Object-oriented Technology
Workshop 3 – Suggested Solution

Part 1

1.   <<include>> use case must also be invoked when the base use case is invoked with no guard condition.
<< extend>> use case is only invoked when a guard condition in the base use case is satisfied.

2.
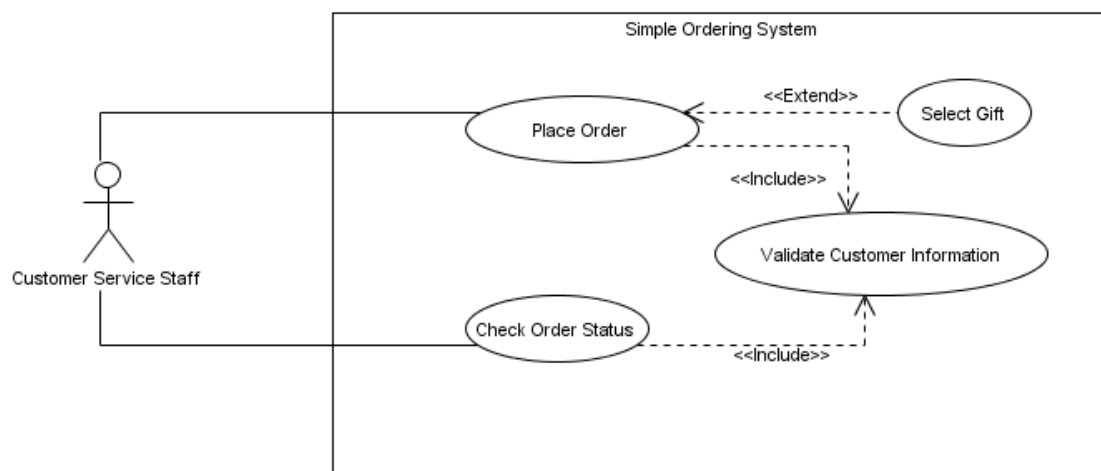
Part 2

Actors are the external entities that interact with the system.

Primary Actors are those who use the system's main functions, deriving benefits from it directly.

Secondary Actors play a supporting role to facilitate the primary actors to achieve their goals.

Primary Actors – Private Customer, Commercial Customer, Manager

Secondary Actor – Bank Transfer Gateway

Use Case describes a sequence of actions a system performs to yield an *observable result* or *value* to a particular actor.

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.

Base Use Cases – Register online account, Transfer money, Apply for loan, Pay utility bill, Approve loan

