Assignment 3
COMP 3004

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This is the Documentation File Please Read below tips on how to maximize your experience.

1. Structure of the assignment

    a. Use Cases

    b. Textual explanation

    c. UML

    d. Traceability Matrix

    e. Sequence Diagram

2. My Sequence Diagram have a little heading text before the diagram which is followed by the explanation for why I designed it that way a. Reason why is so that the diagram is a little more readable

3. Thanks for reading the tips

4. I have also added the video Demo below for your viewing!

Video Demo
https://youtu.be/sxsEGgemj4U

Use Case: Passenger Uses the elevator normally

Primary Actor: Passenger

Precondition: Passenger is in front of the elevator and elevator is working.

Success Guarantee: Passenger calls the elevator and gets in and gets off the desired floor

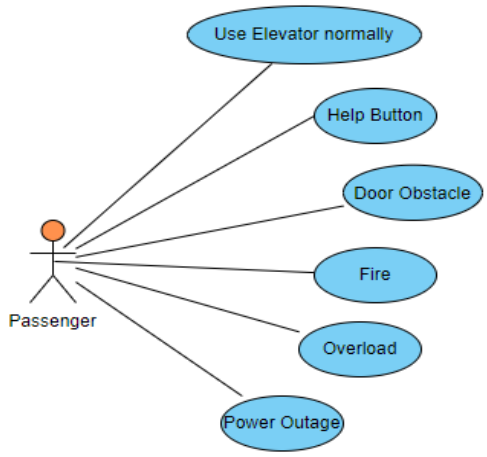
Main Success Scenario:

1. User presses the button (up or down) to call the elevator.
2. The button is illuminated showing that the elevator is on its way.
3. The Elevator arrives and a bell is rung.
4. Passenger/s enters the elevator and presses the desired floor.
5. The Bell is rung again.
6. the door is closed.
7. Elevator proceeds to target floor.
8. The Elevator reaches the target floor.
9. An audio announces the passenger floor level reached
10. Door Opens and a bell is rung.
11. Passenger Exits on desired floor.

Extensions:

2a. Button is not illuminated when pressed.
2a_1. Wait for Elevator to arrives if the button is not illuminated.
2a_2. Elevator doesn't arrive and button is not illuminated passenger takes the stairs and issue is reported to building staff.
3a. Bell doesn't ring when elevator arrives.

Use Case Diagram



Use Case: Passenger presses the Help Button

Primary Actor: Passenger

Precondition: Passenger is in the elevator.

Success Guarantee: Passenger calls for help through Help Button

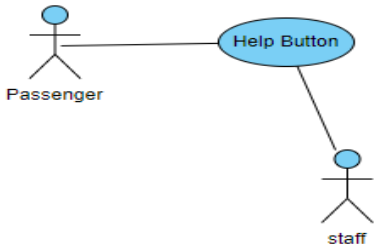
Main Success Scenario:

1. Passenger enters the elevator.
2. Passenger closes the door.
3. Passenger clicks desired floor button.
4. Door doesn't open and help button is pressed.
5. Staff are alerted of this scenario and respond.
6. If issue is big escalate to 911.

Extension:

5a. If staff do not respond in certain time frame a direct report is sent to 911

Use Case Diagram



Use case: Passenger/Passengers cause Door Obstacles

Primary Actor: Passenger

Precondition: Passenger is reaching /at the/in the elevator.

Success Guarantee: The elevator Door has an obstacle that needs to be moved (removed)

Main Success Scenario:

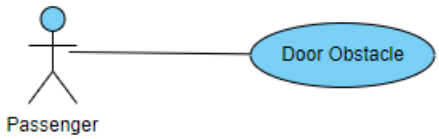
1. The door is closing.
2. Passenger interrupts the elevator sensor.
3. The door reopens and audio is sounded.
4. Passenger removes the obstacle.
5. Door closes.

Extension:

3a. Door doesn't reopen and continues closing.

3a_1. Passenger presses the open key button and door reopens.

Use case diagram for Obstacles



Use Case: Elevator Fire Safety Feature

Primary Actor: Passenger

Precondition: Passenger is in the elevator when the fire alarm is sounded

Success Guarantee: Fire is detected at one of the floors elevators takes passengers to safe floor.

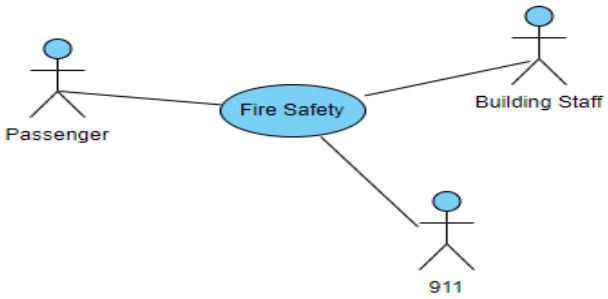
Main Success Scenario:

1. Elevator plays an audio (fire alarm)
2. Elevators display a fire on the display screen.
3. Elevator starts moving to the safe floor.
4. Elevator stops at safe floor.
5. Bell is rung.
6. Passengers disembark the elevator on the safe floor.

Extension:

1a. Elevator doesn't play an audio
2a. Elevator doesn't display warning on the display screen
3a. Elevator stops moving
  3a_1. Passengers press the help button and wait till help arrives (get assistance)
4a. Elevator doesn't stop at safe floor
  4a_1. Passengers press the help button and wait till help arrives (get assistance)

Use Case Diagram



Use Case: Overload safety feature.

