SE201.3
Systems Analysis and Design

Modeling Sequence and State transition

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Outline

- Sequence diagrams.
- State transition diagrams.

SEQUENCE DIAGRAM

- A ***sequence diagram*** Illustrates the objects that participate in a use case and the messages that pass between them over time for ***one*** use case.

- Generic sequence diagram vs. Instance sequence diagram

- Purposes
  - To capture the dynamic behavior of a system.
  - To describe the message flow in the system.
  - To describe the structural organization of the objects.
  - To describe the interaction among objects.

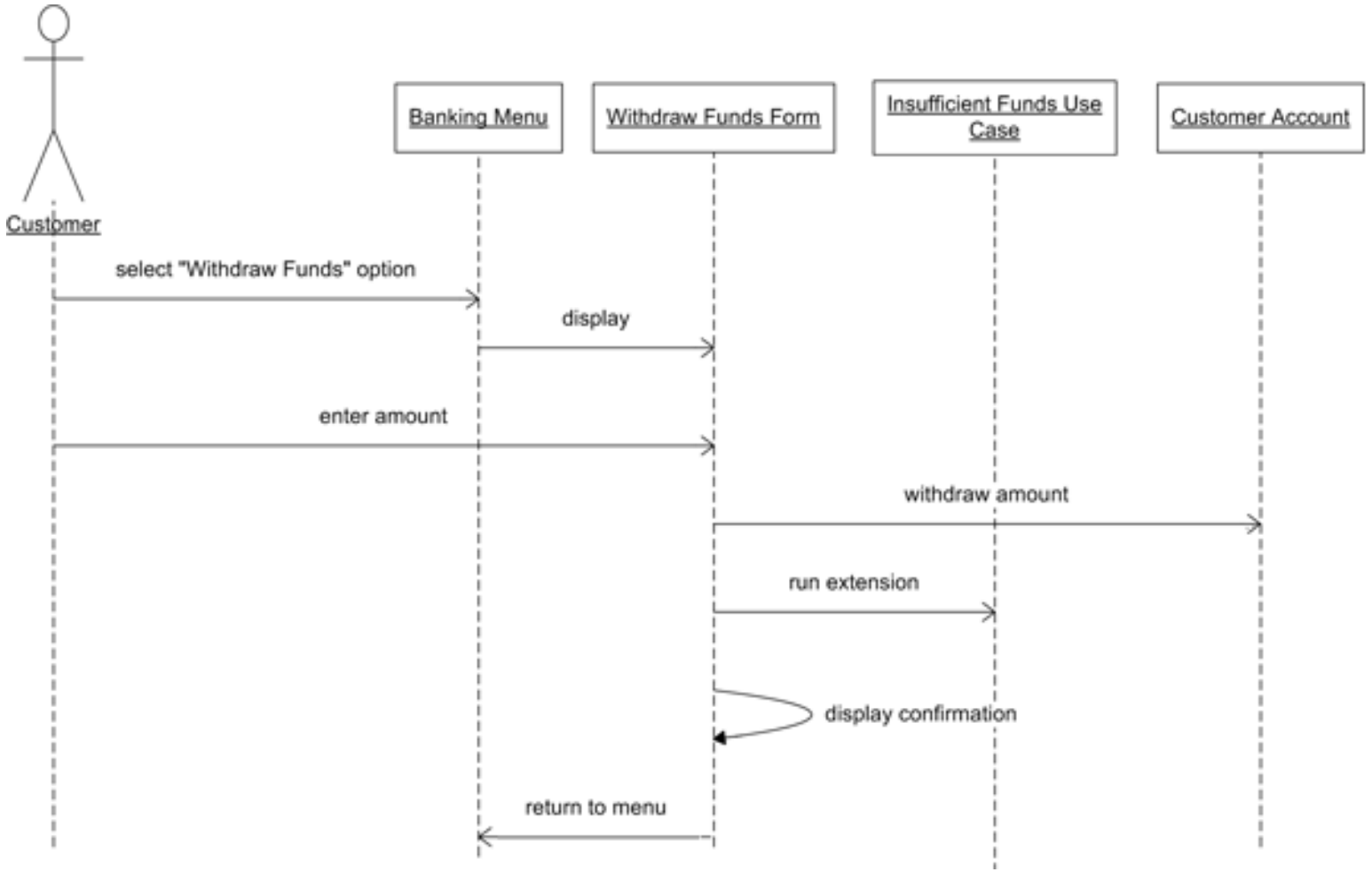
Syntax

An object: ▪ Participates in a sequence by sending and/or receiving messages. ▪ Is placed across the top of the diagram.	
A lifeline: ▪ Denotes the life of an object during a sequence. ▪ Contains an X at the point at which the class no longer interacts.	
A focus of control: ▪ Is a long narrow rectangle placed atop a lifeline. ▪ Denotes when an object is sending or receiving messages.	
A message: ▪ Conveys information from one object to another one.	

