

USE CASES

- It is helpful to create scenarios that identify a thread of usage for the system to be constructed.
- These scenarios are often called use cases.
- Use cases tell a story about how an end user interacts with the system under a specific set of circumstances.
- This story may be:
 - ◆ narrative text
 - ◆ an outline of tasks or interactions
 - ◆ a template-based description
 - ◆ diagrammatic representation
- It depicts software from an end-user point of view.

DEVELOPING USE CASES

- “A use case captures a contract.. [that] describes the system’s behavior under various conditions as the system responds to a request from one of its stakeholders.”
- Steps in creating a use case:
- Step One:
 - Define the actors that will be involved in the story.
 - Actors are different people (or devices) that use the system or product within the context of the function/behavior that is to be described.
 - Actors represent the roles that people (or devices) play as the system operates.
 - An actor is anything that communicates with the system or product.
 - Note, an actor and an end-user are not necessarily the same thing. End-users may play many roles. An actor plays one role in the context of a use-case.

Basics...

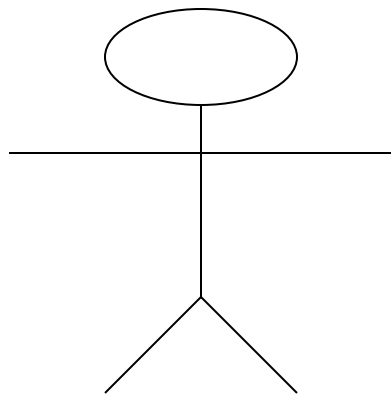
- UCs specify functionality by describing interactions between actors and system
- Focuses on external behavior
- UCs are primarily textual
 - UC diagrams show UCs, actors, and dependencies
 - They provide an overview

Use Case Diagrams

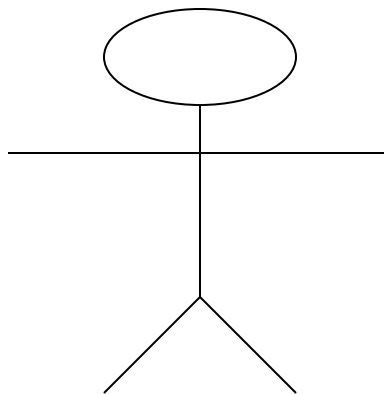
- A set of **ACTORS** : roles users can play in interacting with the system.
 - An actor is used to represent something that users our system.
- A set of **USE CASES**: each describes a possible kind of interaction between an actor and the system.
 - Uses cases are actions that a user takes on a system
- A number of **RELATIONSHIPS** between these entities (Actors and Use Cases).
 - Relationships are simply illustrated with a line connecting actors to use cases.

Use Case Diagrams - Actors

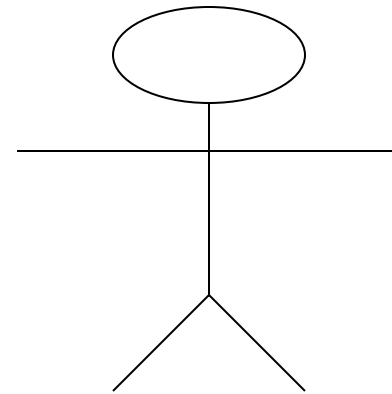
- An *actor* is a user of the system playing a particular role.
- Actor is shown with a stick figure.



employer



employee



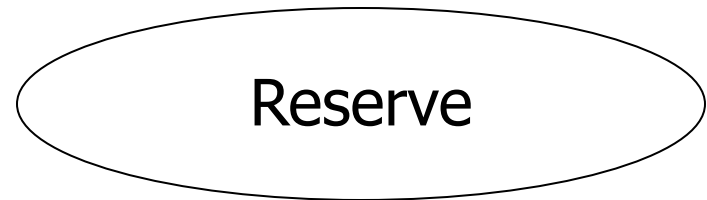
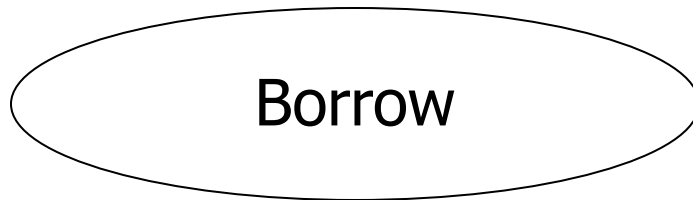
client

Basics..

- Actor: a person or a system that interacts with the proposed system to achieve a goal
 - Eg. User of an ATM (goal: get money); data entry operator of data processing; (goal: Perform transaction)
- Actor is a logical entity, so receiver and sender actors are different (even if the same person)
- Actors can be people or systems

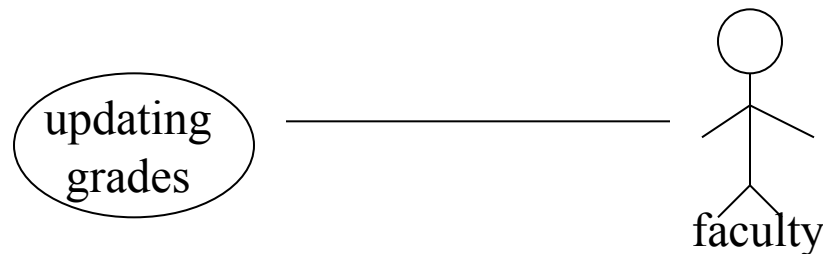
Use Case Diagrams – Use Cases

- Use case is a particular activity a user can do on the system.
- Is represented by an ellipse.
- Following are two use cases for a library system.



Relationships between Use Cases and Actors

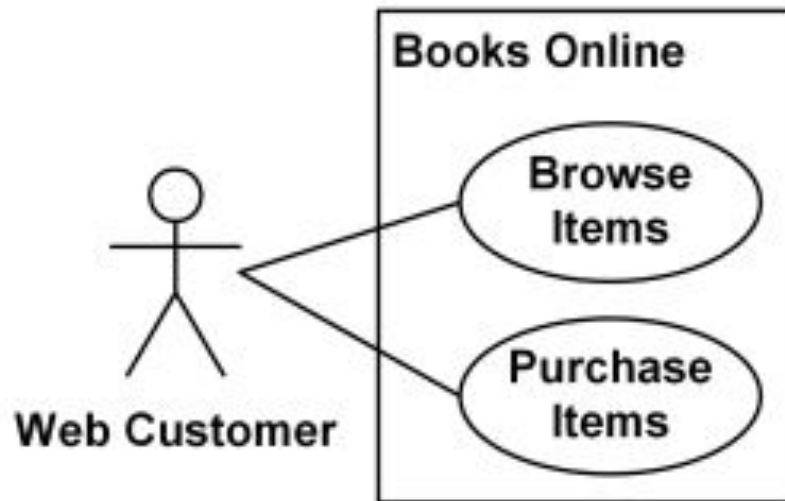
- Actors may be connected to use cases by associations, indicating that the actor and the use case communicate with one another using messages.



