מטלה 0

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First Partie

1. Similar works from internet of the optimization of elevators :

- https://github.com/arunsingh16/Elevator-Control-System
- https://github.com/groverkaran11/elevator-control-system
- https://github.com/joeblau/sample-elevator-control-system
- https://github.com/bernadinm/elevator

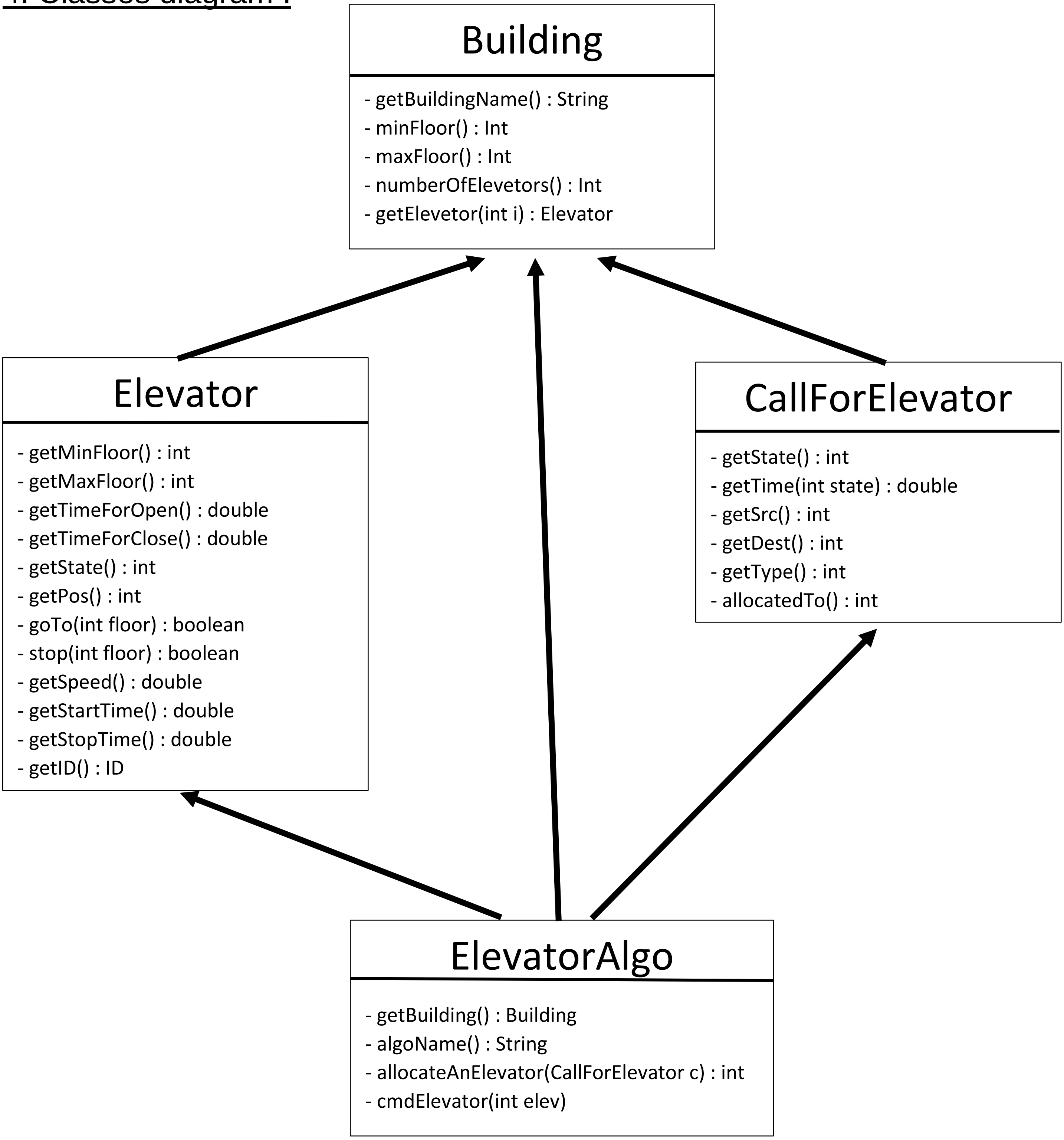
2. Off-line algorithm for the problem of allocating elevator calls :