Abstract Use Case - Login
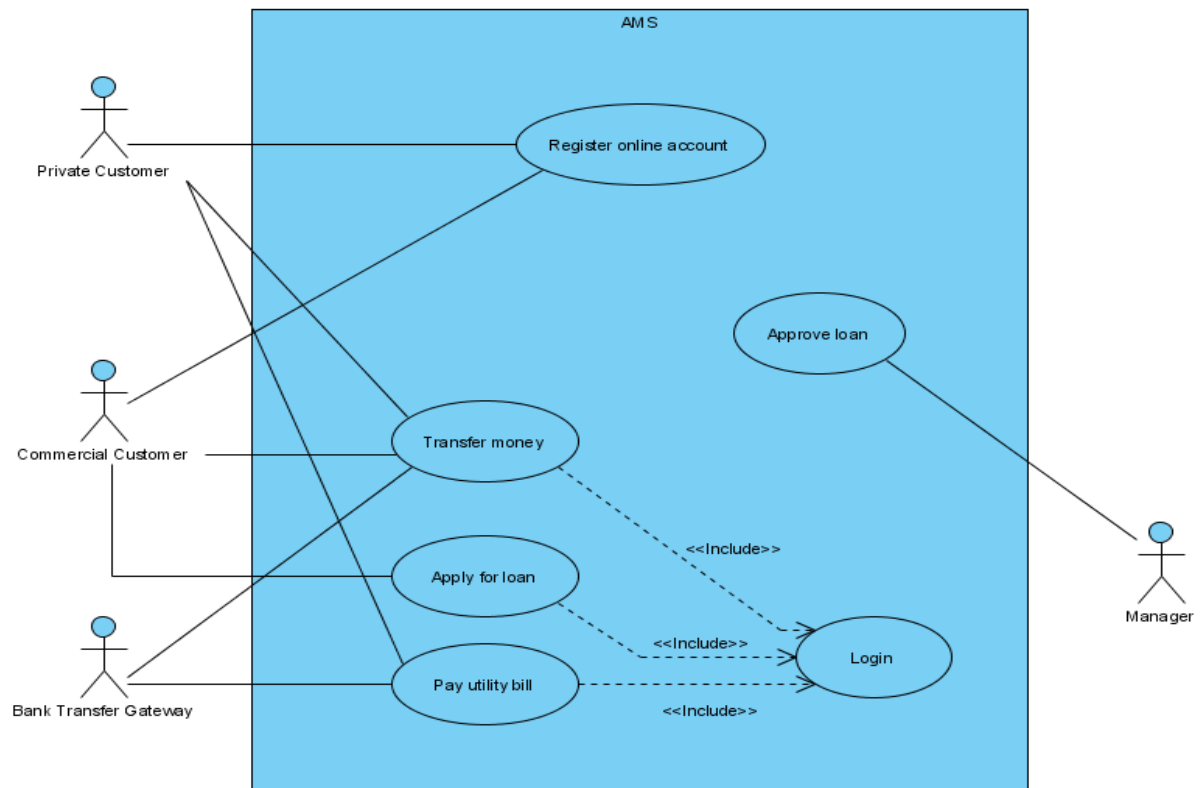
Part 3

Identify the major actors.

Actor specification
Actor name: Public User
Description: A public user can be a registered or un-registered customer of the book store. The pubic user can search books.

Actor specification
Actor name: Customer
Description: A customer is an individual or organization who has registered for the use of the online book store. The customer can order books or post used books for sale.

Actor specification
Actor name: Payment Gateway
Description: An external entity, which handles the credit card transaction.

Actor specification
Actor name: Shipping Agent
Description: An external entity which handles delivery of books.

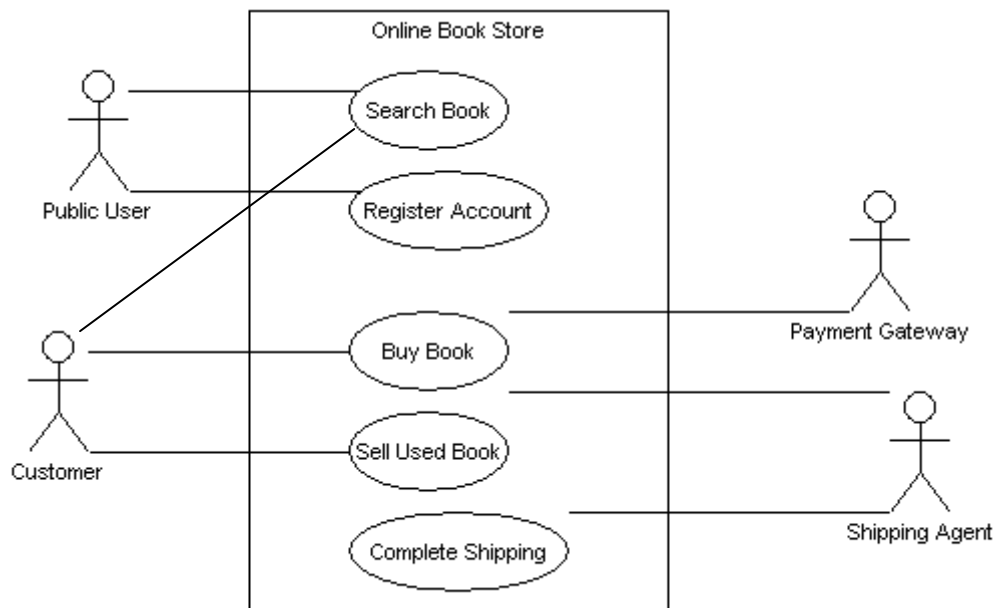**Examine the roles of each actor and identify use cases.**

Public user: search book, register account
Customer: buy book, sell used book
Shipping Agent: complete shipping

Note: the public user cannot invoke the buy book use case or sell used book use case since a public user is not yet registered.

