1. Exercises on <<Include>> and <<Extend>>

a) Consider an online bookstore website. A customer of the bookstore has the option of cancelling an order in conjunction with checking the order status.

[EXTEND]
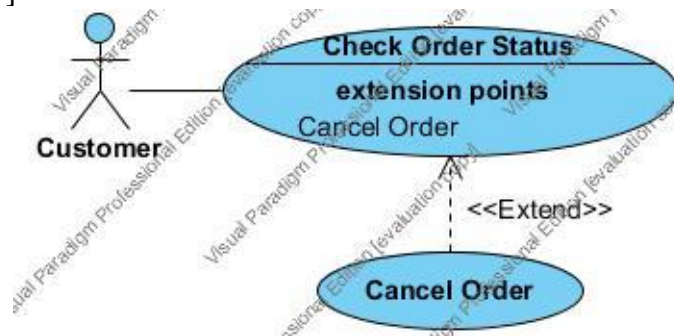
b) Consider an online flight booking system. A user will search for an available flight time and book the flight if desired. The user will be able to check if there is any seat available, either when searching or booking a flight.

[INCLUDE]
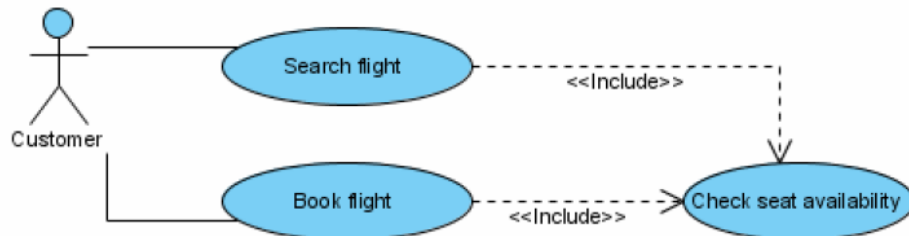

c) Consider an online selling / buying website. The website requires the seller and buyer to register their bank account information. A separate process will be called if the bank account is suspended / unavailable / illegitimate.

[EXTEND]
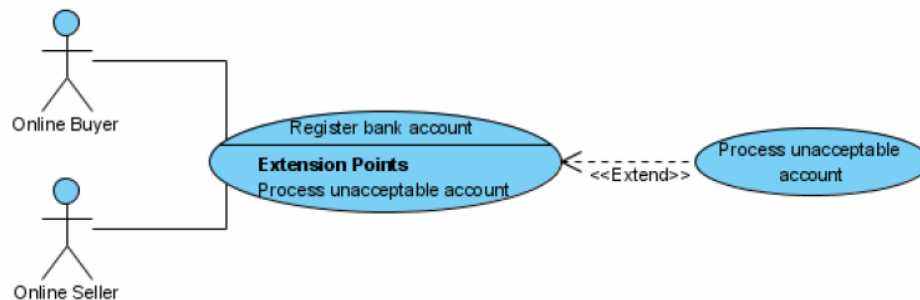
d) Consider a Shop Sales System. A sales officer uses the system to process / record requests of both customer order and faulty goods return. Both processes will need to identify the customer first.

[INCLUDE]
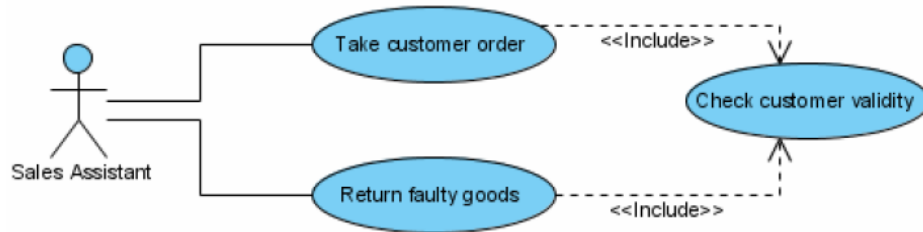
e) As part of an online flight booking system, the customer may have the option to upgrade their seat (e.g., economy to business class) when making flight booking.

[EXTEND]
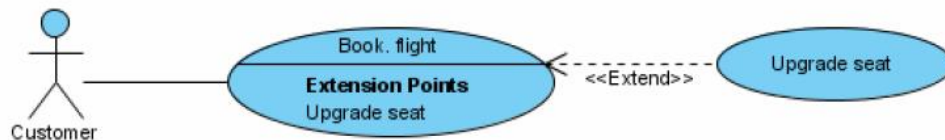
f) As part of a Student management system, a student who enrolls in a university will automatically be enrolled in seminars provided by the university, but a security check will be performed if the request to enroll in university is invoked for a new student.