Primary Actor: Passenger

Precondition: Too many passengers are waiting to get into the elevator.

Success Guarantee: The alarm is sounded, and message is displayed showing that the elevator is overloaded and excess passengers get off.

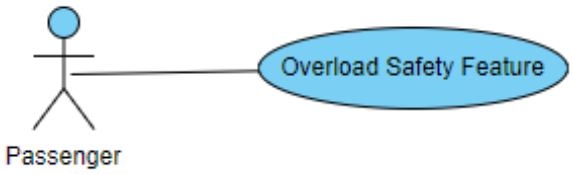
Main Success Scenario:

1. Elevator is called.
2. Elevator arrives.
3. Bell is rung.
4. Many Passengers enter the elevator.
5. Elevator doesn't move.
6. The elevator sounds the "Overload" alarm and displays the text.
7. Excess passengers disembark the elevator.
8. Elevator door closes.
9. Elevator starts to move to desired floors.

Extension:

6a. Elevator doesn't sound the alarm and the door closes and it doesn't move
  6a_1. Passengers press the help button and talk to building staff
9a. Elevator doesn't move
  9a_1. Passengers press the help button and talk to the building staff.

Use Case Diagram



Use case: Power outage safety feature

Primary Actor: Passenger

Precondition: Passenger is in elevator

Success Guarantee: Power goes out and passenger is taken to safe floor.

Main Success Scenario:

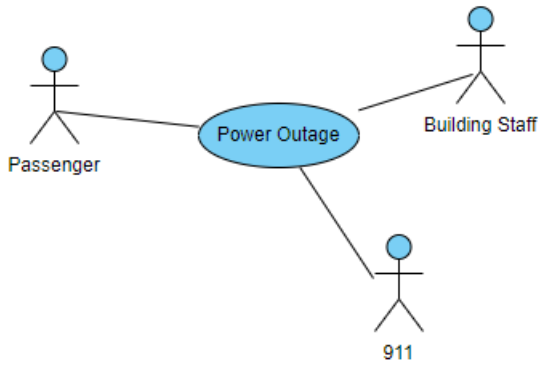
1. Passenger calls the elevator.
2. Elevator arrives.
3. Bell is rung.
4. Passenger enters the elevator.
5. Elevator starts moving.

6. Power goes out.
7. Elevators play the ‘Power Out’ alarm and display the text message.
8. Elevator continues moving to safe level.
9. Elevator stops at safe level.
10. Bell is rung.
11. Passenger gets off at the safe floor.

Extension:

8a. Elevator stops moving
8a_1. Passengers presses the help button and the building staff/911 is contacted
9a. Elevator doesn’t stop at safe floor/level
9a_1. Passenger presses the help button and is connected to the building staff.

Use case Diagram



References:

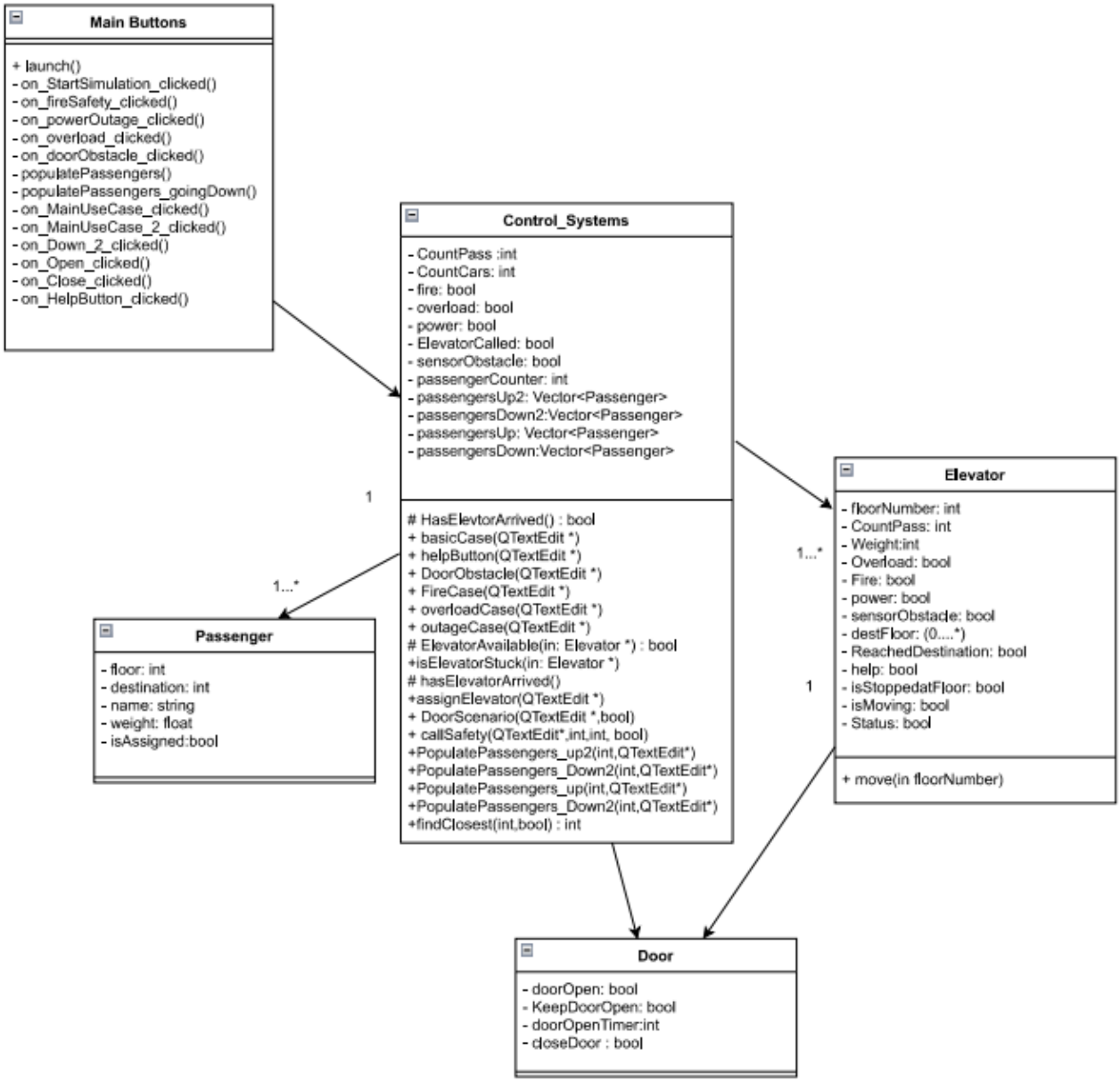
1. For Use cases diagram I referred the TB and Create a UML use case diagram - Microsoft Support site and used Use Case Diagram Binary Relation | Visual Paradigm Online (visual-paradigm.com) to build my diagrams