Relationships between Use Cases

1. Generalization - use cases that are specialized versions of other use cases.
2. Include - use cases that are included as parts of other use cases. Enable to factor common behavior.
3. Extend - use cases that extend the behavior of other core use cases. Enable to factor variants.

Use Case Subject



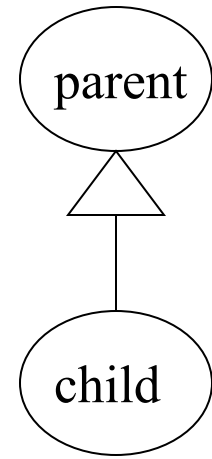
Books Online (subject) with applicable use cases and Web Customer actor.

QUIZ

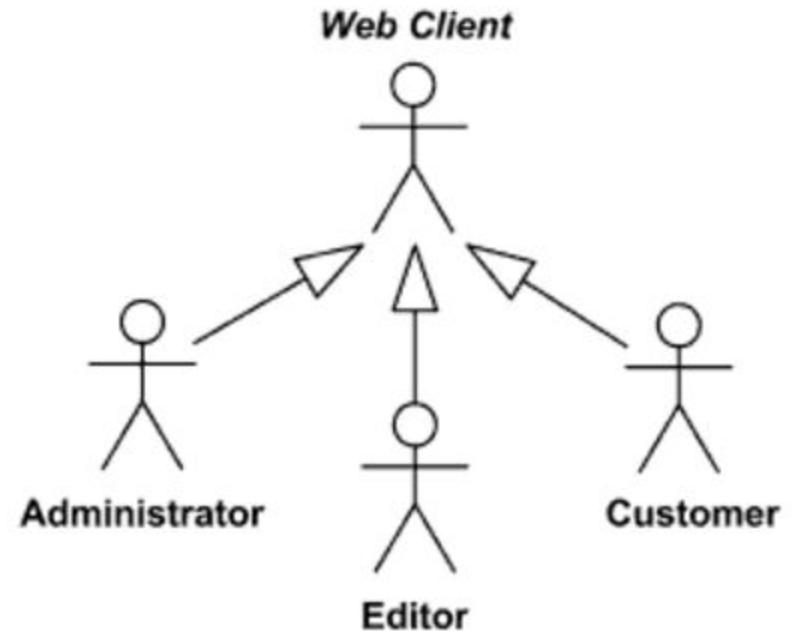
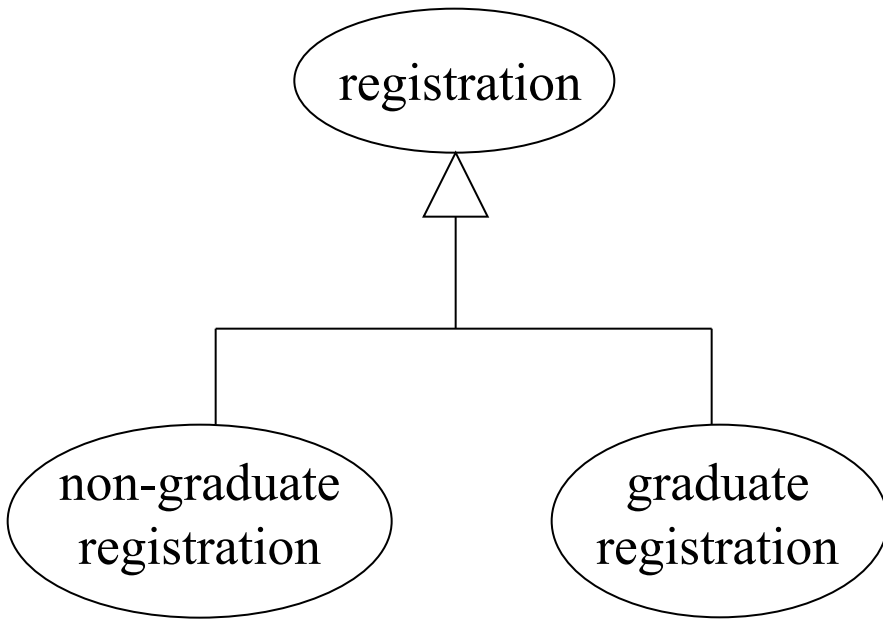
- Actors or internal or external to system?
- Use cases capture requirements?
- Actor represent group of users?
- Role of actor is based user interaction or user type?
- Which can be actor among student, web client and bank?
- Association between actor and use case represent communication?

1. Generalization

- The child use case inherits the behavior and meaning of the parent use case.
- The child may add to or override the behavior of its parent.



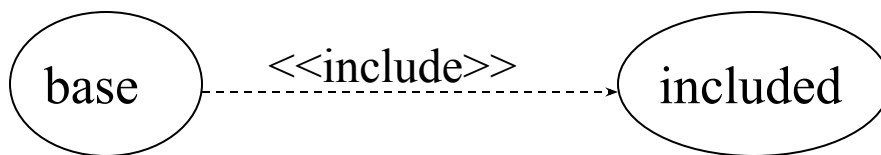
More about Generalization



Web Client actor is abstract superclass for Administrator, Editor, and Customer actors.