[INCLUDE AND EXTEND]
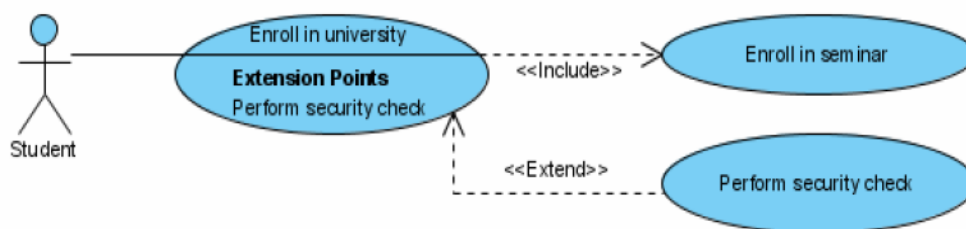
g) Consider an exam mark entry system. After marking the exam questions, the teacher will record grades. If there is any change in the grade, the teacher is allowed to update the grades. When a teacher either records or updates grades, the grades will be saved and, in some cases, the guardians are notified if the students failed the exam.

- Draw the first use case diagram based on the above statement.

[INCLUDE & EXTEND]
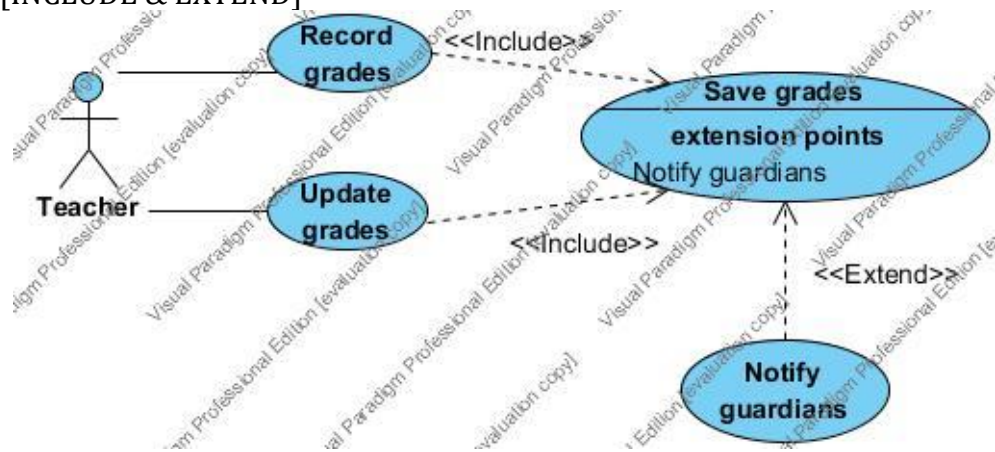
- Next, modify your use case diagram to illustrate the following statement: *The guardians will be notified every time the grades are saved.*

[INCLUDE]
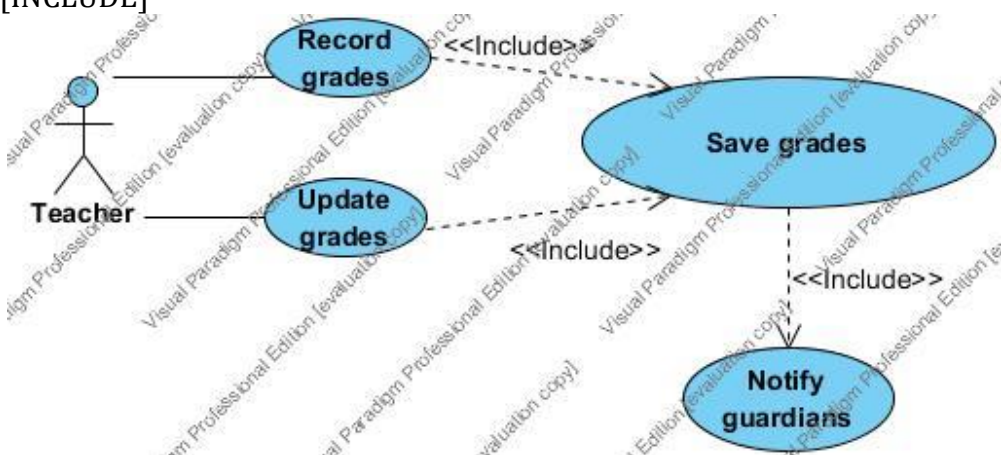
2. Exercises on Generalization

a) Consider the online bookstore website again. The customers can search a book on the bookstore website. There are three different searches that the customers can perform: search by author, search by title and search by author and title.