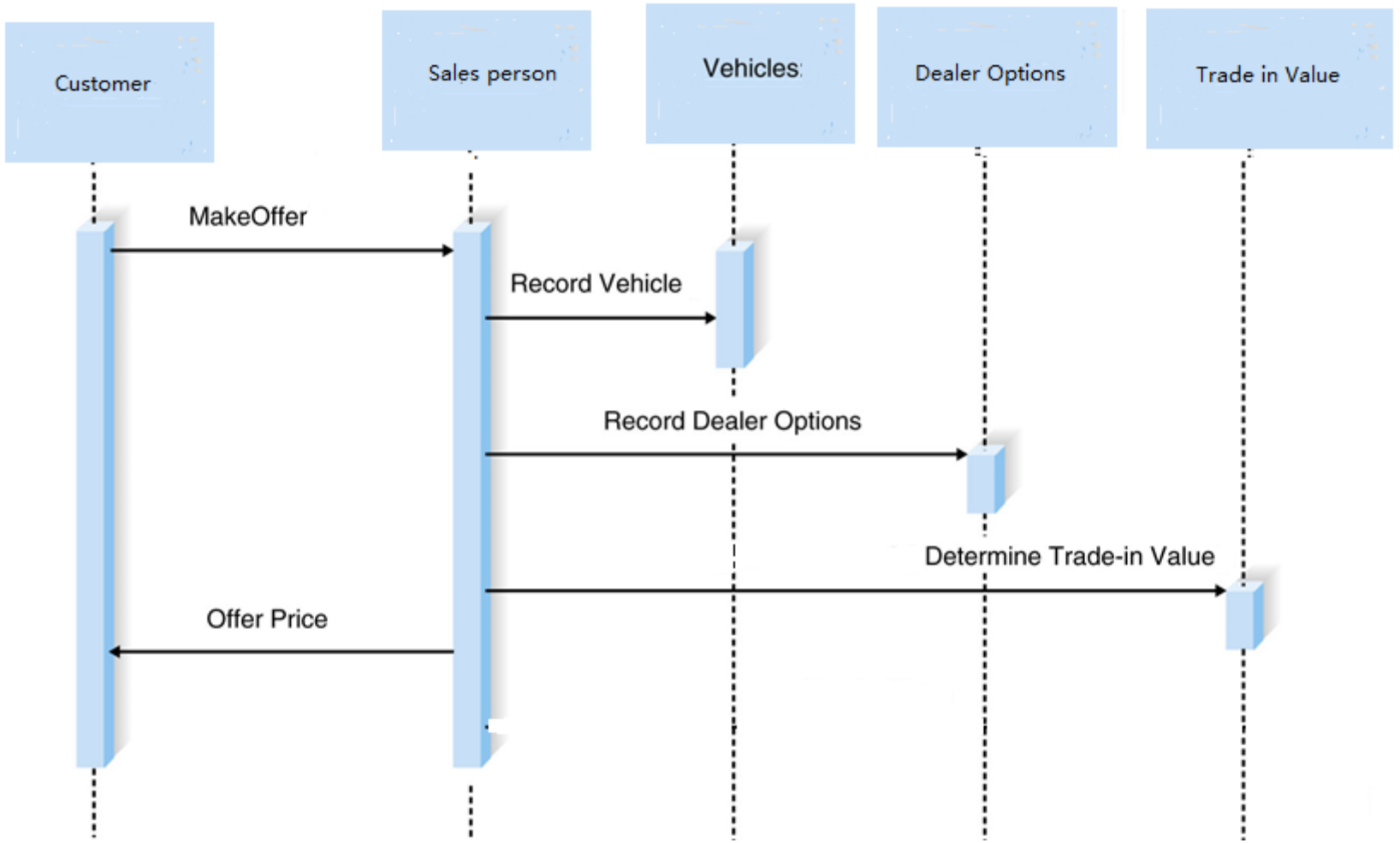
Creating a Sequence Diagram

- Steps in creating a sequence diagram
  1. Identify objects.
  2. Add messages.
  3. Place lifeline and execution occurrences.

