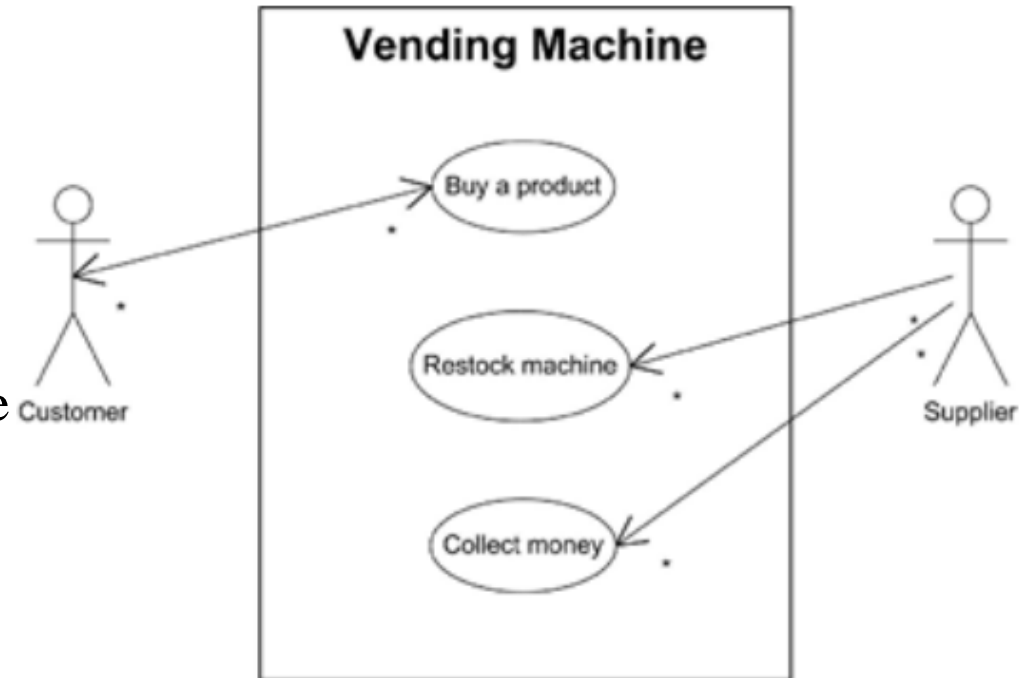
5. Receive conformation number from salesperson

Vending Machine

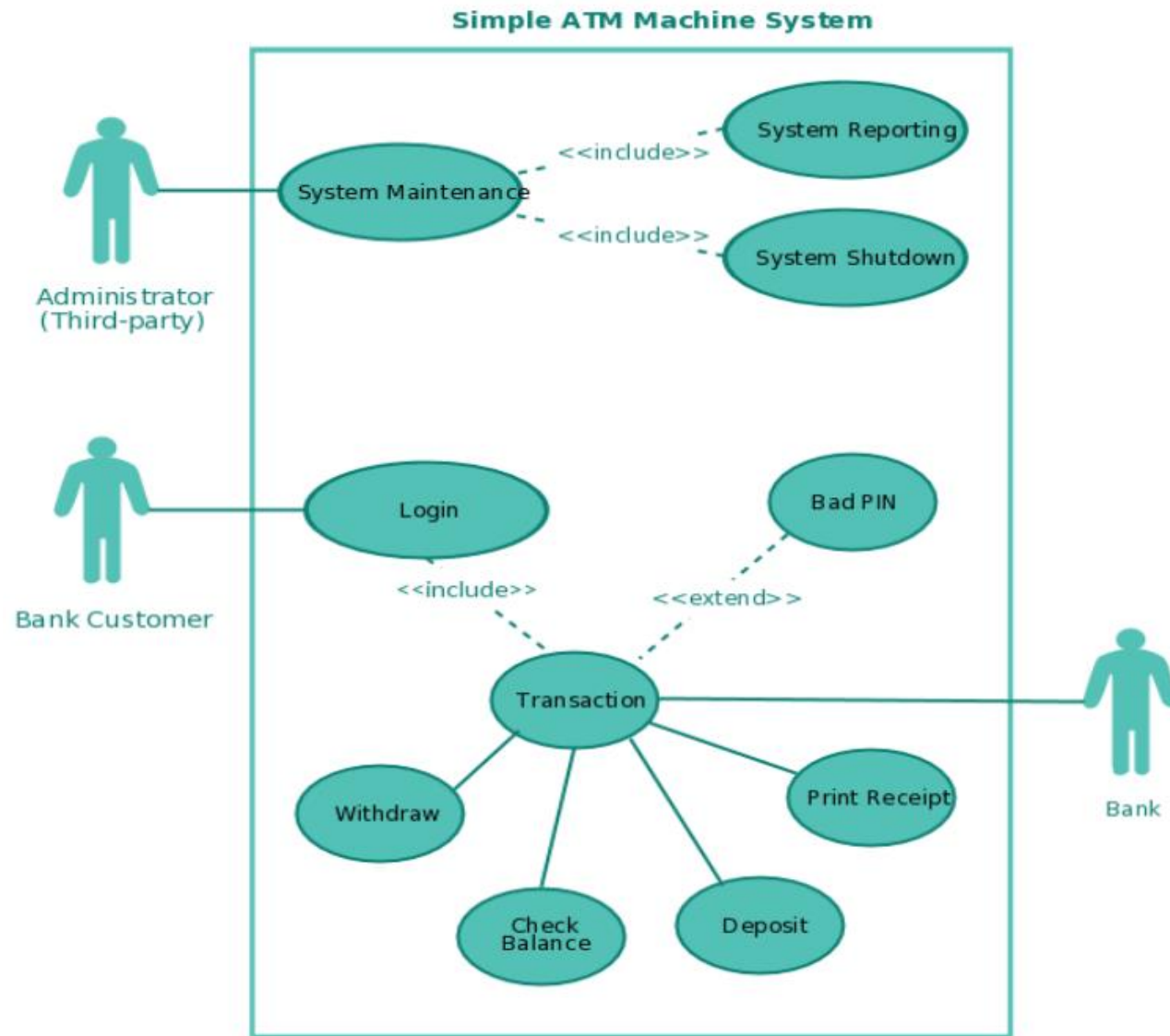After client interview the following system scenarios were identified:

❑ A customer buys a product

❑ The supplier restocks the machine

❑ The supplier collects money from the machine

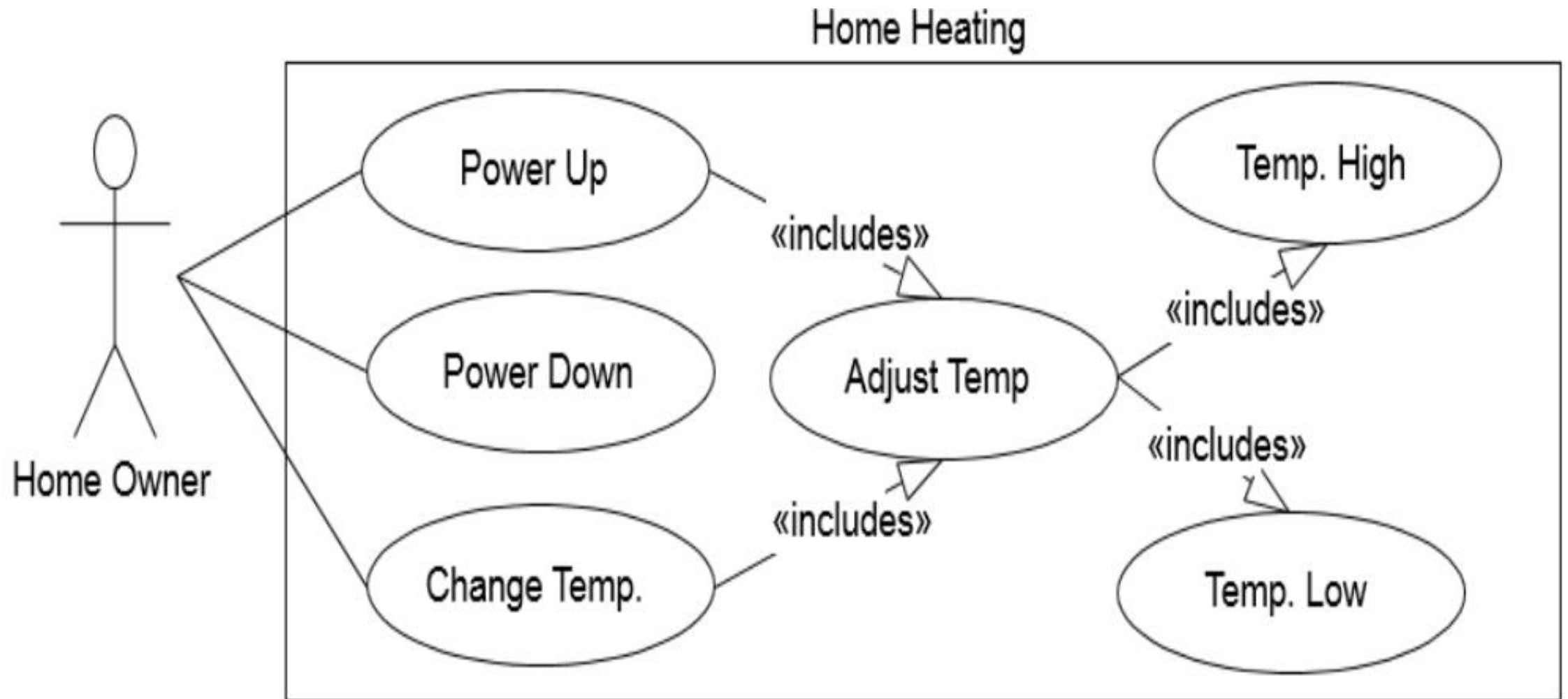On the basis of these scenarios, the following three actors can be identified:

Customer; Supplier

Use Cases Diagram

Home Heating System

Use Case Scenario

Home Assignment Distribution and Collection System (HACS)

Homework assignment and collection are an integral part of any educational system. Today, this task is performed manually. What we want the homework assignment distribution and collection system to do is to automate this process.

The system will be used by the Instructor/Teacher to distribute the homework assignments, review the students' solutions, distribute suggested solution, and distribute student grades on each assignment.

This system will also help the students by automatically distributing the assignments to the students, provide a facility where the students can submit their solutions, remind the students when an assignment is almost due, remind the students when an assignment is overdue.

HACS - Use Case Diagram