b) Consider the Manufacturing Sales System again. The admin or sales officer is required to manage customer goods orderings and requests to return faulty goods. How do you generalize both these use cases into one base case?
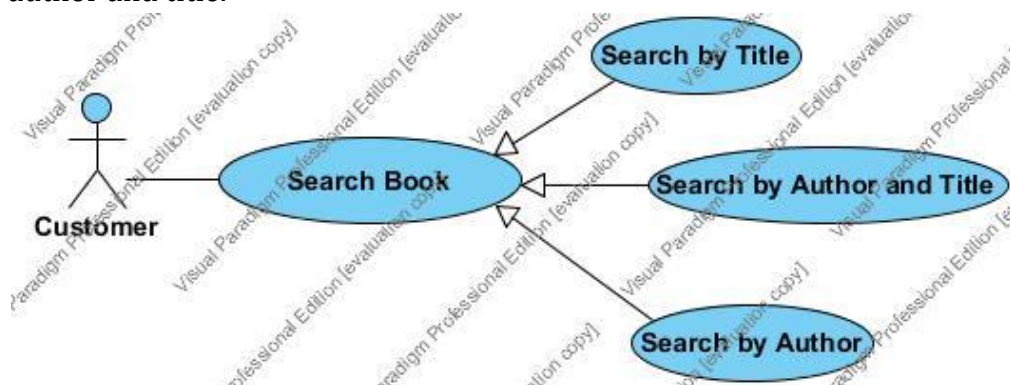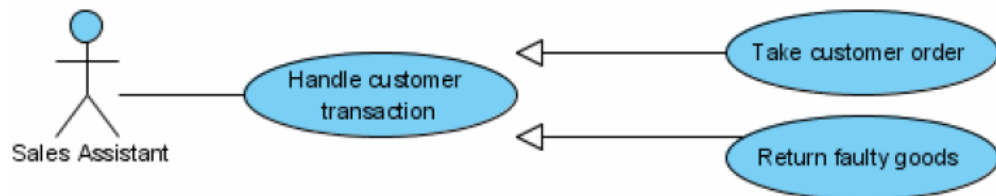

c) An order management system accepts ordering of product by phone or internet. Write the generalization for this, where that base use case will be used by the order registry clerk.
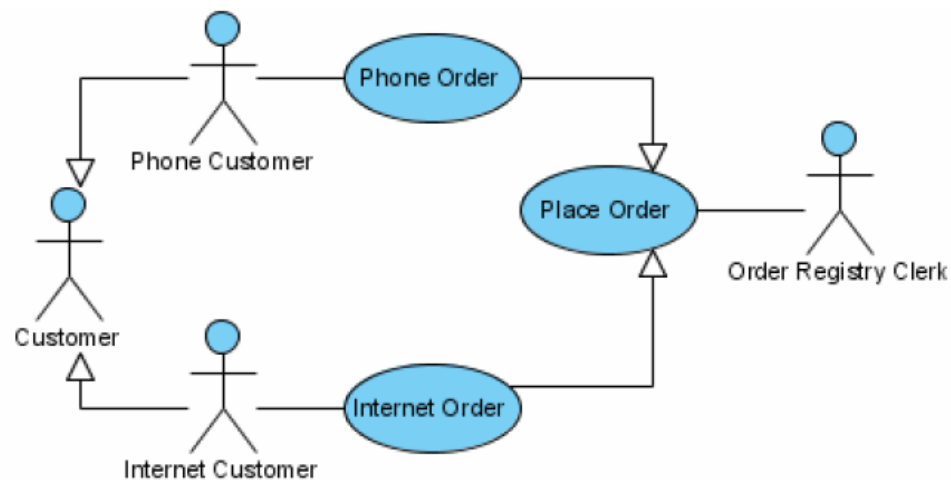
d) To ensure the validity of user of a high security system, 3 behaviors are required to be done on behalf of the user: Password checking, fingerprint scan and retinal scan. Generalize this.
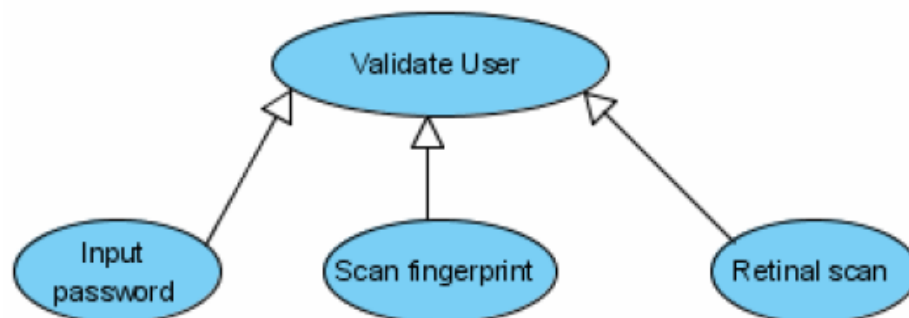
3. **Read the case study below carefully and answer questions 3(a) and (b).**