2. Taken From A2 and A1 assignments

Textual Explanation for Design Decisions

I decided to go with the mediator design pattern. Where the ECS is the control system that will control all interactions happening between an elevator and the client. When the passengers press the help button it will invoke an interaction with the staff which can then be escalated to 911. The door sensors are kept in the door class since they will interact with the elevator in closing the door ONLY when certain constraints are met such as weight limit (might change to number of passengers) or if the door sensors are interrupted via moving object OR if the passenger decides to keep the door open by pressing the keep door open button or close the door earlier by pressing the close door button. I decided to make my passenger an object for one main reason is to segregate and get the individual weight of the passenger and its name so that ALL common floor passengers can get off at the destination floor. I decided to use 2 Strategies for implementing design call strategies with a little mix in from a common strategy that is time based. The First Strategy is based around the Elevator Centered Strategy i.e., closest elevator gets assigned to the passenger. The Second Strategy is based around the Destination Known Strategy where the system knows where the passenger is and its destination and from there assign corresponding elevators to serve those passengers. The Main window class contains all the button functionalities that enable and disable buttons based on user execution. I removed the previous implementation of Elevator Button and Display Window Class Since they were being added to and displayed on the main window. And also since the elevator buttons are accessed and used by user on the elevator.

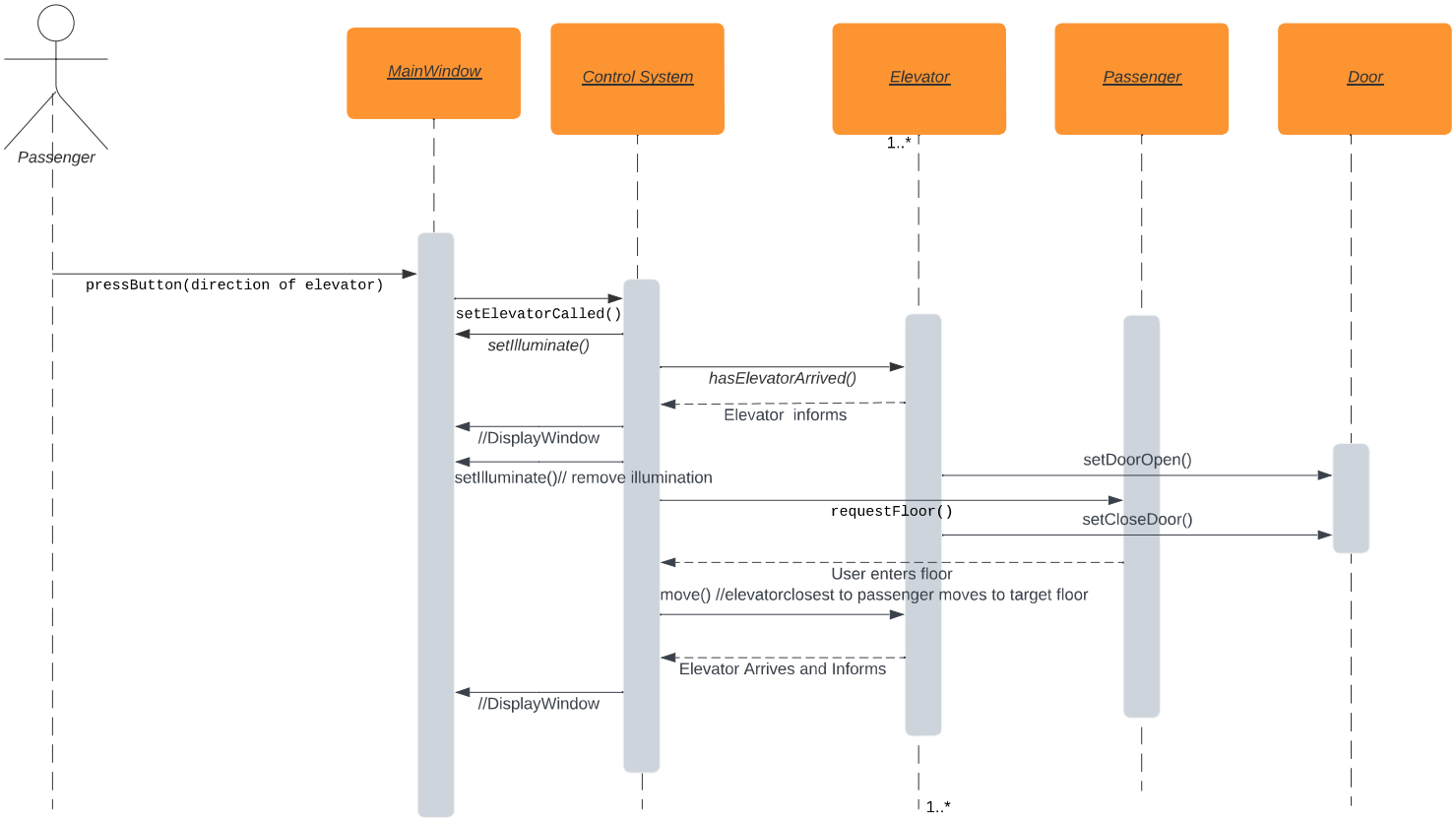
UML CLASS DIAGRAM



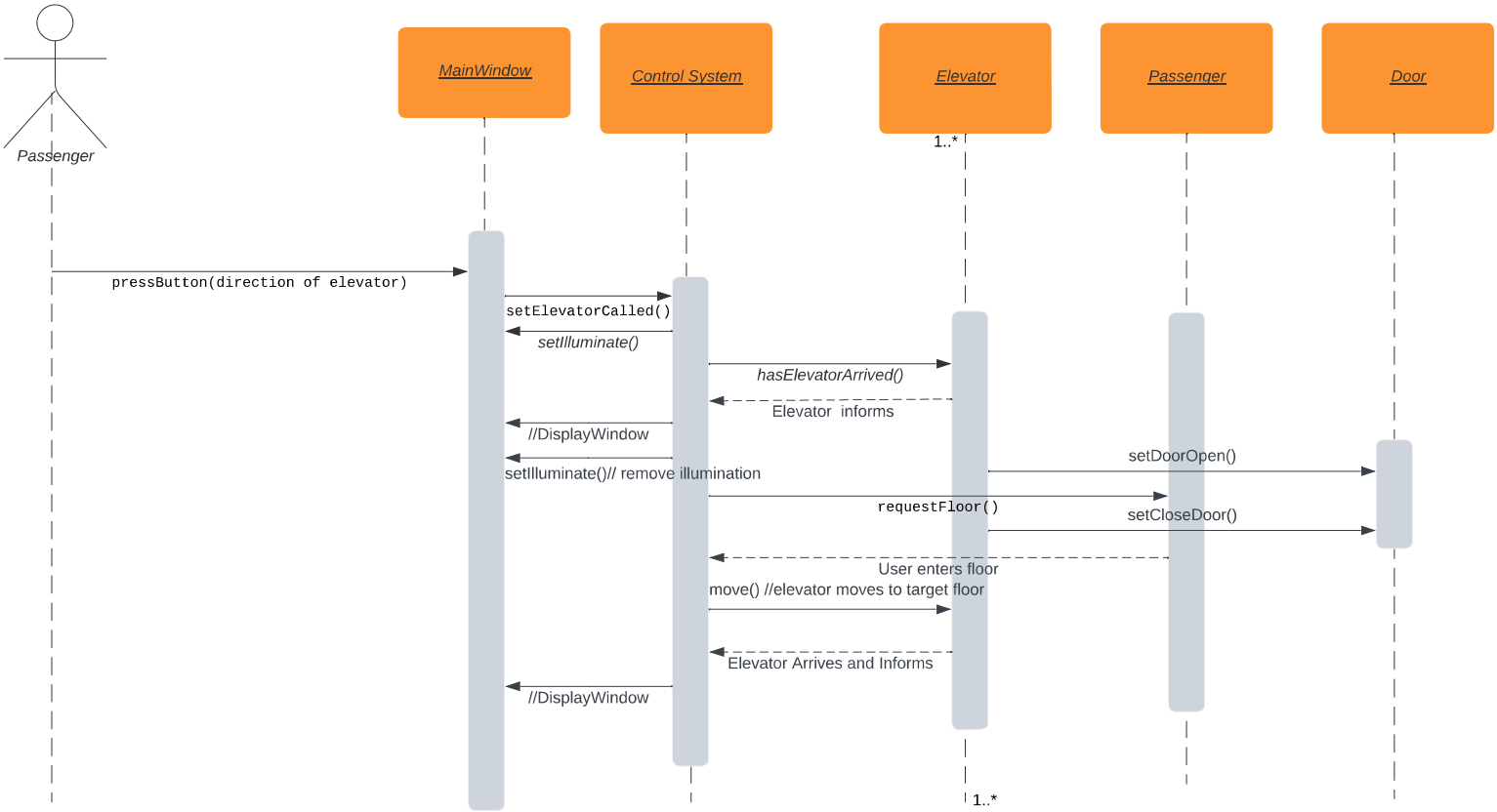
Traceability Matrix

ID	Requirement	Related Use Cases	Fulfilled By	Test	Description
1	Main interface that has button that will simulate all interactions between passenger and elevator including safety features	NA	MainWindow	Run the QT Program and view the buttons that will simulate an elevator	Main interface will be expected to have atleast 7 buttons which will simulate the safety features and main use of the elevator. 2 Separate buttons for closing and opening and 2 buttons to show the passenger populating
2	When user presses the Allocation strat 1 button and Passengers are populated	Passenger uses the elevator normally	MainWindow, Control, Passenger, Elevator, Door	Press Allocation strat 1 AFTER populating passengers and observe system log	When Passengers have chosen their destination and clicked allocation strategy 1 the Control Systems method simulates a scenario where the NEAREST elevator is assigned to the passenger