Draw initial use case diagram

Write initial descriptions for the use cases.

Use Case: Register Account
Use Case ID: UC-100
Actor: Public User
Description: A public user provides email address, home address, password to register a customer account.

Use Case: Search Book
Use Case ID: UC-200
Actor: Public User, Customer
Description: A user or customer can search books by entering keywords.

Use Case: Buy Book
Use Case ID: UC-300
Actor: Customer
Description: The customer searches and selects a book. The system displays the price of new copy and used copies. The customer adds the book into the shipping cart. The customer checks out the book. The system asks the customer to login. The customer selects the shipping option. The system displays the total amount. The customer selects the payment method and enters the required information. The system charges the amount to the customer's credit card account or account. The system confirms the transaction and sends the shipping request to the shipping agent. If the order has used book(s), the system also sends a message to the book seller(s).

Use Case: Sell Used Book
Use Case ID: UC-400
Actor: Customer
Description: The customer searches and selects a book. The system displays the price of new copy and used copies. The customer sells the book. The system asks the customer to login. The customer enters the price and condition of the book. The system stores the sale order of the book.

Use Case: Complete Shipping
Use Case ID: UC-500
Actor: Shipping Agent
Description: The shipping agent sends a shipping completion message to the system. The system updates the seller's account (if any) and the buy order's status to 'completed'.

Develop base use case descriptions

Use case name:	Register Account
Use case ID:	UC-100
Primary actor:	Public User
Secondary actor(s):	
Brief description:	A public user provides email address, home address, password to register a customer account. The system creates the account and sends an acknowledgement to the user via email.
Preconditions:	The public user does not have an account in the system
Flow of events:	1. The public user enters the email address, home address and password. The system confirms the no account exists for the new customer. 2. The system creates the account and sends an acknowledgement to the user via email.
Postconditions:	A new customer account is created.
Alternative flows and exceptions:	• If an account already exists, the execution of the use case terminates
Non-behavior requirements:	
Assumptions:	
Issue:	
Source:	

Use case name:	Search Book
Use case ID:	UC-200
Primary actor:	Public User, Customer
Secondary actor(s):	
Brief description:	A user or customer can search books by entering keywords
Preconditions:	
Flow of events:	1. A user or customer can search books by entering keywords. The system displays list of books matching the keywords. 2. The user selects a book. The system displays the detail information of book.
Postconditions:	
Alternative flows and exceptions:	
Non-behavior requirements:	
Assumptions:	

| Issue:	
Source:	

Use case name:	Buy Book
Use case ID:	UC-300
Primary actor:	Customer
Secondary actor(s):	Payment Gateway, Shipping Agent
Brief description:	The customer searches and selects a book. The customer adds the book into the shipping cart. The customer checks out the book. The customer selects the payment method and enters the required information. The system charges the amount to the customer's credit card account or account.
Preconditions:	The customer has a valid account
Flow of events:	1. A customer enters keywords of the book. The system displays list of books matching the keywords. 2. The customer selects a book. The system displays the detail information of book. 3. The customer adds a copy of the book into the shopping cart. The system displays the books in the shopping cart. 4. The customer checks out the book. The system asks the customer to login. 5. The customer enters the email address and password. The system asks the customer to select the shipping option. 6. The customer selects the shipping option. The system displays the total amount. 7. The customer selects the payment method and enters the required information. The system charges the amount to the customer's credit card account or account. 8. The system confirms the transaction and sends the shipping request to the shipping agent.
Postconditions:	A new buy order is created and stored in the system. The amount is charged to the customer's account or credit card.
Alternative flows and exceptions:	• Steps 1-3 can be repeated until the customer proceeds to step 4. • In step 7, if the customer selects credit card payment, the amount is charged to the customer's credit card through the payment gateway. • In step 8, if the order has used book(s), the system also sends a message to the book seller(s).
Non-behavior requirements:	If the user has not been registered, the user interface allows the user to choose to register when the user is prompted to login.
Assumptions:	
Issue:	
Source:	