A company hires out cars to customers and requires a computerised system to record details of bookings. Cars may be booked in advance, or customers may appear at the reception desk and ask if there is a car available for immediate hire. When dealing with a booking or allocating an available car to a customer, the receptionist has to check whether the customer has previously hired car from the company or is a new customer. For a new customer, the receptionist has to enter the customer's details. Otherwise, the receptionist has to retrieve the existing customer's record and update any details if necessary. The minimum period of hire is one day and all hires are made for a number of complete days. The return of a car at the end of the hire period is recorded by the receptionist, or by a technician if the reception desk is closed.

Questions:

a) **Draw a use case diagram describing the main functions of the Car Booking System. You should assume that all financial transactions are recorded separately from the hire system and do not need to be covered by your specification.**

Sample Solution:
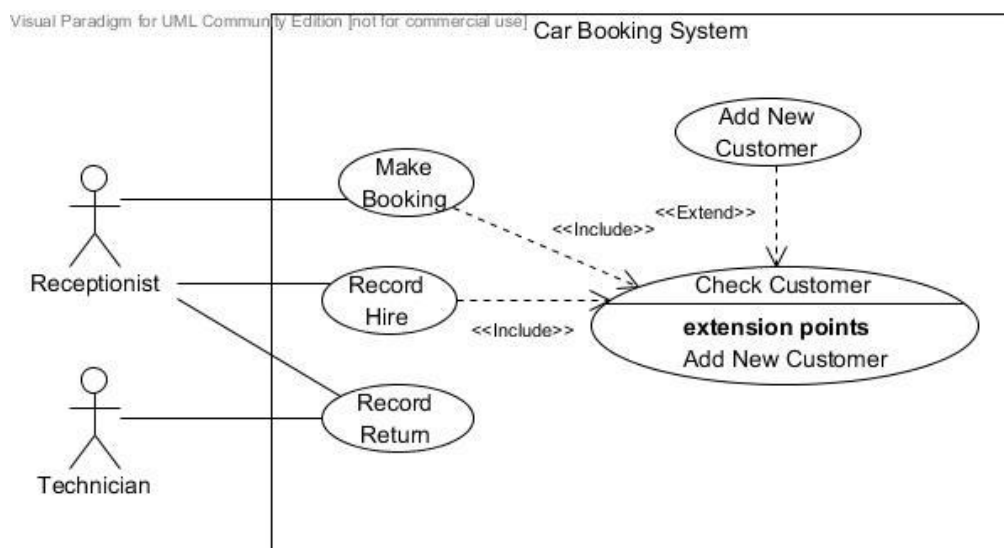
b) Give a short description of each use case.

Sample solution:

- **Make Booking:** accept booking for car from customer; may be new or existing customer.
- **Record Hire:** confirm booking or record immediate hire; customer for immediate hire may be a new or existing customer.
- **Check Customer:** check records for existing customer and update details if necessary; if no record exists then we have the extension Add New Customer.
- **Add New Customer:** allows a new customer to be added (this could be a separate use case included in Make Booking and Record Hire, or it could be included within Check Customer).
- **Record Return:** records the return of a car after hire.