3	When user presses the Allocation strat 2 button and Passengers are populated	Passenger uses the elevator normally	MainWindow, Control, Passenger, Elevator, Door	Press Allocation strat 2 AFTER populating passengers and observe system log	When Passengers have chosen their destination and clicked allocation strategy 2 the Control Systems method simulates a scenario where the destination of the passenger is known and an elevator is allocated to the passenger and passenger is delivered to their destn
4	HELP Button is pressed in the elevator	Passenger presses the help button	MainWindow, Control, Passenger, Elevator, Door	Press Help Button in the elevator and view the System log for simulated scenario	When the help case button is pressed the function in control class should be triggered to demonstrate the safety feature functionality where passenger is connected to staff. Which if not connected after a set period of time are connected to the local police department.
5	Passenger interrupts door sensor	Passenger causes Door Obstacles	MainWindow, Control, Passenger, Elevator, Door	Press Door Obstacle button and view the System log for simulated scenario	When the incoming passenger causes a trigger in the door sensor the elevator will inform the passenger via the control system and the door never closes till the obstacle is cleared.
6	Fire alarm is triggered	Elevator Fire Safety Feature	MainWindow, Control, Passenger, Elevator, Door	Press Fire button and view the System log for simulated scenario	When the passenger triggers the fire alarm or the fire alarms are triggered. All M elevators whereever they are will move to the safe floor and passengers must be informed of the situation via the alarm display
7	Elevator is overloaded	Overload Safety Feature	MainWindow, Control, Passenger, Elevator, Door	The overloaded button is pressed and we view the system log for simulated scenario	When the number of passengers/ weight limit exceed the set max number an alarm is sounded and the door remains open until the excess passenger/weight is dropped.
8	There is a power outage	Power outage safety feature	MainWindow, Control, Passenger, Elevator, Door	The Power outage button is pressed and we view the system log for simulated scenario	When the power outage alarms are triggered. All M elevators whereever they are will move to the safe floor and passengers must be informed of the situation via the alarm display which is in the System log.
9	Open Door Scenario	NA	MainWindow, Control, Passenger, Elevator, Door	Door Open Button is pressed	When the Door Open button is pressed The counter is changed from the default time of 10 second to 20 and after that it defaults to closing the elevator
10	Open Door Scenario	NA	MainWindow, Control, Passenger, Elevator, Door	Door Close Button is pressed	When the Door Close button is pressed The counter is changed from the default time of 10 second to 20 and after that it defaults to closing the elevator

