SOFTWARE REQUIREMENTS

Elevator System

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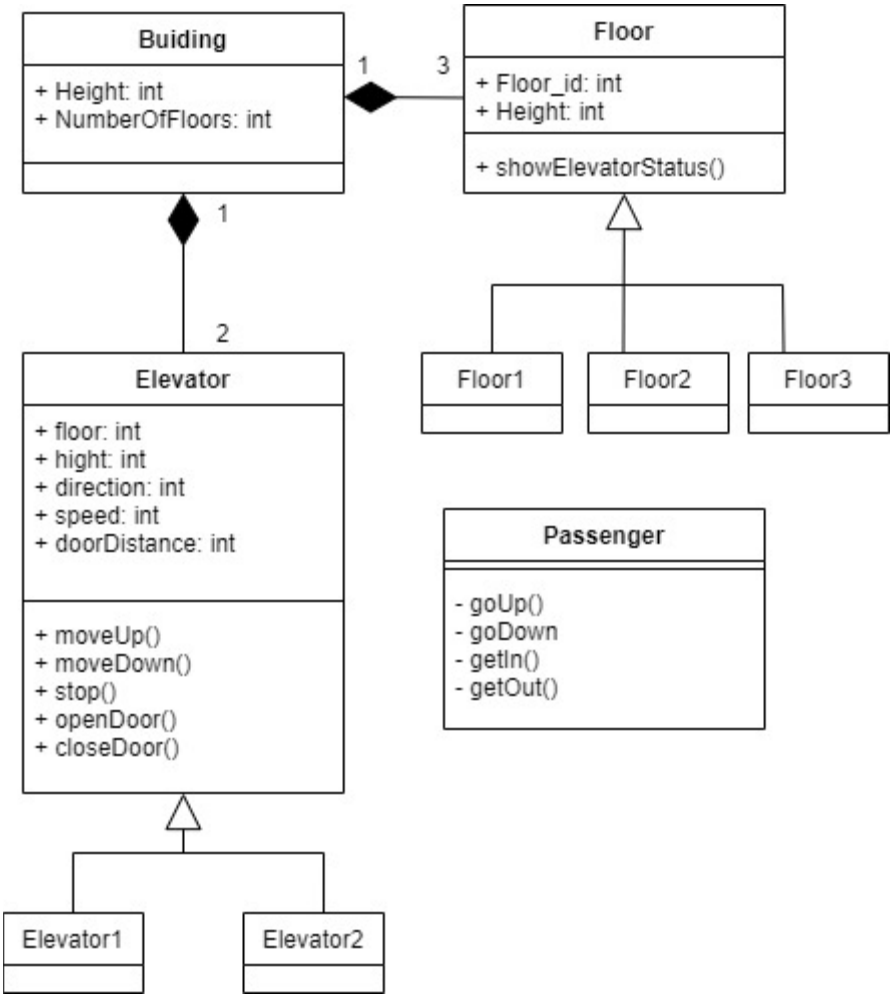
System Objective

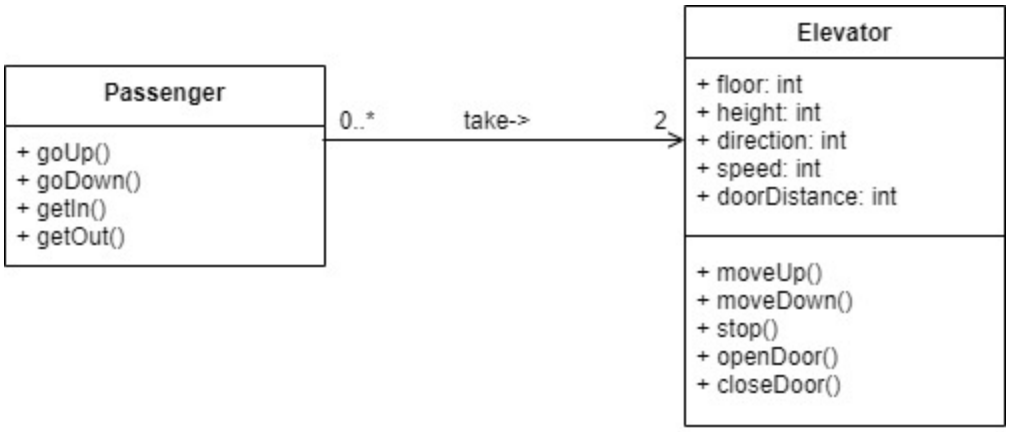
In this project, we are developing a software that can manage the movement of elevator automatically according to the passengers' selection. Through considering sensors on the elevator and flexibly scheduling on run, the system helps to improve the safety and efficiency of elevator, which can improve customer satisfaction.