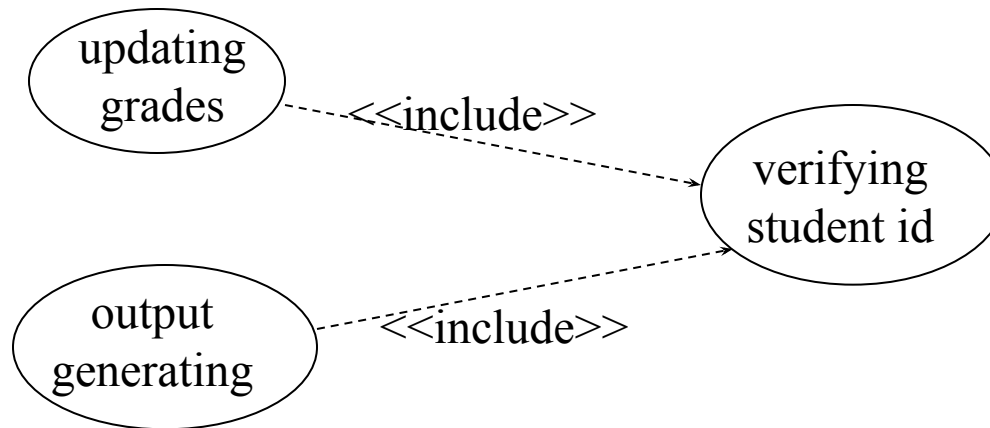
2. Include

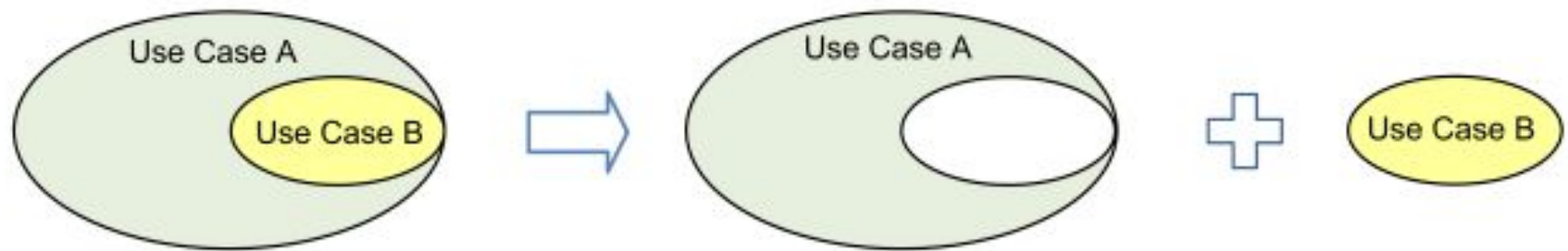
- The base use case explicitly incorporates the behavior of another use case at a location specified in the base.
- The included use case never stands alone. It only occurs as a part of some larger base that includes it.



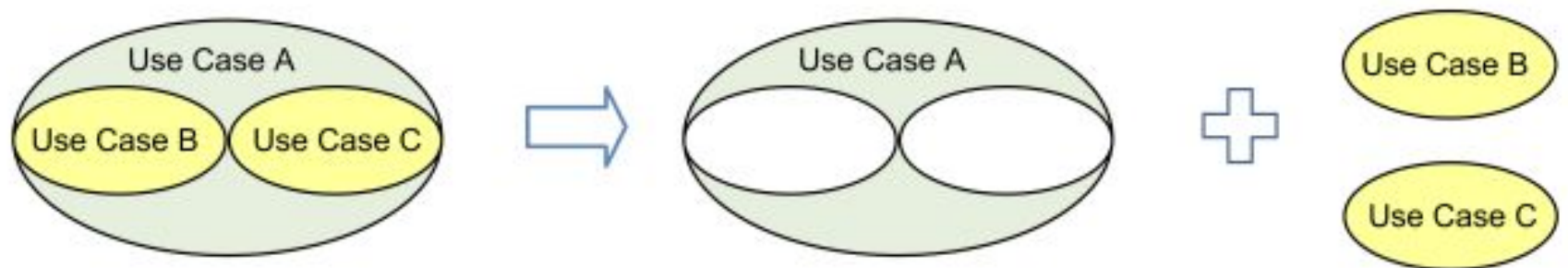
More about Include

- Enables to avoid describing the same flow of events several times by putting the common behavior in a use case of its own.

