SE-1108 Self Study-5

In this self-study, you are supposed to implement a simulation system that implements the interface **Simulatable ,** which we implemented in the lecture. The system is **Elevator System** of a building that has **N** floors. There are **M** elevators in the building. All elevators are identical (having the same set of characteristics) Each elevator is placed initially at the **zeroth floor.** One step of the simulation corresponds to one second. Elevators has certain capacities both for the number of persons and total weight (**EPC** and **EWC**) . An elevator can be either going up, down, waiting on a floor for a short time (**FWT**) or waits idle on the **zeroth floor**. Once an elevator goes up it goes all the way up the last floor and once an elevator starts going down it goes all the way down to the zeroth floor. Once an elevator arrives at zeroth floor it starts waiting idle until it is reactivated by the elevator system.

At each floor, at each second, a random number of people with random weights and random target floors are generated. The probability and the characteristics of this generation changes from floor to floor. From each floor, elevators are called for up and down directions by pressing the corresponding button. You can assume that call of the elevators are done by the people automatically as soon as they appear. An elevator stops at a floor while passing by, if there is a person in the elevator who needs to get off or there is a person at the floor who wants to get on. Otherwise the elevator passes the floor without stopping. When an elevator stops at a floor it waits there for a certain amount of time (**FWT**) It takes a certain amount of seconds (**FI**) for an elevator to move from a floor up or down to the next one. Each person has a certain patience (**PP**) which is determined randomly between (**PPMin**) and (**PPMax**).

Implement the necessary classes for the above-described simulation**.** Try to make design as flexible as possible by using interfaces and OOP mechanisms. Collect at least the following statistical data:

- Total number people carried by the elevator
- Average waiting time (in seconds)
- Total number of floors visited by all elevators
- Number of people who decide not to use the elevator because of too much waiting
- Average weight of the people who use the elevator

Implement a user friendly **SystemVisualizer** for the Elevator System that displays the collected data and states of objects in the Elevator System (i.e. elevators, floors etc.)

The following table lists some of the system parameters that are mentioned in the description above. Define those parameters as an attribute in the corresponding classes :

N		The number of floors
M		The number of elevators
EPC	Elevator Person Capacity	The number of person that an elevator can take at most.
EWC	Elevator Weight Capacity	The maximum weight that an elevator can carry at most

FWT	Floor Wait Time	The number of seconds that elevator waits at a floor if it stops at that floor
FI	Floor Interval	The number of seconds it takes for an elevator to go from one floor to the next
PP	Person Patience	The number of seconds a person waits for an elevator. It changes from person to person.
PPMin	Person Patience Minimum	The lower bound for the randomly generated patience value for a person (in seconds)
PPMax	Person Patience Maximum	The upper bound for the randomly generated patience value for a person (in seconds)

Important Note: If you find any information missing or ambiguous make your own assumption and implement it accordingly.