Domain Analysis

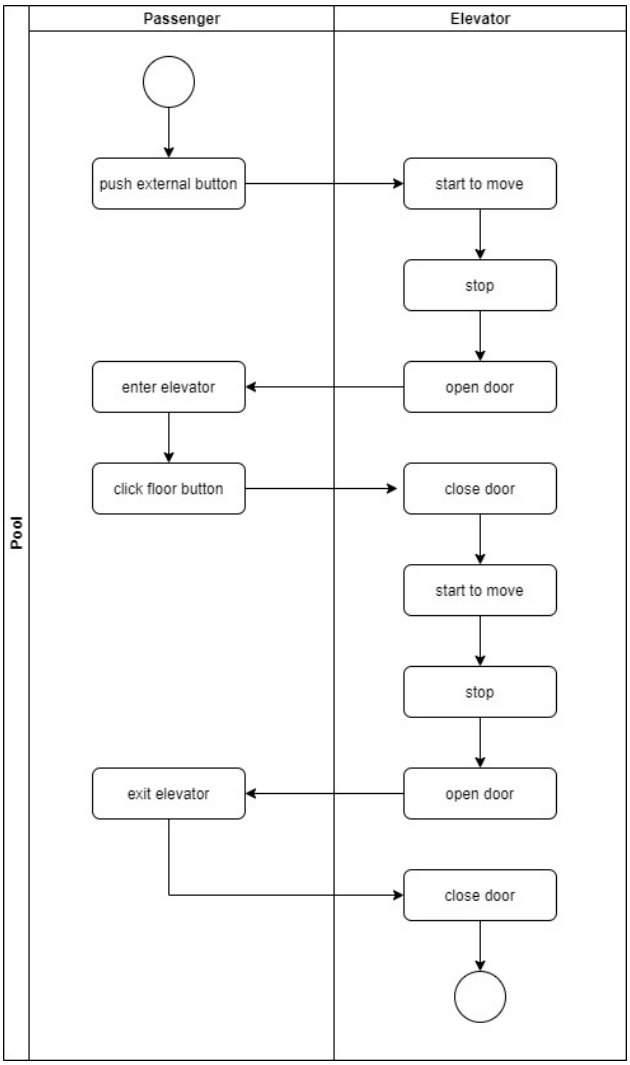
The participants of activities relating to elevator can be categorized into Passenger and Elevator.



The relationships among different participants are shown as follows:

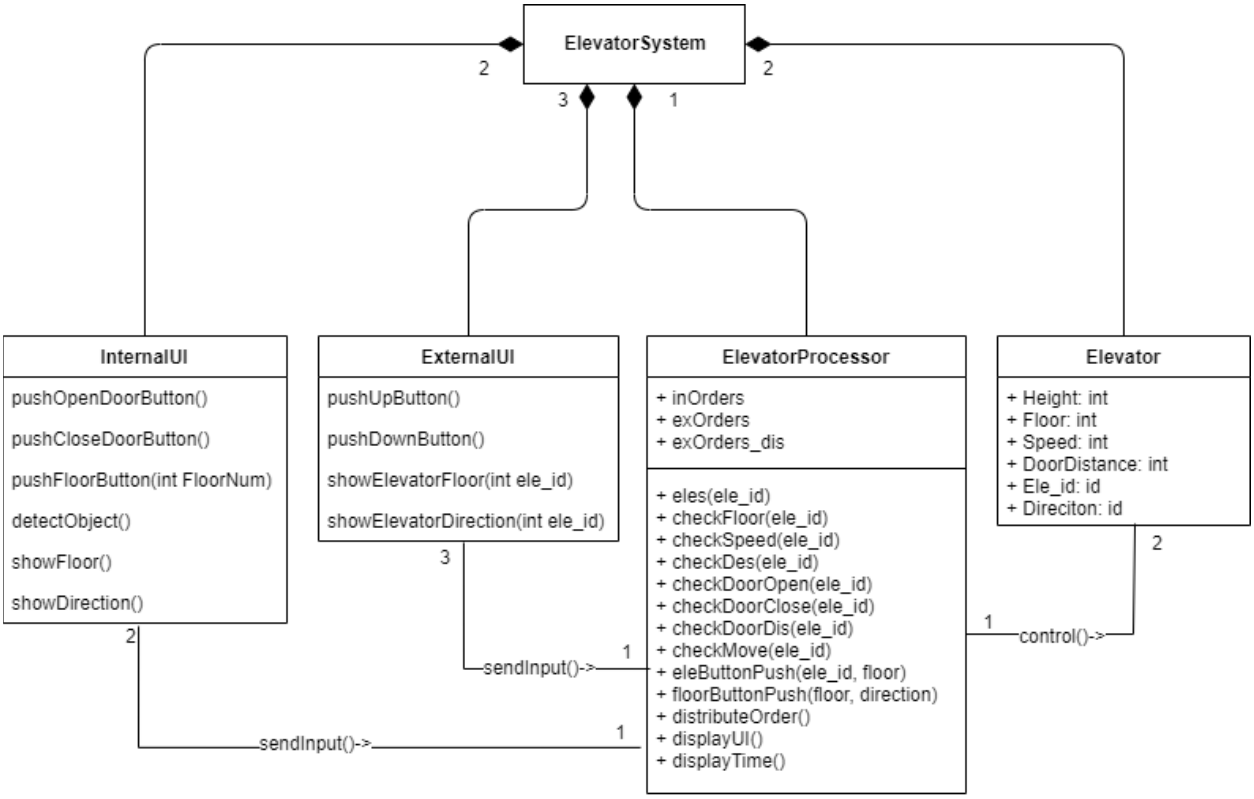


Here is the sequence of events for a passenger to take elevator:



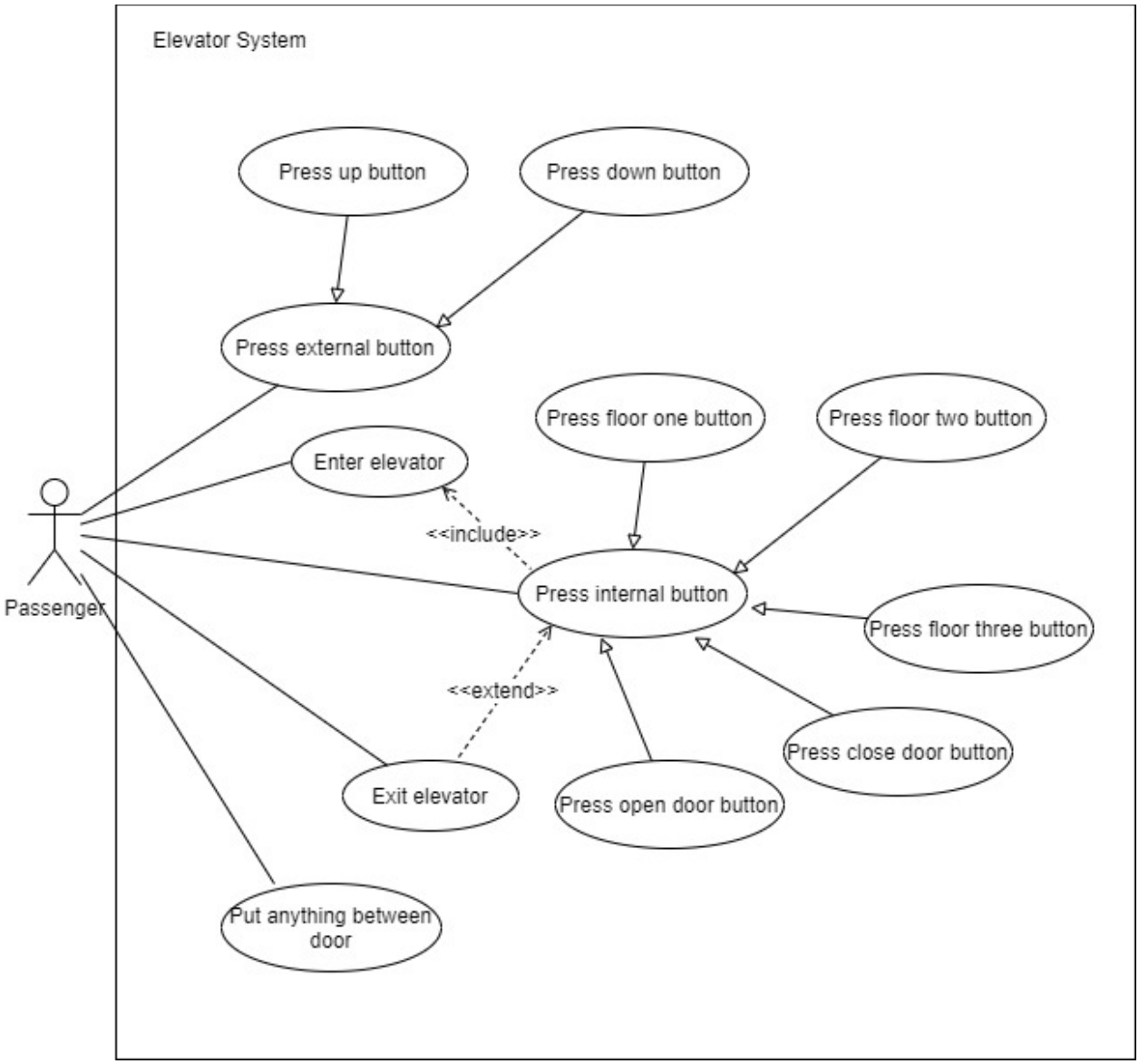
System Architecture

From the information above, we will design a software system that allows the passengers to choose which floor to go using interface in and outside elevators. The elevator can bring the passenger to target floor and display its status during running. The system architecture is shown below:



Use Cases

The system can achieve the following use cases from the passenger's and the elevator's perspectives:



Software Requirements

R1: ExternalUI

- R1.1: The passenger should be able to select up/down by tapping up/down button on the ExternalUI
- R1.2: The passenger should be able to know he/she is on which floor by referring to label on ExternalUI
- R1.3: The passenger should be able to know the status of the elevators:
    - R1.3.1: The passenger should be able to know the 2 elevators are on which floors by referring to ExternalUI

    - R1.3.2: The passenger should be able to know the movement status of the 2 elevators by referring to indicator light on the ExternalUI, e.g. Is the elevator's movement trend up or down, or it is idle.

R2: InternalUI

- R2.1: The passenger should be able to select buttons on the UI.
    - R2.1.1: The passenger should be able to choose which floor to go by tapping the 3 floor buttons on InternalUI
    - R2.1.2 : The passenger should be able to open the door of elevator by tapping the open-door button when the elevator is not moving up/down
    - R2.1.3: The passenger should be able to close the door of elevator by tapping the close-door button when the elevator is not moving up/down and the elevator door is not opening and the elevator doesn't detect any objects in the middle of the door and no one else intends to open the elevator door, e.g. tapping open-door button or tapping up/down button on ExternalUI
- R2.2: The passenger should be able to cancel his selection of floor by tapping the button again when the elevator is not moving
- R2.3: The passenger should be able to know the status of the elevator
    - R2.3.1: The passenger should be able to know the elevator is on which floor by referring to InternalUI
    - R2.3.2: The passenger should be able to know the movement status of the elevator by referring to InternalUI, e.g. Is its movement trend up or down, or it is idle

R3: ElevatorProcessor

- R3.1: The ElevatorProcessor should be able to schedule the elevator efficiently
    - R3.1.1: The passenger should finally arrive at the target floor
    - R3.1.2: The ElevatorProcessor should let the nearer elevator handle the order when the two elevators are idle
    - R3.1.3: The ElevatorProcessor should let the elevator handle the order in passing
    - R3.1.4: The ElevatorProcessor should let the faster elevator handle the order when the 2 elevators are moving in the same direction
- R3.2: The ElevatorProcessor should be able to schedule the elevator safely
    - R3.2.1: The ElevatorProcessor should force the door of elevator to open if any object is detected in the middle of the door when the elevator is not in movement
    - R3.2.2: The ElevatorProcessor should make the priority of opening the door of elevator greater than the priority of closing the door, i.e. it is useless to tap close-door button when the door is opening or when the door is intended to open
    - R3.2.3: The ElevatorProcessor should force the door of elevator closed when the elevator is in movement