Example: withdraw cash from bank



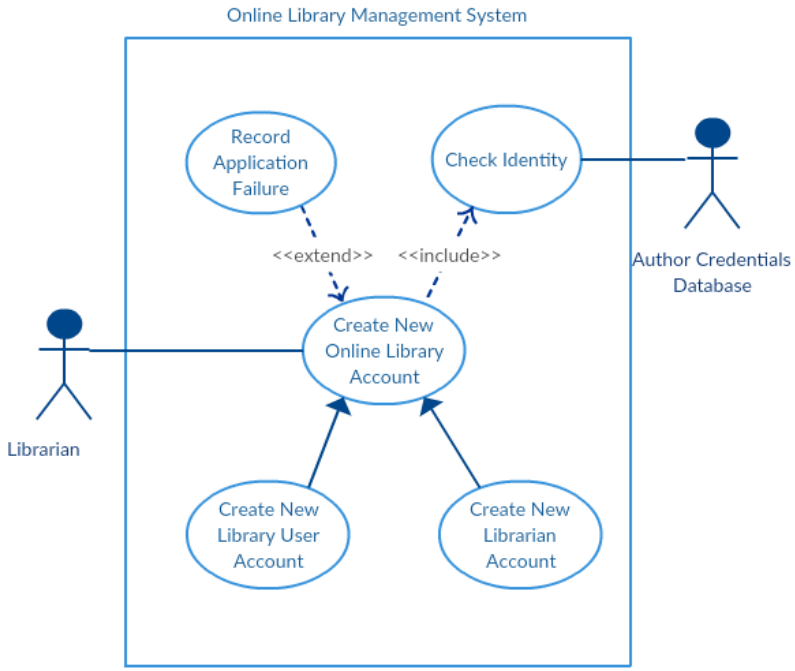
Example: The process by which a customer creates a new offer for the Holiday Travel Vehicle system.



Exercise

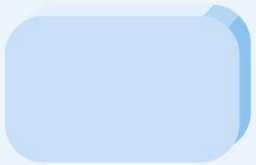
- From the below use case diagram example of ‘Create New Online Library Account’, focus on the use case named ‘Create New Library User Account’ to draw your sequence diagram.

- The librarian request the system to create a new online library account
- The librarian then selects the library user account type
- The librarian enters the user’s details
- The user’s Credentials are checked by the system.
- Then the new library user account creation is completed.
- A summary of the of the new account’s details are then emailed to the user.



STATE TRANSITION DIAGRAM

- A ***behavioral state transition diagram*** is a dynamic model that shows the different states that a single class passes through during its life in response to events, along with its responses and actions.