Use case name:	Sell Used Book
Use case ID:	UC-400

Primary actor:	Customer
Secondary actor(s):	
Brief description:	The customer searches and selects a book. The system displays the price of new copy and used copies. The customer sells the book. The customer enters the price and condition of the book. The system stores the sale order of the book.
Preconditions:	The customer has a valid account.
Flow of events:	1. A customer enters keywords of the book. The system displays list of books matching the keywords. 2. The customer selects a book. The system displays the detail information of book. 3. The customer sells the book. The system asks the user to enter the price and the general condition of the used book. 4. The customer enters the price and condition of the book. The system asks the customer to login. 5. The customer enters the email address and password. The system stores the sale order of the book.
Postconditions:	A new sell order is created and stored in the system.
Alternative flows and exceptions:	
Non-behavior requirements:	If the user has not been registered, the user interface allows the user to choose to register when the user is prompted to login.
Assumptions:	
Issue:	
Source:	

Use case name:	Complete Shipping
Use case ID:	UC-500
Primary actor:	Shipping Agent
Secondary actor(s):	
Brief description:	The shipping agent sends a shipping completion message to the system. The system updates the seller's account (if any) and the buy order's status to 'completed'.
Preconditions:	A shipping request has been submitted to the shipping agent.
Flow of events:	1. The shipping agent sends a shipping completion message to the system. The system updates the seller's account (if any) and the buy order's status to 'completed'.
Postconditions:	The order's status is updated to the "completed" status and the amount minus the commission is credited to the seller's account.
Alternative flows and exceptions:	
Non-behavior requirements:	
Assumptions:	
Issue:	
Source:	

Iteratively elaborate the base use cases descriptions and determine extend, include, and generalization relationships. Refine the use case diagram and the use case descriptions to reflect the use case relationships.
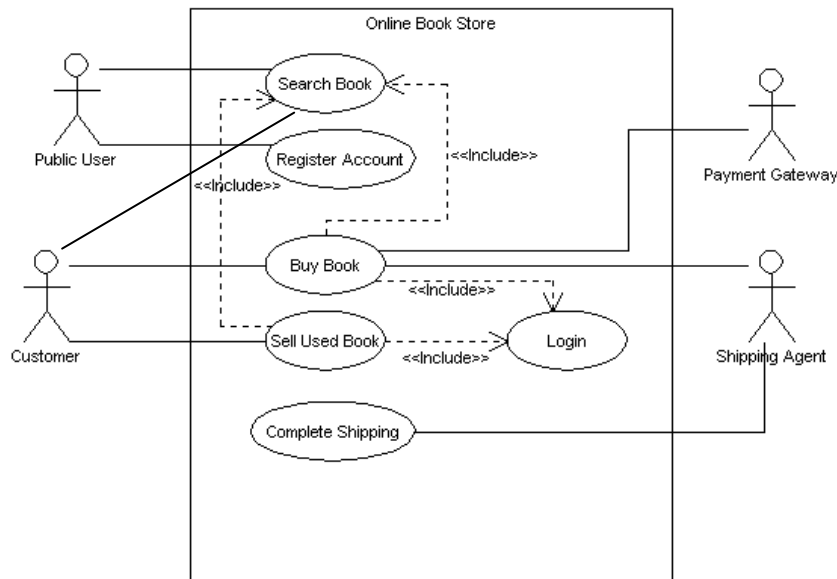
Only the description of the buy book use case is further elaborated and refined here. Refinement of other use case descriptions is similar.

