Exercise n.4

1 - Create the use case diagram according to the following elevator control system functional requirements:

1. The elevator control system shall allow the passenger to call the elevator and to select the destination floor;
2. When the passenger pushes the external button (to call the elevator), or the internal button (to select the destination floor), the central control system switches the button light on;
3. When the passenger calls the elevator or selects the destination floor, the central control system opens/closes the elevator door;
4. When the passenger calls the elevator or selects the destination floor, the central control system moves/stops the elevator to/at the passenger call floor or to/at the passenger destination floor.
5. When the passenger leaves the elevator, the central control system switches the button light off.

Also, describe the use case “Select Floor” by specifying:
   • Use case name
   • Participating actors
   • Description
   • Entry conditions
   • Flow of events (see use case description at point 3. Pay attention: consider JUST the interface events)
   • Exit conditions

2 - Create the Class diagram of the elevator control system.

3 - According to the following description of the “Select Floor” use case, create the 1) Sequence, the 2) Collaboration and the 3) Activity diagram:
   1. The passenger pushes the destination floor button (internal button);
   2. The internal button sends the system the order to select the direction (up/down);
   3. The system changes the elevator status (from idle to busy);
   4. The system switches the floor button (internal button) light on;
   5. The system closes the elevator door;
   6. The system moves the elevator according to the destination floor direction (up/down);
   7. The elevator sends the system the order to control if the floor that the elevator is going to get through is the destination one;
   8. The system stops the elevator at the destination floor;
   9. The system opens the door at the destination floor;
   10. The passenger moves outside the elevator;
   11. The system switches the internal button off.

4 - Create the Statechart diagram of the object “Elevator”.

Solution 1. Use-case diagram of the “Elevator control system”

Solution 1. Description of the use case “Select Floor”

<table>
<thead>
<tr>
<th>Use case name</th>
<th>Select Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating actors</td>
<td>Passenger</td>
</tr>
<tr>
<td>Description</td>
<td>It allows to move the passenger to the desired floor.</td>
</tr>
<tr>
<td>Entry condition</td>
<td>The passenger is inside the elevator</td>
</tr>
<tr>
<td>Flow of events</td>
<td>1. The passenger pushes the destination floor button (internal button); 2. The system switches the floor button (internal button) light on; 3. The system closes the elevator door; 4. The system moves the elevator according to the destination floor direction (up/down); 5. The system stops the elevator at the destination floor; 6. The system opens the door at the destination floor; 7. The passenger moves outside the elevator; 8. The system switches the floor internal button off.</td>
</tr>
<tr>
<td>Exit condition</td>
<td>The passenger is outside the elevator in the desired floor; the elevator is idle</td>
</tr>
</tbody>
</table>
Solution 2. Class diagram of the “Elevator control system”
Solution 3. Sequence diagram of the use case “Select Floor”
Solution 3. Collaboration diagram of the use case “Select Floor”
Solution 3. Activity diagram of the use case “Select Floor”

- **Passenger**
  - Push destination floor button

- **Elevator Control System**
  - Select destination floor direction (up/down)
  - Change elevator status (from idle to busy)
  - Switch internal button light on
  - Close door
  - Move elevator to destination floor direction
  - Control current floor
  - `<Current floor NOT= Destination floor>`
  - `<Current floor = Destination floor>`
  - Stop elevator at destination floor
  - Open door at destination floor
  - Switch external button light off
  - Move outside the elevator
Solution 4. Statechart diagram of the object “Elevator”

Going up
- Stop():Current floor=Floor number
- Move(up):Direction=up

At the floor
- Stop():Current floor=Floor number

Going down
- Move(down):Direction=down