4. **Read the case study carefully and answer questions 4(a) and (b).**

CarMatch is a franchising company that is being set up to promote car sharing. CarMatch seeks to promote car sharing and to provide a service to potential car sharers by matching up people who both live and work near one another. Here is a short excerpt from an interview transcript with one of the directors who is setting up CarMatch. Mick Perez is the systems analyst and Janet Hoffner is the director.

Mick Perez: So you're saying that car sharers will be able to register by telephoning the office and speaking to someone there who will enter their details into the system.

Janet Hoffner: Yes. Either the franchisee, or more likely one of the office staff will take the call and enter the details into the computer.

MP: who are the office staffs?

JH: Well, there are one or two clerks, a receptionist and a supervisor. They all have a role in administration in the system.

MP: What will they be entering?

JH: Oh, the person's name and address, details of the journey they want to share, any preferences they have such as being a non-smoker.

MP: Is that they only way that this information will get into the system?

JH: No, it could also be transferred in from the national web-server.

MP: How will this information be used?

JH: Two ways. Firstly, it will be used to match up potential car sharers, and secondly, it will be used to produce a management report for the franchisee showing the number of registrations per week, whether they come from the web-server or by telephone and breaking down by area.

Questions:
  a) **Identify all the possible actors.**
     Sample Solution:

     Actors are people, devices or systems that interact with use cases. Note that for this example, the car sharers do not interact directly with the system, and so they are not actors.

- There is nothing to distinguish the roles that the clerks, receptionist and supervisor play in this part of the system; they all administer the registration process, so we can use the actor role **CarMatch Administrator** to include all of them.
- **Franchisee** is also an actor, as the franchisee has a separate role as recipient of the management report.
- The final actor role is the **National Web-server**, as this is another system with which the CarMatch system interacts.

b) **Draw a use case diagram describing the main functions of the CarMatch system.**

Sample Solution:

Use cases represents sequence of actions carried out by the system, so to find use cases, we need to look for the actions of the system. In this exercise, there are four distinct use cases:

- Manually add car sharer
- Transfer car sharer from web server
- Match car sharers
- Produce management report
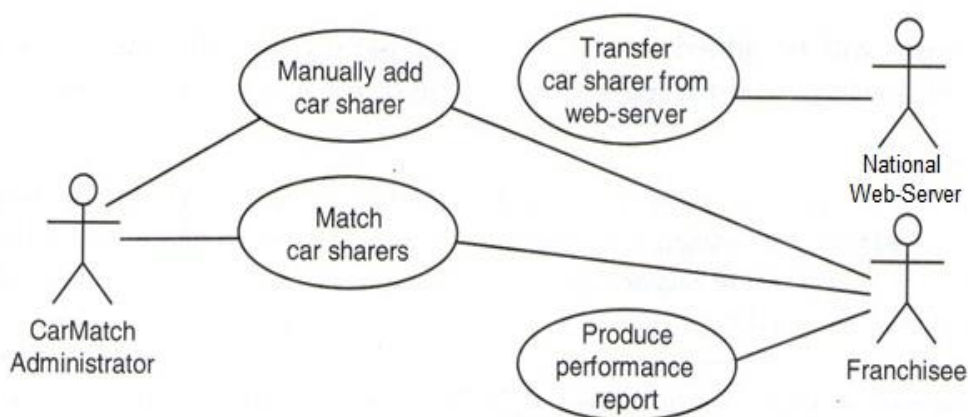
5. Read the case study below carefully and answer questions 5(a) and (b).

XYZ is the leading film exhibitor and distributor in Malaysia. It has 30 cinema branches all over Malaysia. XYZ provides an Online Movie Booking System to minimise operation cost and increase ticket sales. Each cinema consists of many rooms and each room has many seats. Room and seat information such as room number, room type, seat number and seat type are recorded in the system.

Cinema manager can schedule, reschedule and correct the timetable of each cinema. A movie timetable consists of schedule screening sessions for all the movies. Every movie will be scheduled to at least one screening session. A room will be selected to screen a movie on a particular session.

All customers can search movie timetable to obtain available ticket for a session in any cinema specified by the customer. Only the registered customer is allowed to make online booking. A new customer needs to register a new account by entering personal details. The system will create a customer account if one does not already exist. When the account is created, the registered customer can proceed to login to the system.

To make a booking, a customer is required select a movie session and number of tickets. Next the customer can select seat number(s). After selecting the seat number(s), he/she can proceed to make a payment for the booking using credit card or debit card. The payment is subject for an approval from the Bank Credit Unit. Once payment has gone through successfully, the system will issue a booking confirmation by sending a notification to the customer via email. If the payment is rejected, customer will receive a failure notification.