Use case name:	Sell Used Book
Use case ID:	UC-400
Primary actor:	Customer
Secondary actor(s):	
Brief description:	The customer searches and selects a book. The system displays the price of new copy and used copies. The customer sells the book. The customer enters the price and condition of the book. The system stores the sale order of the book.
Preconditions:	The customer has a valid account.
Flow of events:	1. include (search book). 2. The customer sells the book. The system asks the customer to login. 3. The customer sells the book. The system asks the user to enter the price and the general condition of the used book. 4. The customer enters the price and condition of the book. The system asks the customer to login. 5. include (login). 6. The system stores the sale order of the book.
Postconditions:	A new sell order is created and stored in the system.
Alternative flows and exceptions:	
Non-behavior requirements:	If the user has not been registered, the user interface allows the user to choose to register when the user is prompted to login.
Assumptions:	
Issue:	
Source:	

Use case name:	Buy Book
Use case ID:	UC-300
Primary actor:	Customer
Secondary actor(s):	Payment Gateway, Shipping Agent
Brief description:	The customer searches and selects a book. The customer adds the book into the shipping cart. The customer checks out the book. The customer selects the payment method and enters the required information. The system charges the amount to the customer's credit card account or account.
Preconditions:	The customer has a valid account
Flow of events:	1. include (search book). 2. The customer adds a copy of the book into the shopping cart. The system displays the books in the shopping cart. 3. The customer checks out the books. 4. include (login). The system asks the customer to select the shipping option. 5. The customer selects the shipping option. The system displays the total amount. 6. The customer selects the payment method and enters the required information. The system charges the amount to the customer's credit card account or account. 7. The system confirms the transaction and sends the shipping request to the shipping agent.
Postconditions:	A new buy order is created and stored in the system. The amount is charged to the customer's account or credit card.
Alternative flows and exceptions:	• Steps 1-2 can be repeated until the customer proceeds to step 3. • In step 6, if the customer selects credit card payment, the amount is charged to the customer's credit card through the payment gateway. • In step 7, if the order has used book(s), the system also sends a message to the book seller(s).
Non-behavior requirements:	
Assumptions:	
Issue:	
Source:	

Use case name:	Login
Use case ID:	UC-20
Brief description:	The customer logins the system.
Flow of events:	1. The customer enters the email address and password. The system verifies the email and password
Postconditions:	The email address and password are verified.
Alternative flows and exceptions:	• If the email address and the password are not valid, the client needs to re-enter them.

Use case name:	Search Book

Use case ID:	UC-200
Primary actor:	Public user, customer
Secondary actor(s):	
Brief description:	The actor search the book by keywords
Preconditions:	
Flow of events:	1. A customer enters keywords of the book. The system displays list of books matching the keywords. 2. The customer selects a book. The system displays the detail information of book.
Postconditions:	The books matching the keywords are listed.
Alternative flows and exceptions:	In step 1, if there are no matching books, the system ask the customer to re-enter keywords.
Non-behavior requirements:	If the user has not been registered, the user interface allows the user to choose to register when the user is prompted to login.
Assumptions:	

Develop instance scenarios. For each use case, develop instance scenarios to cover all possible paths of execution of the use case.

The following is an example of instance scenarios:

Parent use case name:	Buy Book
Parent use case ID:	UC-300
Instance name:	A customer buy a used book using a credit card
Instance ID:	UCIS-300-1
Environmental conditions and assumptions:	The customer has a valid account and the credit card transaction is approved.
Inputs:	The client enters "Java Programming", email: abc@domain.com, password: 1234. The customer selects express shipping. The customer enter credit card number 2232 1232 1323 1323, visa, 12/03
Instance flow description:	1. The customer enters "java programming". The system displays a list of book. 2. The customer selects a book. The system displays the detail. 3. The customer adds a used copy into the shopping cart. 4. The customer checks out the book. The system asks the customer to login. 5. The customer enters the email address abc@domain.com and password 1234. The system asks for shipping option. 6. The customer select express shipping. The system display total amount and ask for payment method. 7. The customer select credit card, enter visa, card number 2232 1232 1323 1323 and expiry date 12/03. 8. The system asks the payment gateway to charge the amount to the credit card. The payment gateway returns the approval code. 9. The system sends a shipping request to the shipping agent and sends a delivery request to the seller.
Outputs:	The new buy order is created and stored.