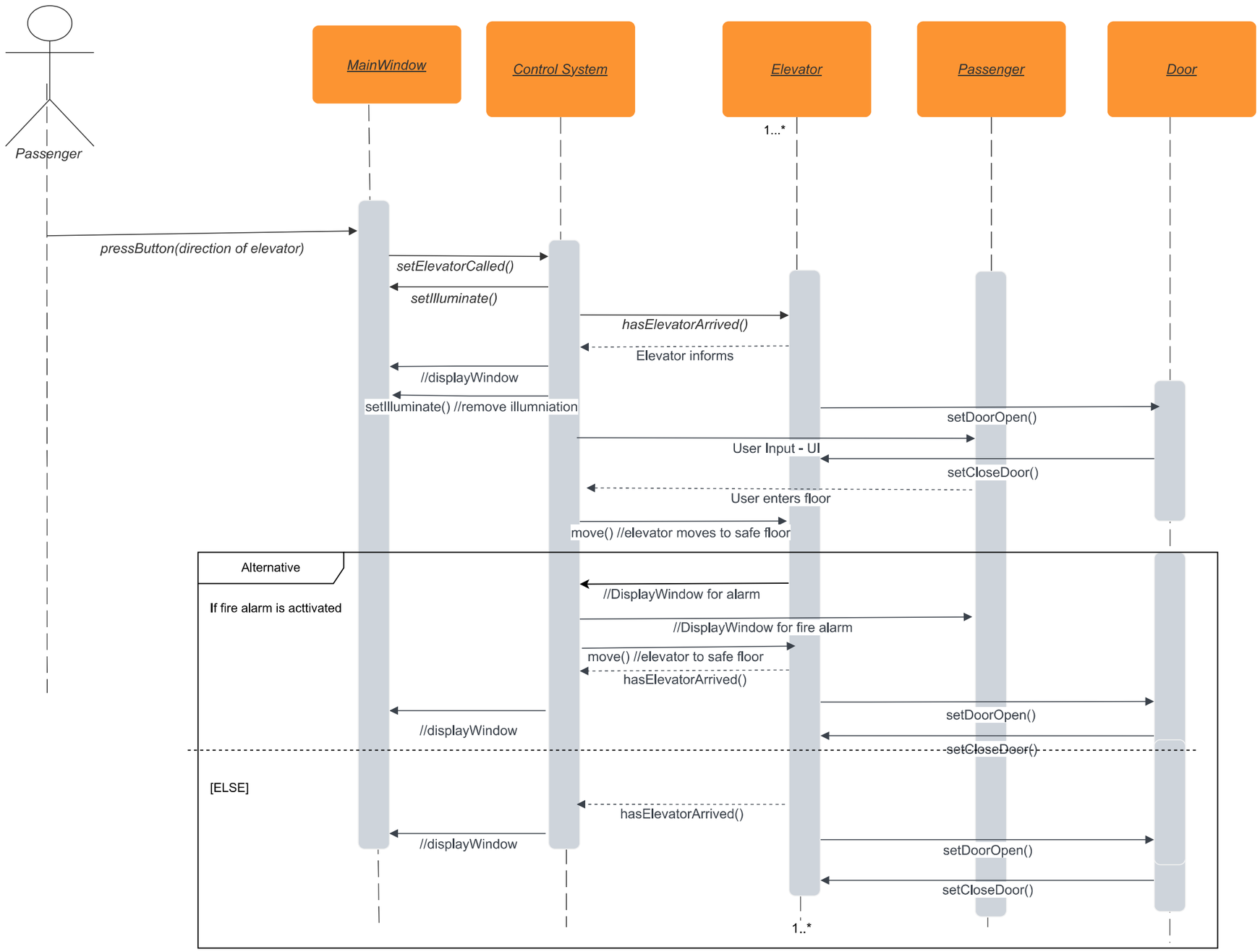
Allocation Strategy 1



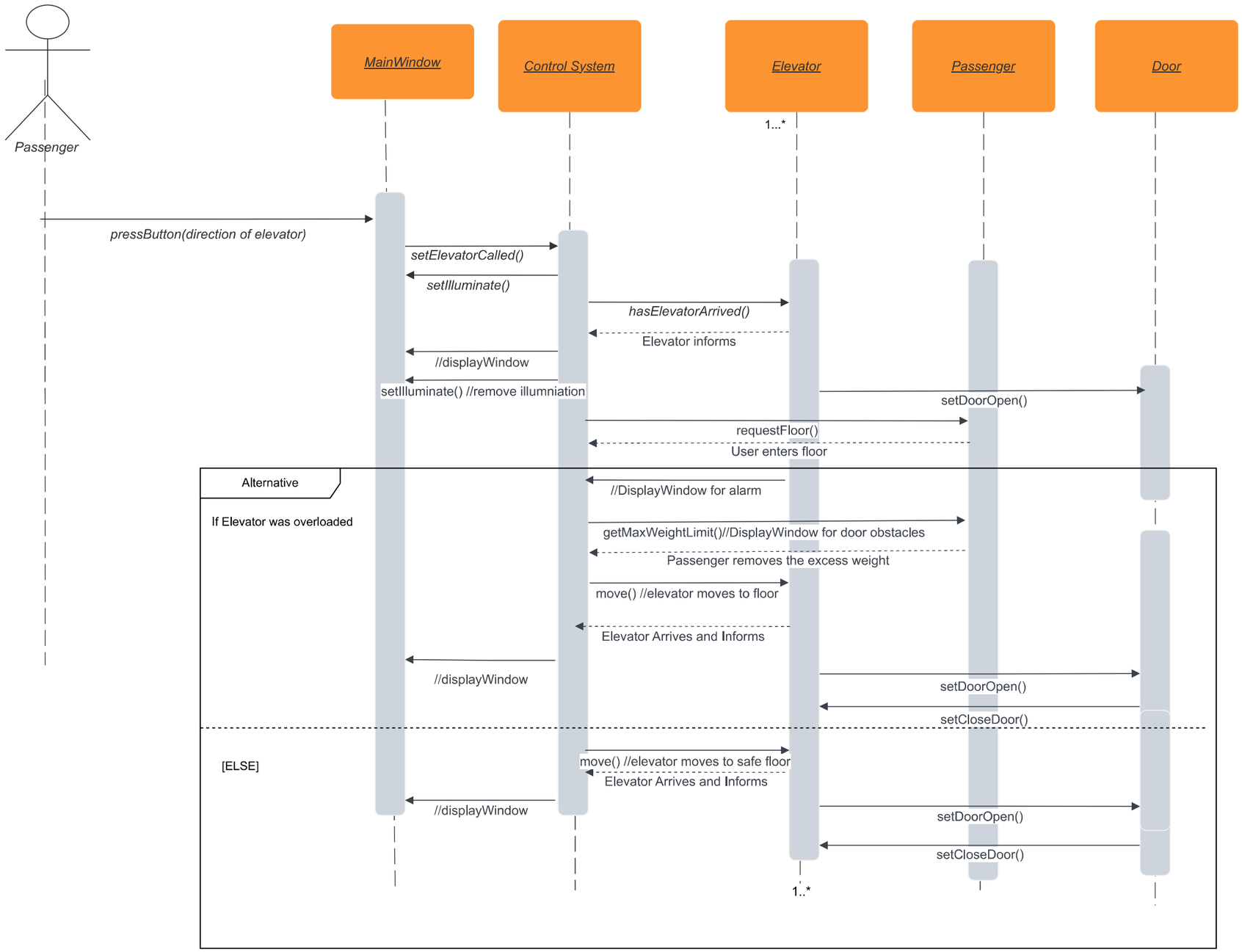