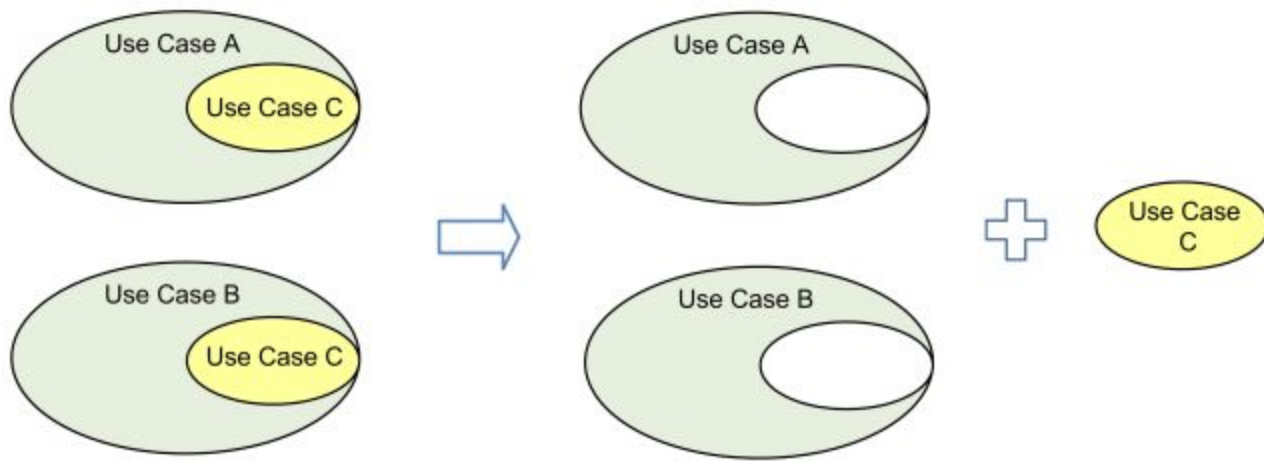




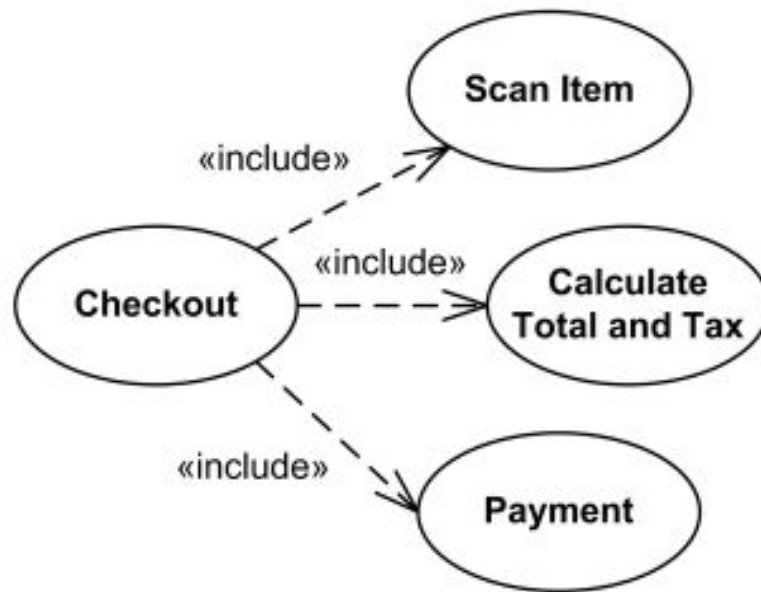
Use case B is extracted from larger use case A into a separate use case.



Use cases B and C are extracted from larger use case A into separate use cases.



Use case C is extracted from use cases A and B to be reused by both use cases using UML include relationship.



Checkout use case includes several use cases - Scan Item, Calculate Total and Tax, and Payment

use case -checkout

step 1: get all list of item

step 2: scan items

step 3: find offers and free items

step 4: generate discount for each item

step 5: total bill with tax

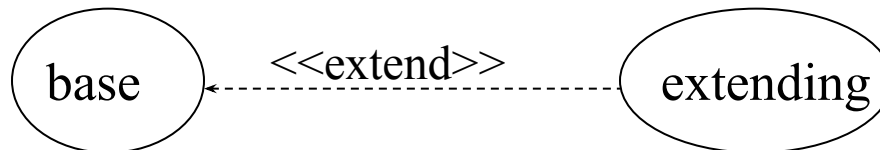
step 6: swipe card

step 7: enter pin

step 8: pack all items

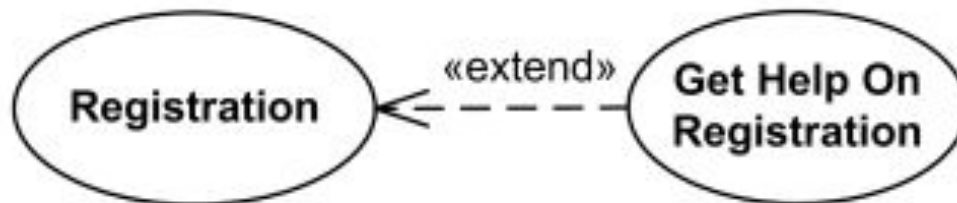
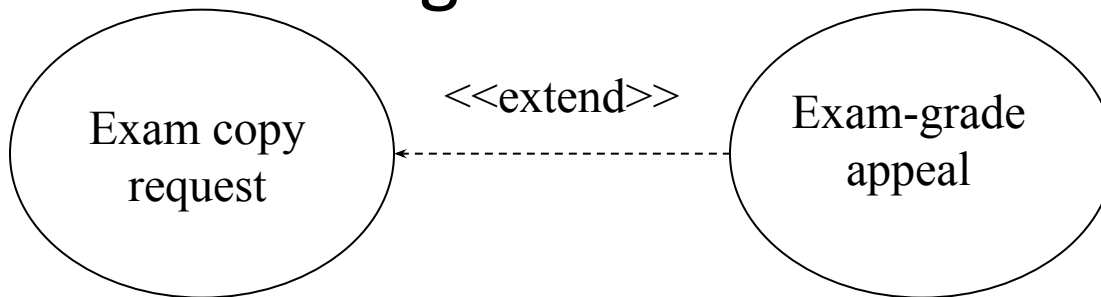
3. Extend

- The base use case implicitly incorporates the behavior of another use case at certain points called extension points.
- The base use case may stand alone, but under certain conditions its behavior may be extended by the behavior of another use case.



More about Extend

- Enables to model optional behavior or branching under conditions.



*Registration use case is complete and meaningful on its own.
It could be extended with optional **Get Help On Registration** use case.*

use case: **registration**

1:srn

2:course

3: fee

4: ackn

5: submit ack dept

usecase: **gethelp
registration**

1:exam notice

2: read instruction

3: srn

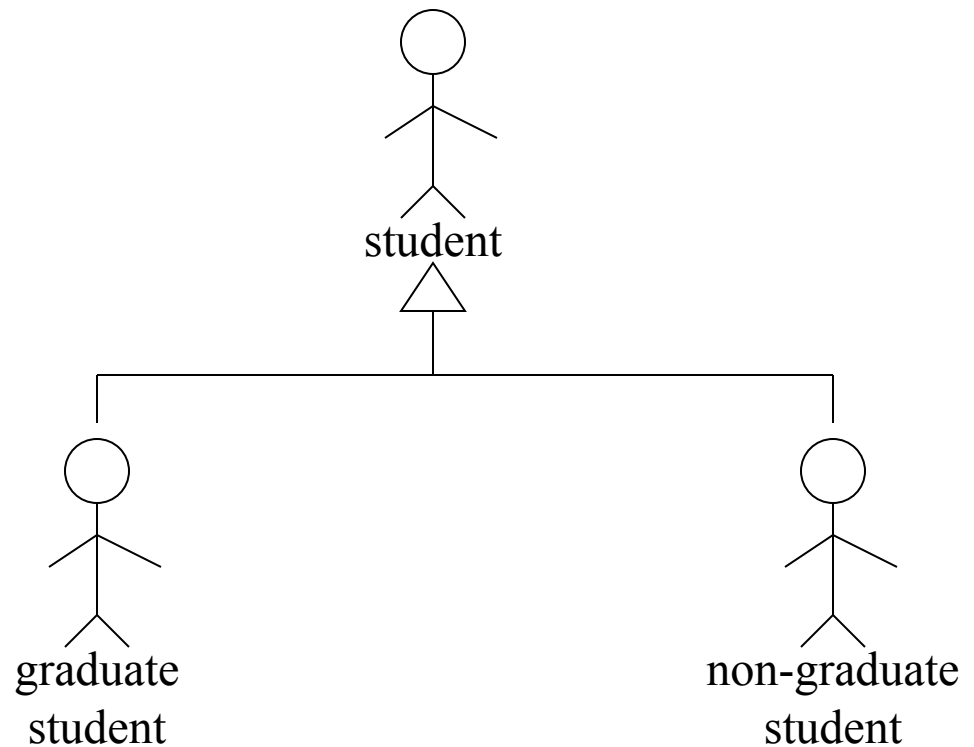
4:course

5:fee

:

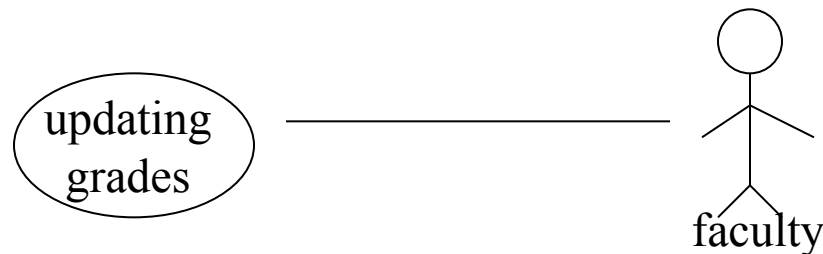
Relationships between Actors

- Generalization.

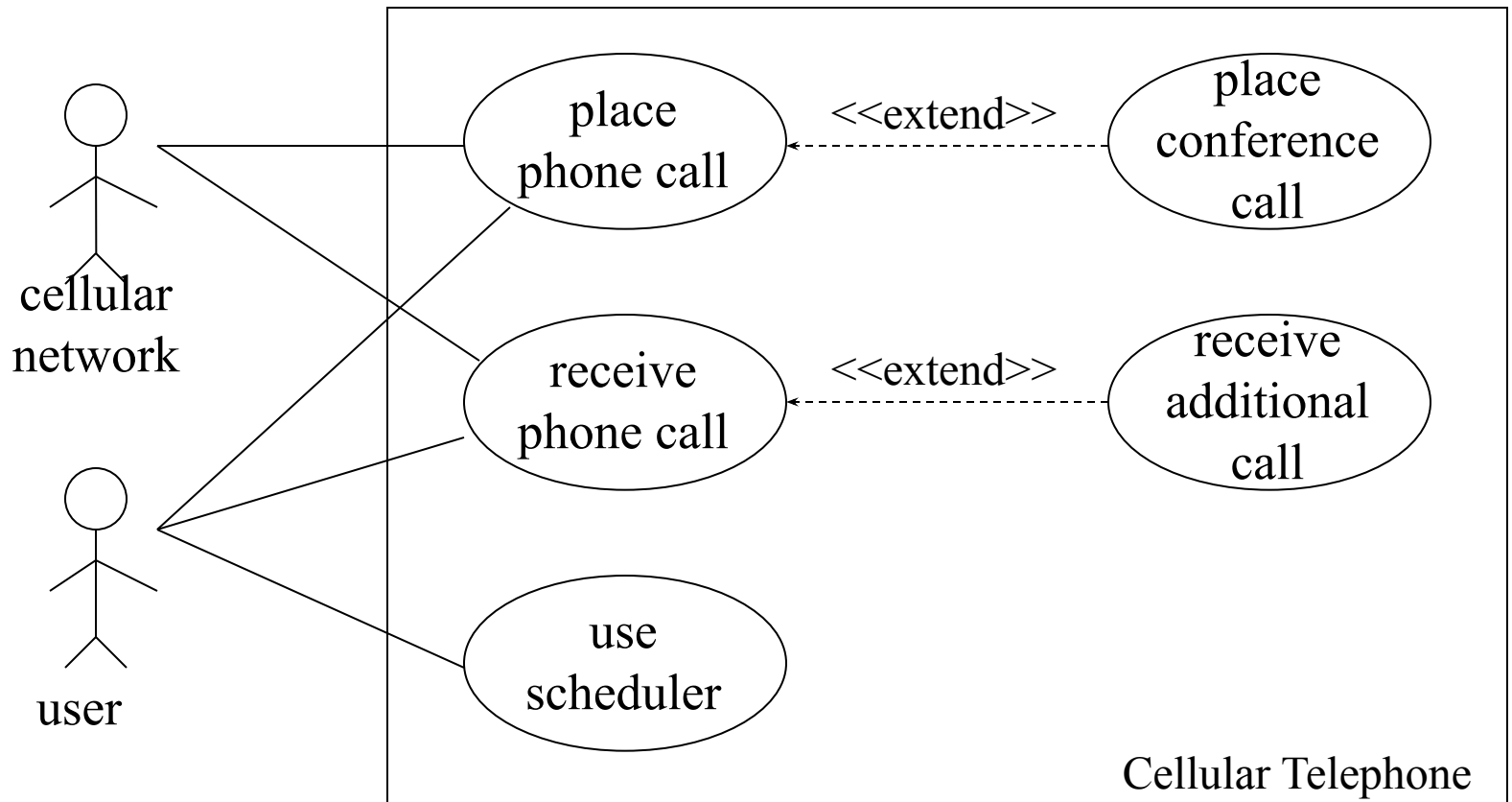


Relationships between Use Cases and Actors

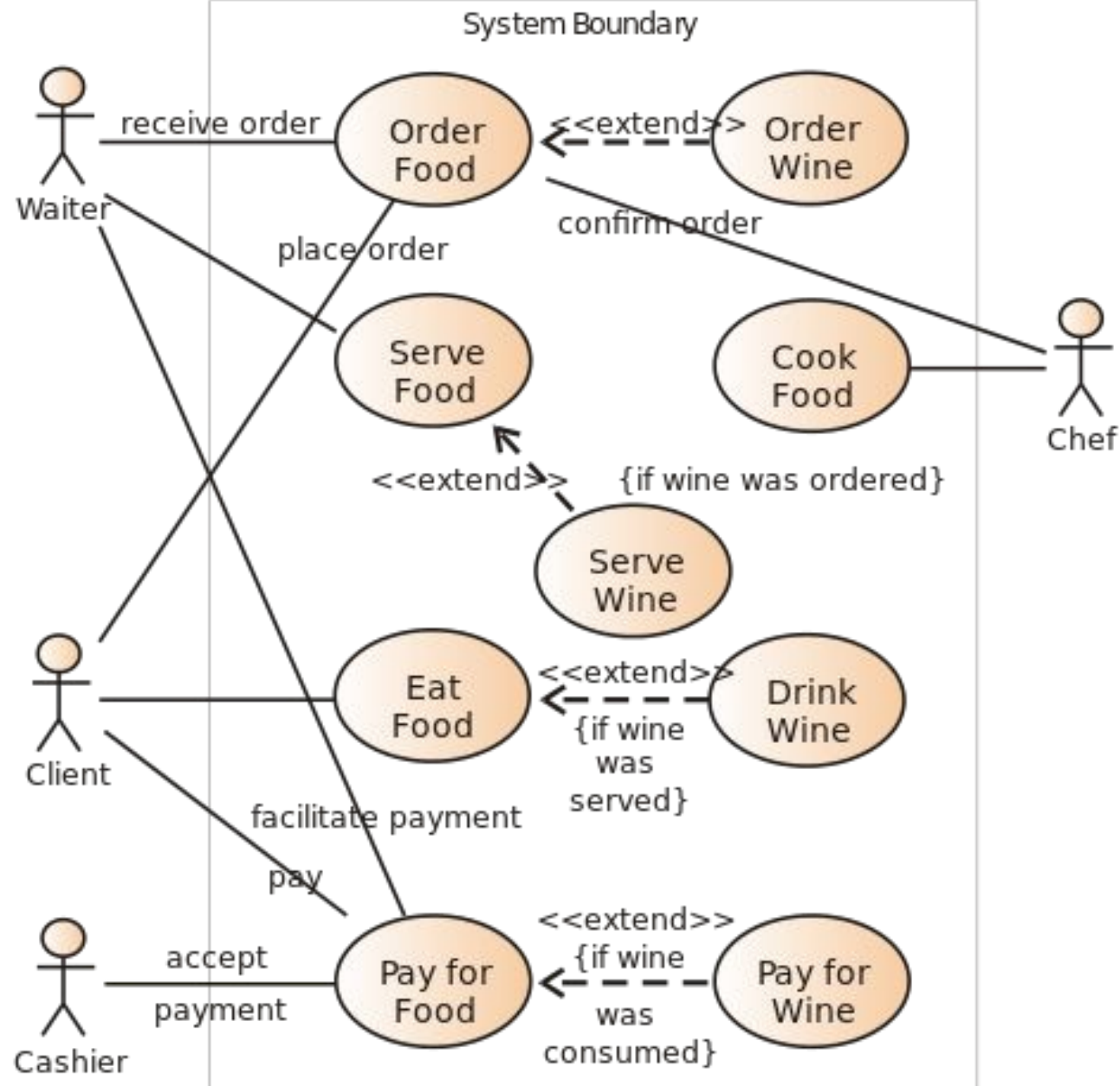
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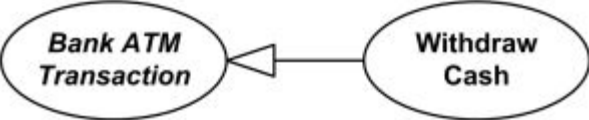
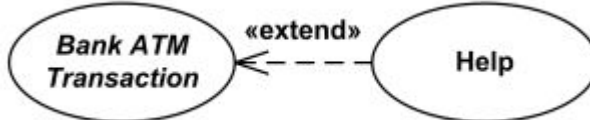
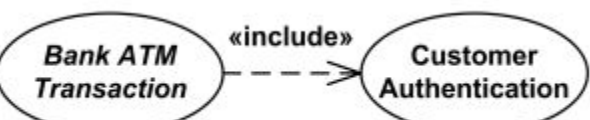


Example



uc Use Cases



Generalization	Extend	Include
 <pre> graph LR A([Bank ATM Transaction]) < -- B([Withdraw Cash]) </pre>	 <pre> graph LR A([Bank ATM Transaction]) -.-> «extend» B([Help]) </pre>	 <pre> graph LR A([Bank ATM Transaction]) -.-> «include» B([Customer Authentication]) </pre>
<p>Base use case could be <u>abstract use case</u>(incomplete) or concrete (complete).</p>	<p>Base use case is complete (concrete) by itself, defined independently.</p>	<p>Base use case is incomplete (<u>abstract use case</u>).</p>
<p>Specialized use case is required, not optional, if base use case is abstract.</p>	<p>Extending use case is optional, supplementary.</p>	<p>Included use case required, not optional.</p>
<p>No explicit location to use specialization.</p>	<p>Has at least one explicit extension location.</p>	<p>No explicit inclusion location but is included at some location.</p>
<p>No explicit condition</p>	<p>Could have optional</p>	<p>No explicit inclusion</p>

Use Cases description

- Story like description easy to understand by both users and analysts
- They do not form the complete SRS, only the functionality part.
- Use case description consists of scenarios.

Basics..

- Scenario: a set of actions performed to achieve a goal under some conditions
 - Actions specified as a sequence of steps