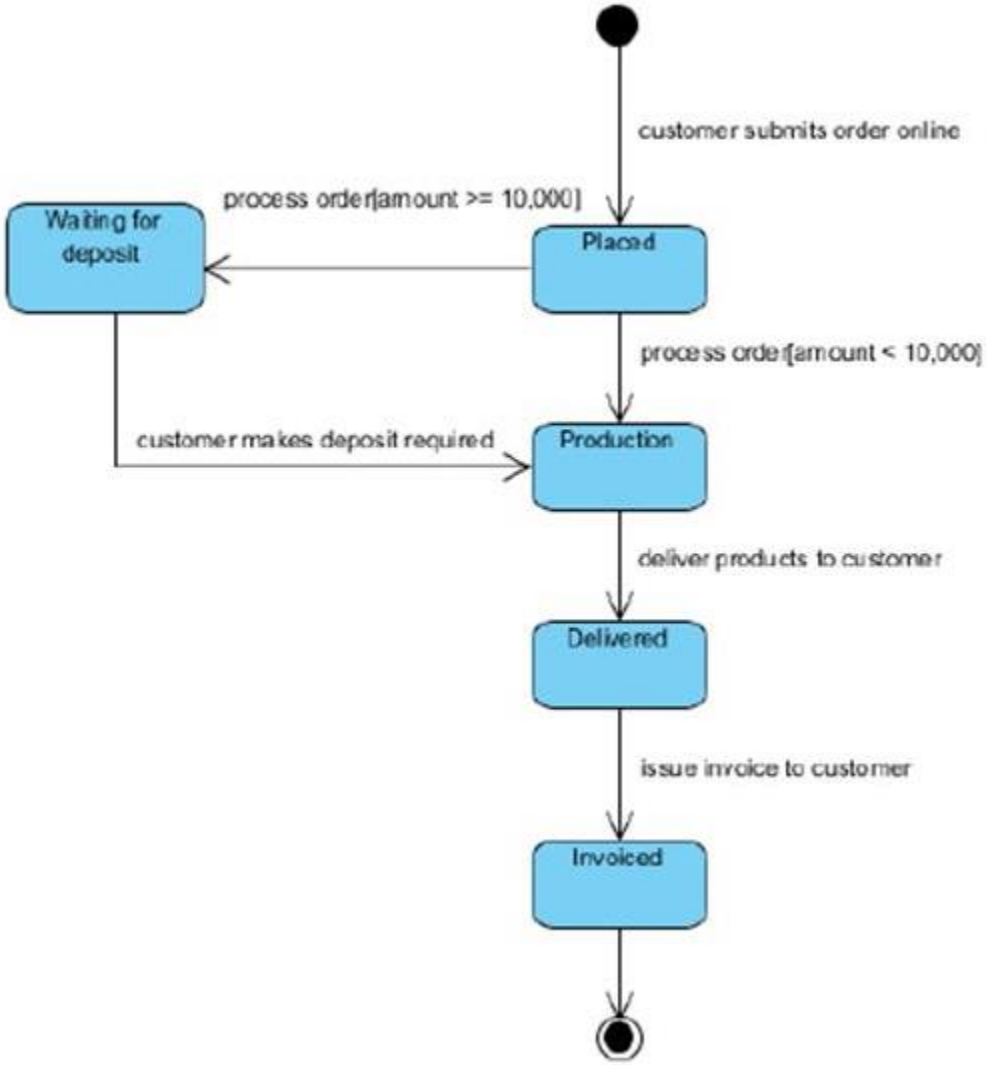
Term and Definition	Symbol
A state ▪ Is shown as a rectangle with rounded corners. ▪ Has a name that represents the state of an object.	
An initial state ▪ Is shown as a small filled-in circle. ▪ Represents the point at which an object begins to exist.	
A final state ▪ Is shown as a circle surrounding a small, solid filled-in circle (bull's-eye). ▪ Represents the completion of activity.	
An event ▪ Is a noteworthy occurrence that triggers a change in state. ▪ Can be a designated condition becoming true, the receipt of an explicit signal from one object to another, or the passage of a designated period. ▪ Is used to label a transition.	Event name
A transition ▪ Indicates that an object in the first state will enter the second state. ▪ Is triggered by the occurrence of the event labeling the transition. ▪ Is shown as a solid arrow from one state to another, labeled by the event name.	

Creating a Behavioral State Machine Diagram

- Steps in creating a behavioral state machine diagram:

1. Identify the states.
2. Identify the transitions.

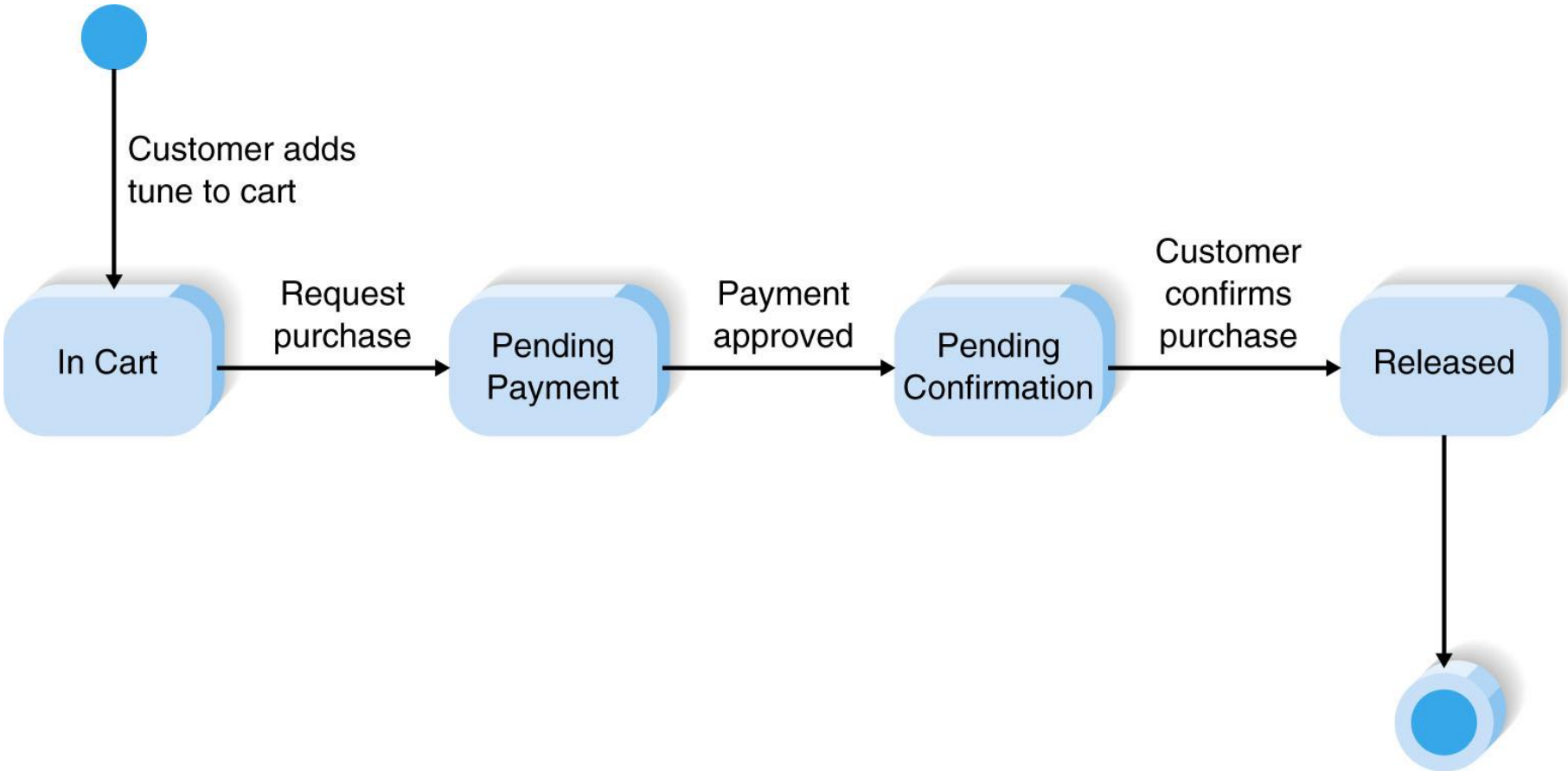
Example: Sales order



Example of States: The Life of an Audio Clip Order

1. The customer adds items into the order and order is in the shopping cart.
2. The customer checks out and submit payment details to the system.
3. The order is pending while payment is authorized.
4. Payment is approved and then the order is pending for final customer approval.
5. Customer confirms the order.
6. The order is released.