- First, we built a priority queue for each elevator.
- Second, we will add to each reading what is the estimated time that the elevator will be on the source floor and what is the estimated time on the target floor.
- Then, we sort the readings according to the time of arrival at the source to the elevator with the fastest time.
- Then, we give for each elevator one reading and update in all the elevators the estimated time that the elevator will reach the source floor of the reading.
- And then, we adjust the reading with the lowest time to the appropriate elevator and update.
- At the end, we will continue with this operation for all the elevators.

3. The On-line algoithm of the same problem :

- First, the algorithm receives commands (a person presses on the floor where he wants to go, so if he wants to go up or down).
- Then, we check which elevator will get to whoever is calling it the fastest.
- And we send the command to the appropriate TreeSet (the objects or elements of the TreeSet are stored in natural order in ascending order).
- Then he tells to the elevator where to go.
- And at the end repeats itself until there are no new commands.

4. Classes diagram :



Building

- getBuildingName() : String
- minFloor() : Int
- maxFloor() : Int
- numberOfElevetors() : Int
- getElevetor(int i) : Elevator

Elevator

- getMinFloor() : int
- getMaxFloor() : int
- getTimeForOpen() : double
- getTimeForClose() : double
- getState() : int
- getPos() : int
- goTo(int floor) : boolean
- stop(int floor) : boolean
- getSpeed() : double
- getStartTime() : double
- getStopTime() : double
- getID() : ID

CallForElevator

- getState() : int
- getTime(int state) : double
- getSrc() : int
- getDest() : int
- getType() : int
- allocatedTo() : int

ElevatorAlgo

- getBuilding() : Building
- algoName() : String
- allocateAnElevator(CallForElevator c) : int
- cmdElevator(int elev)

5. JUnit :

For the Junit, we thought that we can do a check like that :

- Defining a building and an elevator.
- Check that the building and the elevator are the same as what we programmed.
- After that call the elevator from different floors and check that the elevator really go to our destination

Second Partie

Code results :

Case 0 : Code Owners,342615648,207029786, Case,0, Total waiting time: 232.9897426188186, average waiting time per call: 23.29897426188186, unCompleted calls,0, certificate, -813517077

Case 1 : Code Owners,342615648,207029786, Case,1, Total waiting time: 370.9897426188186, average waiting time per call: 37.09897426188186, unCompleted calls,5, certificate, -1421696096

Case 2 : Code Owners,342615648,207029786, Case,2, Total waiting time: 6904.792822120195, average waiting time per call: 69.04792822120194, unCompleted calls,8, certificate, -2465511085

Case 3 : Code Owners,342615648,207029786, Case,3, Total waiting time: 54295.53828433319, average waiting time per call: 135.73884571083298, unCompleted calls,18, certificate, -4466475151

Case 4 : Code Owners,342615648,207029786, Case,4, Total waiting time: 55701.45536864207, average waiting time per call: 111.40291073728415, unCompleted calls,5, certificate, -4239674004

Case 5 : Code Owners,342615648,207029786, Case,5, Total waiting time: 215979.12115705133, average waiting time per call: 215.97912115705134, unCompleted calls,83, certificate, -12165830144

Case 6 : Code Owners,342615648,207029786, Case,6, Total waiting time: 204135.88209694886, average waiting time per call: 204.13588209694885, unCompleted calls,60, certificate, -4896926725

Case 7 : Code Owners,342615648,207029786, Case,7, Total waiting time: 373061.1211570521, average waiting time per call: 373.0611211570521, unCompleted calls,127, certificate, -146111902046

Case 8 : Code Owners,342615648,207029786, Case,8, Total waiting time: 320257.88209694886, average waiting time per call: 320.25788209694883, unCompleted calls,92, certificate, -32120084346

Case 9 : Code Owners,342615648,207029786, Case,9, Total waiting time: 240971.3400743125, average waiting time per call: 240.9713400743125, unCompleted calls,56, certificate, -6713622796