 - A step is a logically complete action performed either by the actor or the system
- Main success scenario – when things go normally and the goal is achieved
- Exceptional scenarios: When things go wrong and goals cannot be achieved

- DEVELOPING USE CASES

- Questions to ask about actors:

- ◆ Who are the actor(s)?
- ◆ What are the actor's goals?
- ◆ What preconditions should exist before the story begins?
- ◆ What exceptions might be considered as the story is described?
- ◆ What variations in the actor's interaction are possible?
- ◆ What type of system information will the actor acquire, produce, or change?
- ◆ Will the actor have to inform the system about changes in the external environment?
- ◆ What information does the actor desire from the system?
- ◆ Does the actor wish to be informed about unexpected change?

Use Case Description

:Each use case may include all or part of the following

- **Actors** - A person or a system which uses the system being built for achieving some goal.
- **Purpose** – Explain the purpose
- **Primary actor** - The main actor for whom a use case is initiated and whose goal satisfaction is the main objective of the use case.
- **Pre Conditions**- must be true to allow execution
- **Post Conditions**- will be set when completes normally
- **Main success scenario** – Describes the interaction if nothing fails and all steps in the scenario succeed.(normal flow of control)
- **Exceptional scenario** - Describes the system behavior if some of the steps in the main scenario do not complete successfully(unusual situations)

Template for use case description

Use Case:

Actors:

Pre Condition:

Post Condition:

Main success scenario:

Step 1 :

Step 2 : -----

Exception scenario:

Step 1 :

Step 2 : -----

Example- Money Withdraw (cont.)