Sales office in each cinema will use the system to manage all the booking confirmation. Sales office will generate monthly sales report to show the analysis of ticket sales for each branch.

Questions:

    a) **Draw a use case diagram describing the main functionalities of the Online Movie Booking System.**

Sample Solution:
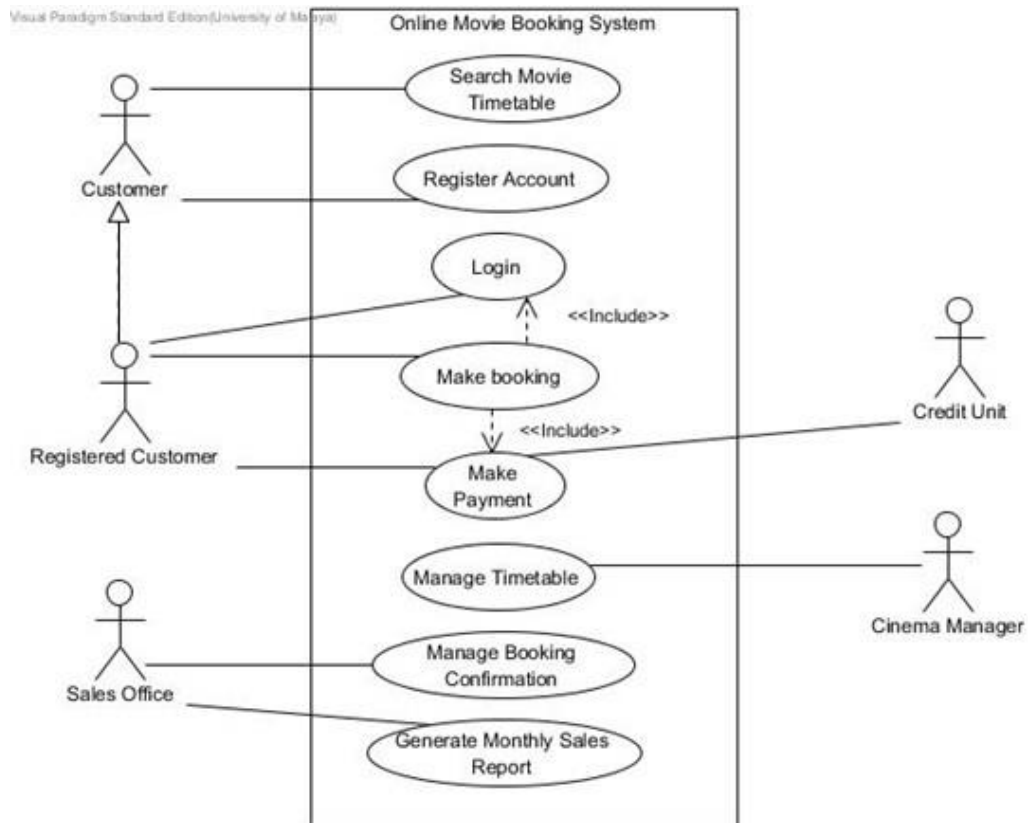
b) **Give a short description for each use case.**

Sample Solution:

- **Search Movie Timetable:** *A customer can search movie timetable to obtain available ticket for a session in any cinema.*
- **Register Account:** *To make an online booking, a new customer needs to register a new account by entering personal details.*
- **Login:** *A customer needs to login to the account to make online booking and payment.*
- **Make Booking:** *A registered customer can make a booking by selecting a movie session and number of tickets, and select seat number(s). Next, the customer is required to login to the system in order to complete the booking and make a payment.The customer will receive booking confirmation once the payment has gone through successfully.*
- **Make Payment:** *A registered customer is required to login to the system in order to make a payment for the booking through credit card or debit card. Bank Credit Unit will verify the validity of payment account and approve the payment made by customer.*
- **Manage Timetable:** *A cinema manager can schedule, reschedule and correct the timetable of each cinema. A room will be selected to screen a movie on a particular session.*
- **Manage Booking Confirmation:** *Sales office in each cinema will use the system to manage all the booking confirmation made by customers.*
- **Generate Monthly Sales Report:** *Sales office will generate monthly sales report to show the analysis of ticket sales for each branch.*