Asst. Prof. Dr. M. Amaç Güvensan

ELEVATOR SIMULATOR

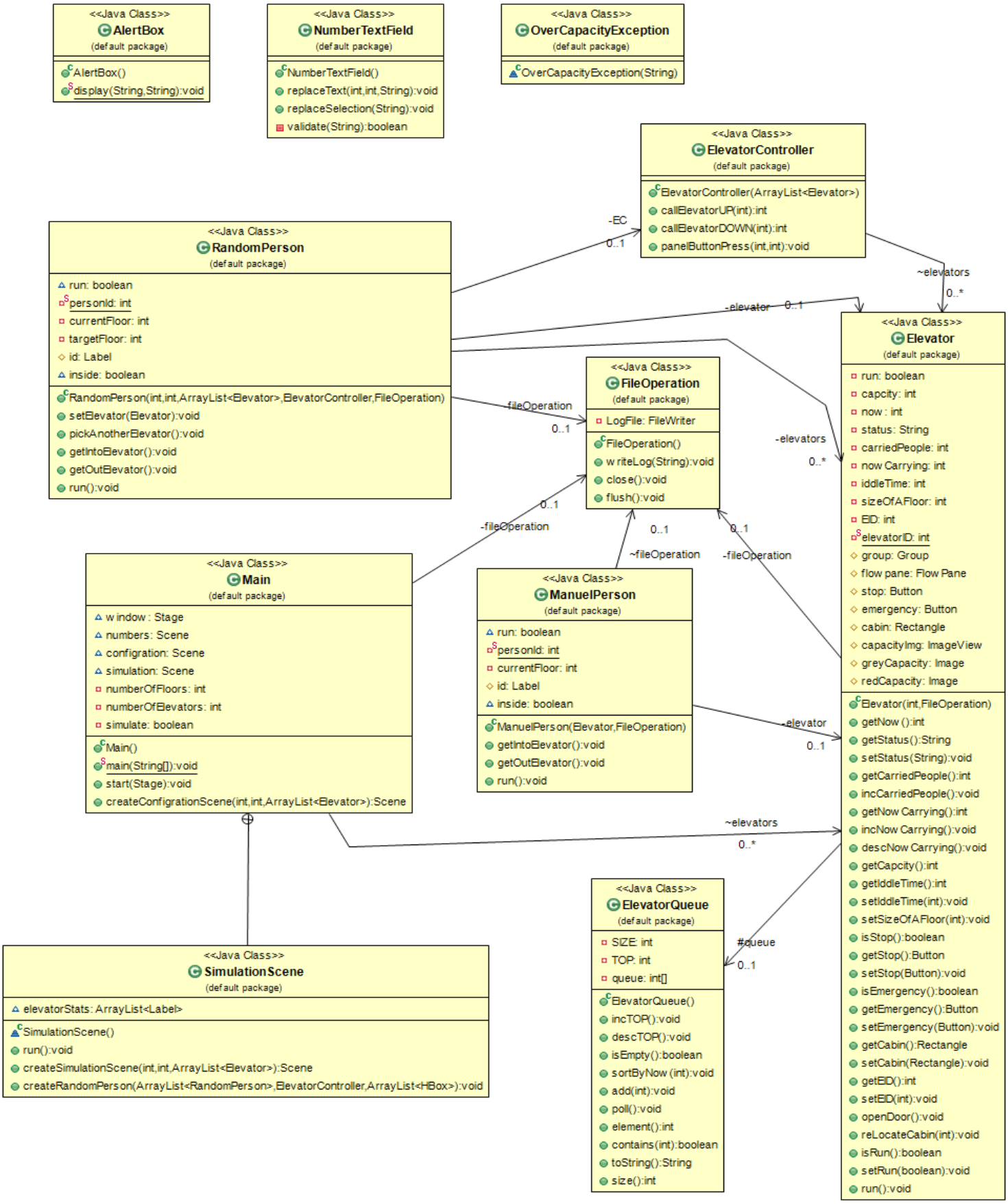
Due on Tuesday, June 07, 2016

İbrahim Cemal Taşkıran - 14011066

ABSTRACT

This project is elevator simulation system. The system which has a GUI is designed with JavaFX. System has 2 modes which are Manuel and Automatic. In manual mode user can control everything. In Automatic mode user cannot control anything, the system runs own by own. There are limitations like maximum floor number is 20 and maximum elevator number is 4. Elevator's control panel shows over capacity warning, total carried people, queue list of elevator, total idle time and status of elevator. The system keeps a log file including these information: every elevator's route, every traveler's route and over capacity exceptions.