- Use Case: Withdraw Money
- Actors: Customer
- Pre Condition:
 - The ATM must be in a state ready to accept transactions
 - The ATM must have at least some cash on hand that it can dispense
 - The ATM must have enough paper to print a receipt for at least one transaction
- Post Condition:
 - The current amount of cash in the user account is the amount before the withdraw minus the withdraw amount
 - A receipt was printed on the withdraw amount
 - The withdraw transaction was audit in the System log file

Example- Money Withdraw (cont.)

main success scenario

- 1. Begins when a Customer arrives at ATM**
- 2. Customer inserts a Credit card into ATM**
- 3. System verifies the customer ID and status**
- 4. System asks for an operation type**
- 5. Customer chooses "Withdraw" operation**
- 6. System asks for the withdraw amount**
- 7. Customer enters the cash amount**
- 8. System checks if withdraw amount is legal**
- 9. System dispenses the cash**
- 10. System deduces the withdraw amount from account**
- 11. System prints a receipt**
- 12. System ejects the cash card**
- 13. Customer takes the cash and the receipt**

Example- Money Withdraw (cont.)

- Exception scenario:
 - 3 a: Customer authorization failed. Display an error message, cancel the transaction and eject the card.
 - 8 a: Customer has insufficient funds in its account. Display an error message, and go to step 6.
 - 8 b: Customer exceeds its legal amount. Display an error message, and go to step 6.
 - 9 a: if Power failure in the process of the transaction before step 9, cancel the transaction and eject the card

USE CASE DESCRIPTION TEMPLATE(pressman book)



Use case: Access camera surveillance via the Internet—display camera views (ACS-DCV)

Iteration: 2, last modification: January 14 by V. Raman.

Primary actor: Homeowner.

Goal in context: To view output of camera placed throughout the house from any remote location via the Internet.

Preconditions: System must be fully configured; appropriate user ID and passwords must be obtained.

Trigger: The homeowner decides to take a look inside the house while away.

Scenario:

1. The homeowner logs onto the *SafeHome Products* website.
2. The homeowner enters his or her user ID.
3. The homeowner enters two passwords (each at least eight characters in length).
4. The system displays all major function buttons.
5. The homeowner selects the “surveillance” from the major function buttons.
6. The homeowner selects “pick a camera.”
7. The system displays the floor plan of the house.
8. The homeowner selects a camera icon from the floor plan.
9. The homeowner selects the “view” button.
10. The system displays a viewing window that is identified by the camera ID.
11. The system displays video output within the viewing window at one frame per second.

Exceptions:

1. ID or passwords are incorrect or not recognized—see use case **Validate ID and passwords**.
2. Surveillance function not configured for this system—system displays appropriate error message; see use case **Configure surveillance function**.
3. Homeowner selects “View thumbnail snapshots for all camera”—see use case **View thumbnail snapshots for all cameras**.
4. A floor plan is not available or has not been configured—display appropriate error message and see use case **Configure floor plan**.
5. An alarm condition is encountered—see use case **Alarm condition encountered**.

Priority: Moderate priority, to be implemented after basic functions.

When available: Third increment.

Frequency of use: Moderate frequency.

Channel to actor: Via PC-based browser and Internet connection.

Secondary actors: System administrator, cameras.

Channels to secondary actors:

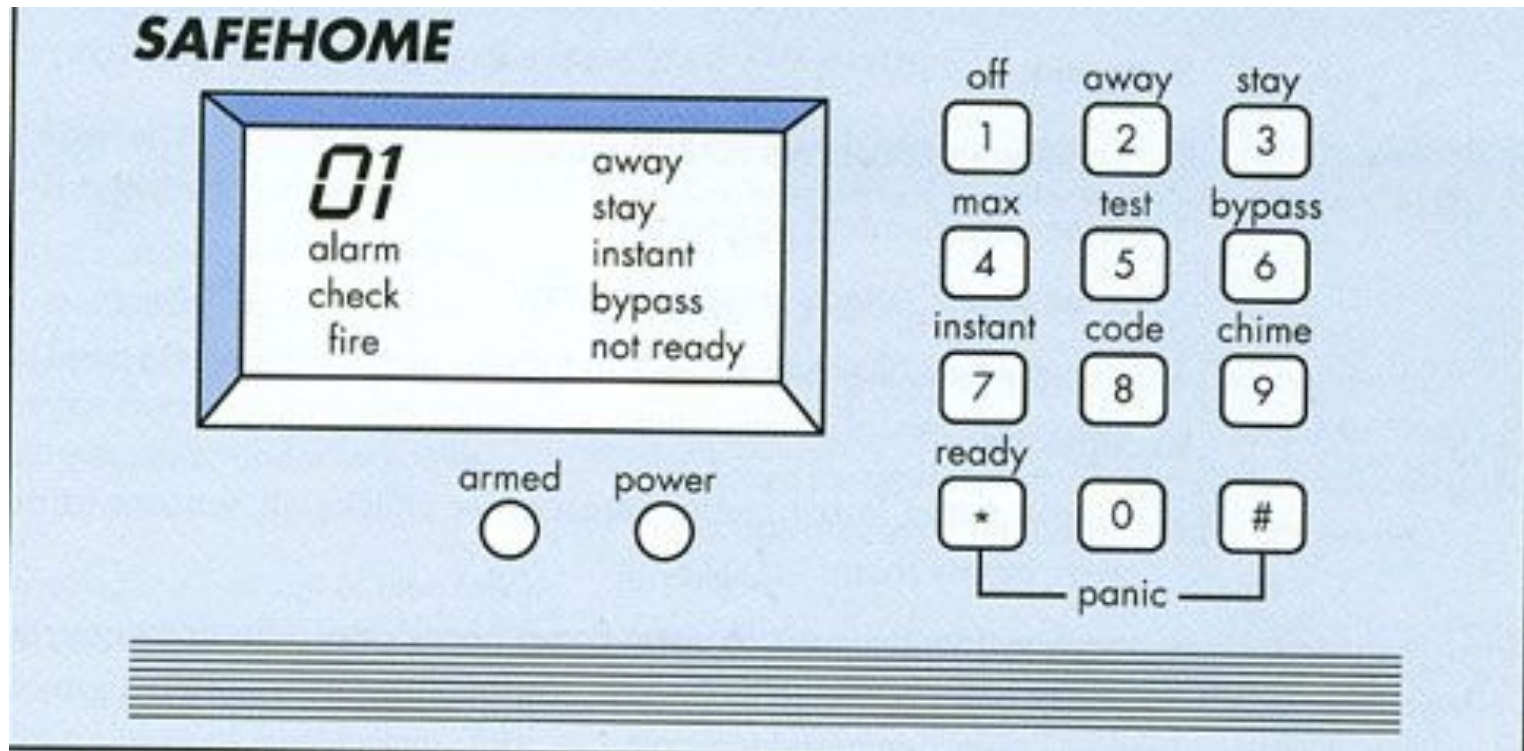
1. System administrator: PC-based system.
2. Cameras: wireless connectivity.