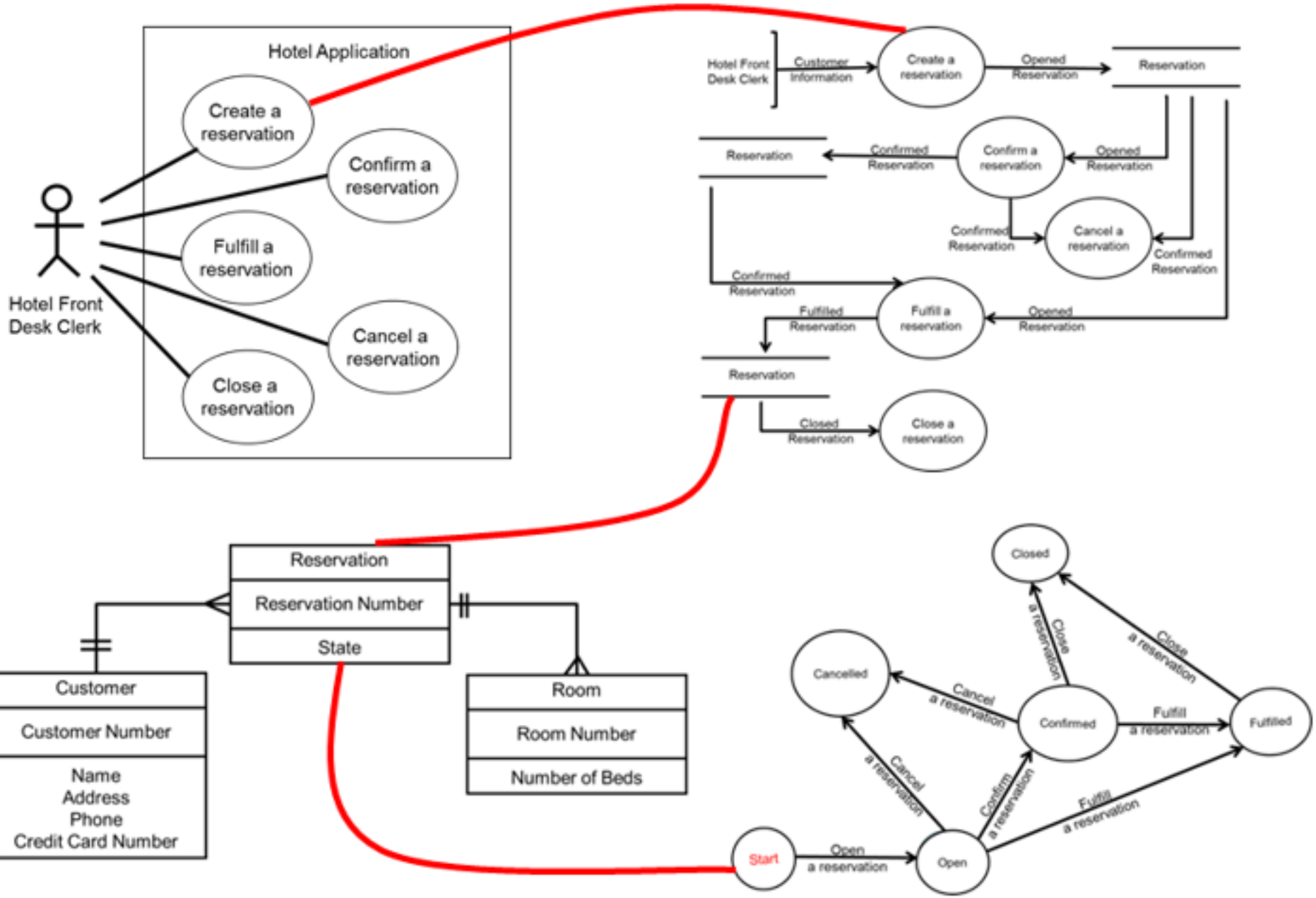
(cont'd)


Customer adds tune to cart
In Cart
Request purchase
Pending Payment
Payment approved
Pending Confirmation
Customer confirms purchase
Released

Exercise

- Refer following room reservation scenario to create state transition diagram of the reservation.
  - Clerk opens a reservation and the room is opened for reservation. When the reservation is confirmed the reservation converts to confirmed. As per the guests' request a confirmed reservation or an open reservation can be cancelled. When the guest checks-in, the confirmed room updates as a fulfilled reservation. When the guest checks-out, the reservation will be updated as closed reservation.

Verifying Use Cases, Data Flow Diagrams, Entity Relationship Diagrams, and State Diagrams


Hotel Application
Create a reservation
Confirm a reservation
Fulfill a reservation
Cancel a reservation
Close a reservation
Hotel Front Desk Clerk
Hotel Front Desk Clerk
Customer Information
Create a reservation
Opened Reservation
Reservation
Confirmed Reservation
Confirm a reservation
Opened Reservation
Confirmed Reservation
Cancel a reservation
Confirmed Reservation
Confirmed Reservation
Fulfilled Reservation
Fulfill a reservation
Opened Reservation
Closed Reservation
Close a reservation
Reservation
Reservation Number
State
Customer
Customer Number
Name
Address
Phone
Credit Card Number
Room
Room Number
Number of Beds
Start
Open a reservation
Open
Cancel a reservation
Confirm a reservation
Fulfill a reservation
Confirmed
Cancel a reservation
Fulfill a reservation
Cancelled
Fulfilled
Close a reservation
Close a reservation
Closed

End of the session