Allocation Strategy 2



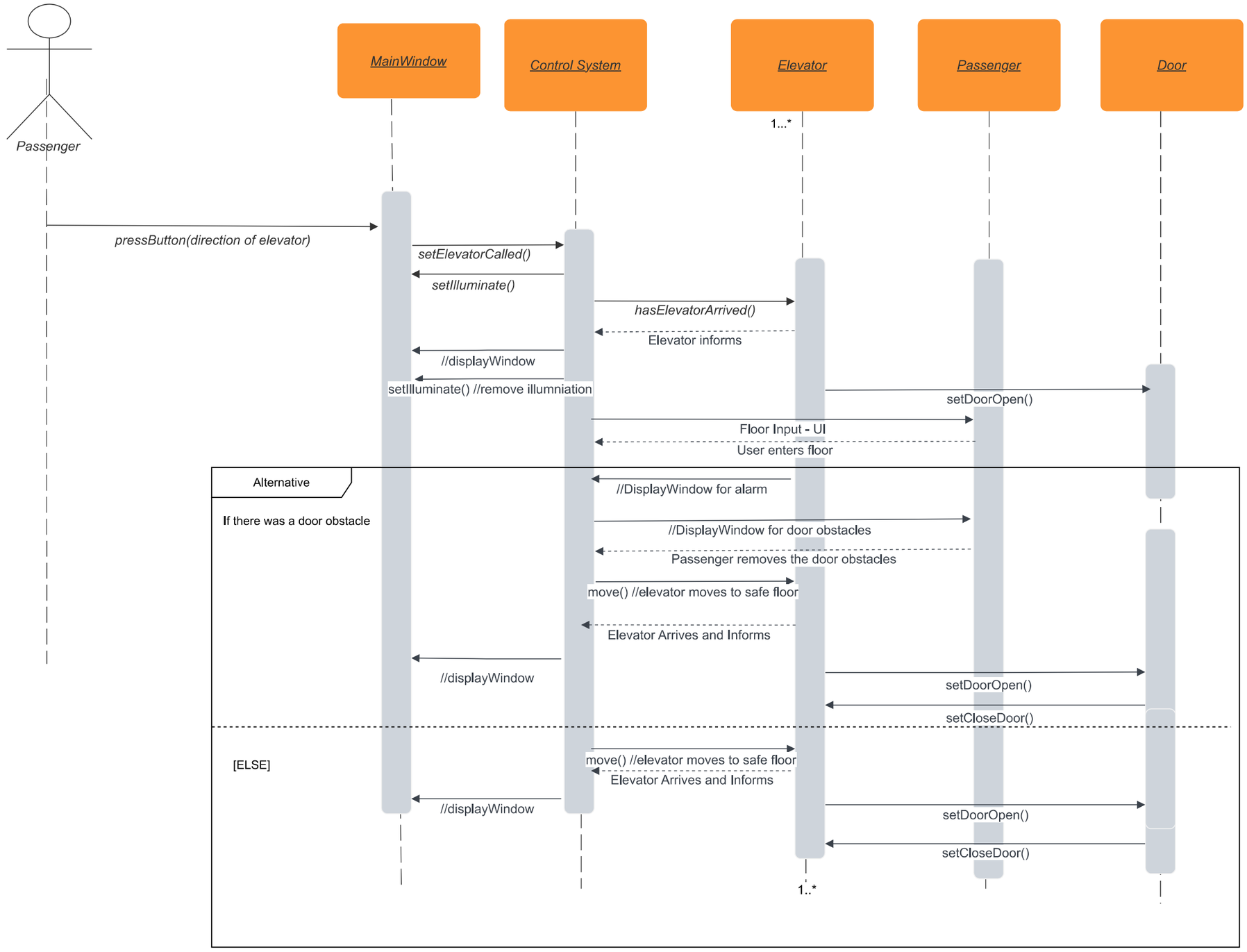