Open issues:

1. What mechanisms protect unauthorized use of this capability by employees of *SafeHome Products*?
2. Is security sufficient? Hacking into this feature would represent a major invasion of privacy.
3. Will system response via the Internet be acceptable given the bandwidth required for camera views?
4. Will we develop a capability to provide video at a higher frames-per-second rate when high-bandwidth connections are available?

Use case description

Think about a home security system.



Contd...

Three actors exist: homeowner/configuration manager, sensors, and the monitoring subsystem.

Let's look at the homeowner. The homeowner interacts with the home security function in a number of different ways using either the alarm control panel or a PC:

- ◆ Enters a password to allow all other interactions.
- ◆ Inquires about the status of a security zone.
- ◆ Inquiries about the status of a sensor.
- ◆ Presses the panic button in an emergency.
- ◆ Activates/deactivate the security system

Use case: InitiateMonitoring

Primary Actor: Homeowner

Goal in context: To set the system to monitor sensors when the homeowner leaves the house or remains inside.

Preconditions: System was programmed for a password and to recognize various sensors.

Trigger: The homeowner decides to “set” the system, i.e turn on the alarm function.

Scenario:

1. Homeowner observes control panel.
2. Homeowner enters password.
3. Homeowner selects ‘stay” or “away”
4. Homeowner observes red alarm light to indicate that SafeHome has been armed

Exceptions:

- 1a. Control panel is not ready: Homeowner checks all sensors to determine which are open and closes them.
- 2a. Password is incorrect (control panel beeps once) homeowner enters correct password.
- 2b. Password not recognized: monitoring and response subsystem must be contacted to reprogram password
- 1. Stay is selected: control panel beeps twice and a stay light is lit; perimeter sensors are activated
- 2. Away is selected. Control panel beeps three times and an away light is lit; all sensors are activated

Priority: Essential, must be implemented

When available: First Increment

Frequency of use: Many times a day

Channel to actor: via control panel

Example

1. Purchaser buy stocks
2. Customer buy product

Example : Purchaser buy stocks

Use Case 1: Buy stocks

Actor: Purchaser

Purpose : Goals of Stakeholders:

Purchaser: wants to buy stocks

Company: wants full transaction info

Precondition: User already has an account

Example (Purchaser buy stocks)...

- **Main Success Scenario**

1. User selects to buy stocks
2. System gets name of web site from user for trading
3. Establishes connection
4. User browses and buys stocks
5. System intercepts responses from the site and updates user portfolio
6. System shows user new portfolio

Example (Purchaser buy stocks)...

Exception Scenario

- 2a: System gives err msg, asks for new suggestion for site, gives option to cancel
- 3a: Web failure. 1-Sys reports failure to user, backs up to previous step. 2-User exits or tries again
- 4a: web site does not ack purchase
- 5a: web site does not return needed info

Example 2- Buy a product

- Use Case 2: Buy a product
- Primary actor: buyer/customer
- Goal: purchase some product
- Precondition: Customer is already logged in

Example 2 (Buy a product)

- **Main Scenario**
 1. Customer browses and selects items
 2. Customer goes to checkout
 3. Customer fills shipping options
 4. System presents full pricing info
 5. Customer fills credit card info
 6. System authorizes purchase
 7. System confirms sale
 8. System sends confirming email

Example 2 (Buy a product) ...

Exception Scenario

- 6a: Credit card authorization fails
 - Allows customer to reenter info
- 3a: Regular customer
 - System displays last 4 digits of credit card no
 - Asks customer to OK it or change it
 - Moves to step 6

Example- An auction site

- Use case 0 : Auction an item
- Use case 1 : Put an item for auction
- Use case 2 : Make a bid
- Use case 3 : Complete auction of an item

Example – summary-level Use Case

- ***Use Case 0 : Auction an item***
- ***Primary Actor:*** Auction system
- ***Scope:*** Auction conducting organization
- ***Precondition:*** None
- ***Main Success Scenario:***
 - Seller performs put an item for auction
 - Various bidders make a bid
 - On final date perform Complete the auction of the item
 - Get feed back from seller; get feedback from buyer; update records

Example – An auction site

- **Use Case1:** Put an item for auction
- **Primary Actor:** Seller
- **Precondition:** Seller has logged in
- **Main Success Scenario:**
 1. Seller posts an item (its category, description, picture, etc.) for auction
 2. System shows past prices of similar items to seller
 3. System specifies the starting bid price and a date when auction will close
 4. System accepts the item and posts it
- **Exception Scenarios:**
 - 2 a) There are no past items of this category
 - * System tells the seller this situation

Example – auction site..

- ***Use Case2:*** Make a bid
- ***Primary Actor:*** Buyer
- ***Precondition:*** The buyer has logged in
- ***Main Success Scenario:***
 1. Buyer searches or browses and selects some item
 2. System shows the rating of the seller, the starting bid, the current bids, and the highest bid; asks buyer to make a bid
 3. Buyer specifies bid price, max bid price, and increment
 4. Systems accepts the bid; Blocks funds in bidders account
 5. System updates the bid price of other bidders where needed, and updates the records for the item

- ***Exception Scenarios:***

- 3 a) The bid price is lower than the current highest

- * System informs the bidder and asks to re-bid

- 4 a) The bidder does not have enough funds in his account

- * System cancels the bid, asks the user to get more funds

Example –auction site..

- **Use Case3: Complete auction of an item**
- **Primary Actor:** Auction System
- **Precondition:** The last date for bidding has been reached
- **Main Success Scenario:**
 - Select highest bidder; send email to selected bidder and seller informing final bid price; send email to other bidders also
 - Debit bidder's account and credit seller's account
 - Transfer from seller's account commission amount to organization's account
 - Remove item from the site; update records
- **Exception Scenarios:** None

End