Fire Alarm Safety



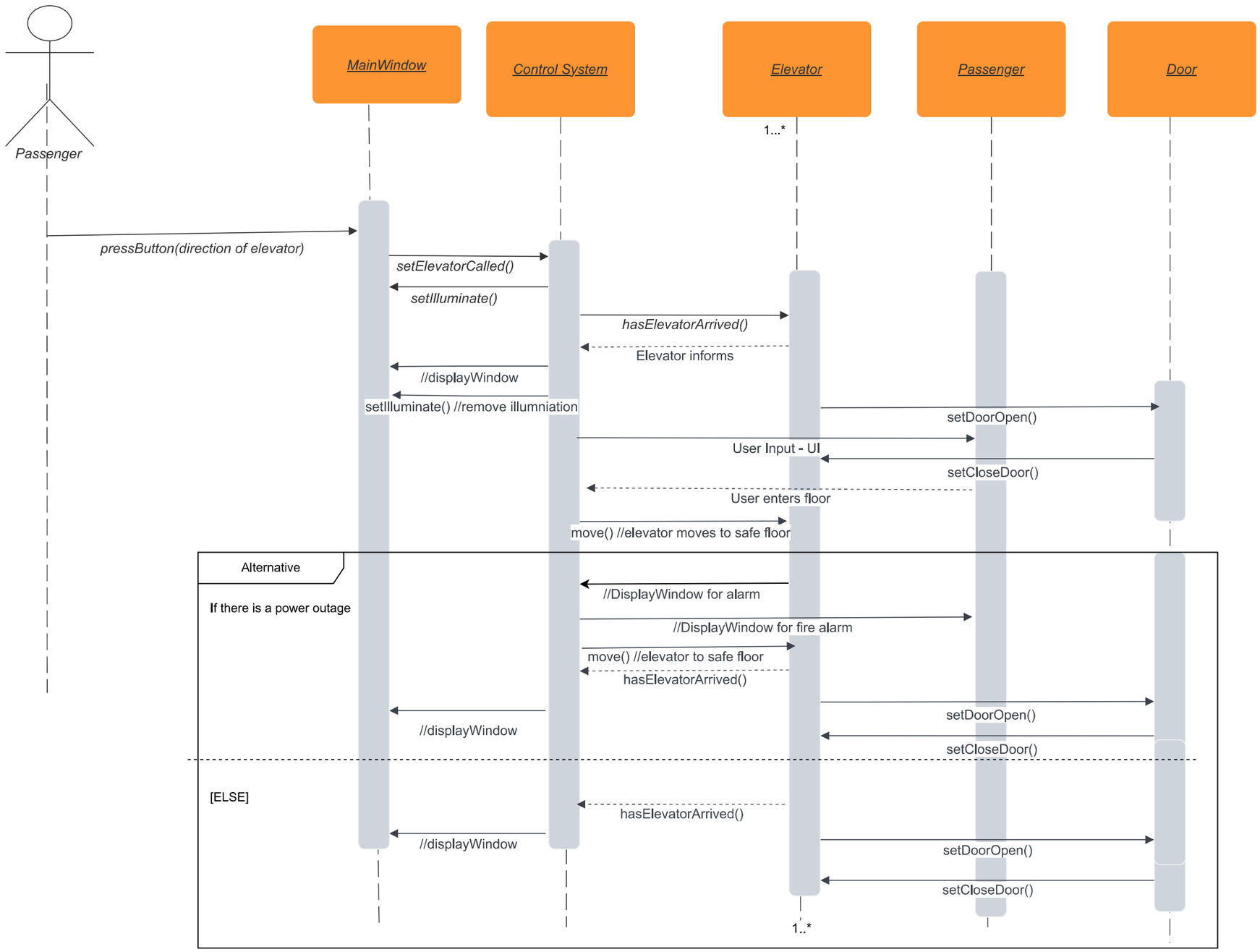
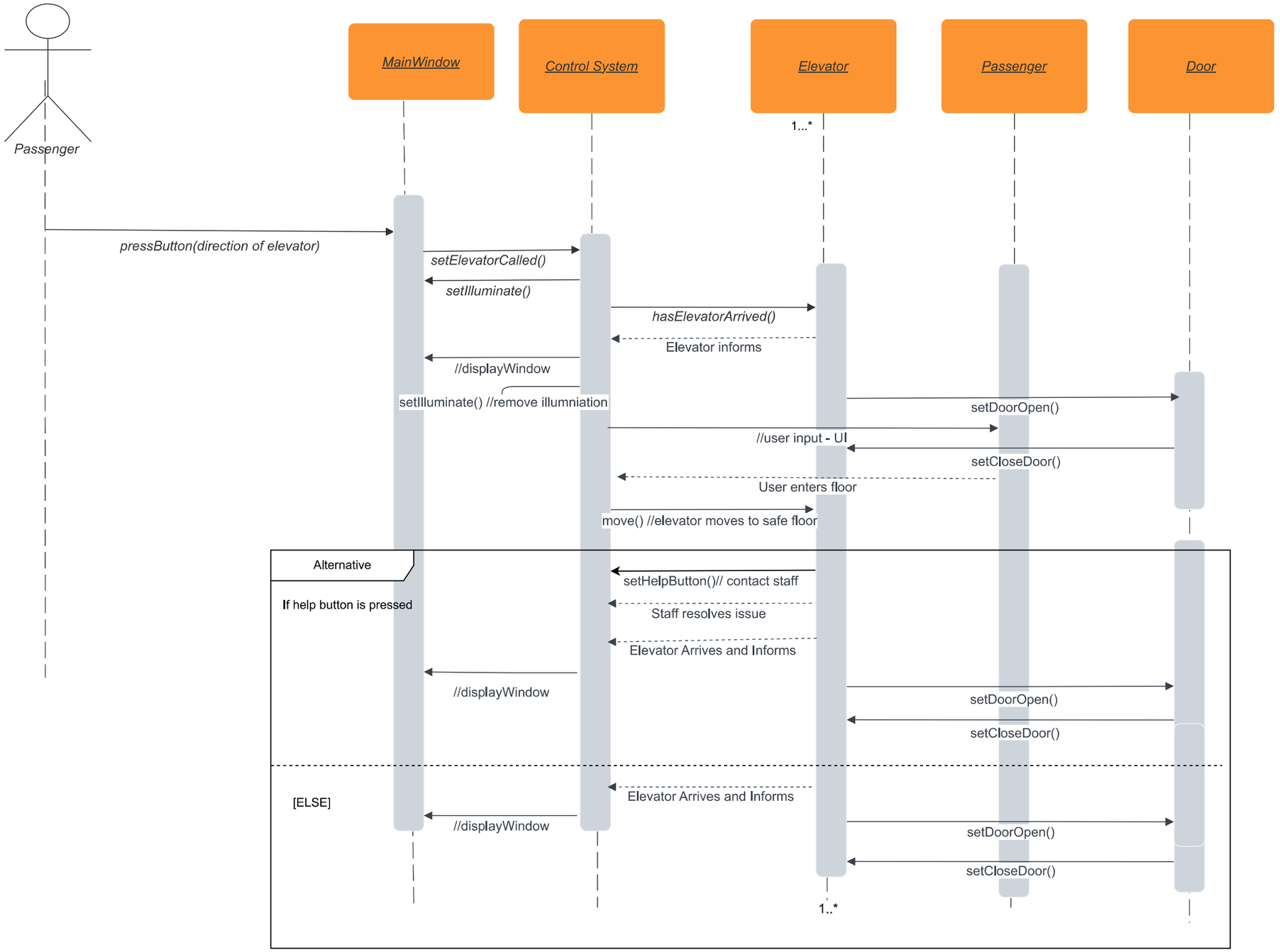
Overloaded Elevator Safety



Door Obstacle



Power Outage



Help Button is pressed