UML


<<Java Class>>
AlertBox
(default package)
AlertBox()
display(String,String):void
<<Java Class>>
NumberTextField
(default package)
NumberTextField()
replaceText(int,int,String):void
replaceSelection(String):void
validate(String):boolean
<<Java Class>>
OverCapacityException
(default package)
OverCapacityException(String)
<<Java Class>>
ElevatorController
(default package)
ElevatorController(ArrayList<Elevator>)
callElevatorUP(int):int
callElevatorDOWN(int):int
panelButtonPress(int,int):void
<<Java Class>>
RandomPerson
(default package)
run: boolean
personId: int
currentFloor: int
targetFloor: int
id: Label
inside: boolean
RandomPerson(int,int,ArrayList<Elevator>,ElevatorController,FileOperation)
setElevator(Elevator):void
pickAnotherElevator():void
getIntoElevator():void
getOutElevator():void
run():void
-EC
0..1
~elevators
0..*
-elevator
0..1
<<Java Class>>
Elevator
(default package)
run: boolean
capcity: int
now : int
status: String
carriedPeople: int
now Carrying: int
iddleTime: int
sizeOfAFloor: int
EID: int
elevatorID: int
group: Group
flow pane: Flow Pane
stop: Button
emergency: Button
cabin: Rectangle
capacityImg: ImageView
greyCapacity: Image
redCapacity: Image
Elevator(int,FileOperation)
getNow ():int
getStatus():String
setStatus(String):void
getCarriedPeople():int
incCarriedPeople():void
getNow Carrying():int
incNow Carrying():void
descNow Carrying():void
getCapcity():int
getIddleTime():int
setIddleTime(int):void
setSizeOfAFloor(int):void
isStop():boolean
getStop():Button
setStop(Button):void
isEmergency():boolean
getEmergency():Button
setEmergency(Button):void
getCabin():Rectangle
setCabin(Rectangle):void
getEID():int
setEID(int):void
openDoor():void
reLocateCabin(int):void
isRun():boolean
setRun(boolean):void
run():void
<<Java Class>>
FileOperation
(default package)
LogFile: FileWriter
FileOperation()
w riteLog(String):void
close():void
flush():void
fileOperation
0..1
-elevators
0..*
-fileOperation
0..1
0..1
~fileOperation
0..1
-fileOperation
<<Java Class>>
Main
(default package)
w indow : Stage
numbers: Scene
configration: Scene
simulation: Scene
numberOfFloors: int
numberOfElevators: int
simulate: boolean
Main()
main(String[]):void
start(Stage):void
createConfigrationScene(int,int,ArrayList<Elevator>):Scene
<<Java Class>>
ManuelPerson
(default package)
run: boolean
personId: int
currentFloor: int
id: Label
inside: boolean
ManuelPerson(Elevator,FileOperation)
getIntoElevator():void
getOutElevator():void
run():void
-elevator
0..1
~elevators
0..*
<<Java Class>>
ElevatorQueue
(default package)
SIZE: int
TOP: int
queue: int[]
ElevatorQueue()
incTOP():void
descTOP():void
isEmpty():boolean
sortByNow (int):void
add(int):void
poll():void
element():int
contains(int):boolean
toString():String
size():int
#queue
0..1
<<Java Class>>
SimulationScene
(default package)
elevatorStats: ArrayList<Label>
SimulationScene()
run():void
createSimulationScene(int,int,ArrayList<Elevator>):Scene
createRandomPerson(ArrayList<RandomPerson>,ElevatorController,ArrayList<HBox>):void

SOLUTION

This program is a GUI program. When I build GUI I used JavaFX. All GUI components are built by handmade. Main class has GUI components. Main class has 3 scenes those are numbers, configuration and simulation. At numbers scene user inputs number of floors and number of elevators. At configuration scene user inputs capacity of each elevator and can add stop and emergency buttons. At simulation scene has all simulation GUI components. This scene is very complex. It has control panels, paths of elevators, control buttons, information panels.

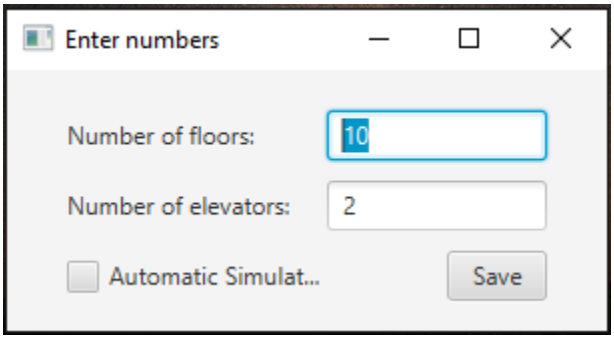
Elevator can call by user or system; it depends on manual or automatic mode. In manual mode user can add traveler to any elevator and user can remove any person from elevator. In automatic mode system runs by own. Every elevator is a thread. So every elevator can relocate separately. When a traveler is created it generates a target floor and a current floor. This traveler calls an elevator.

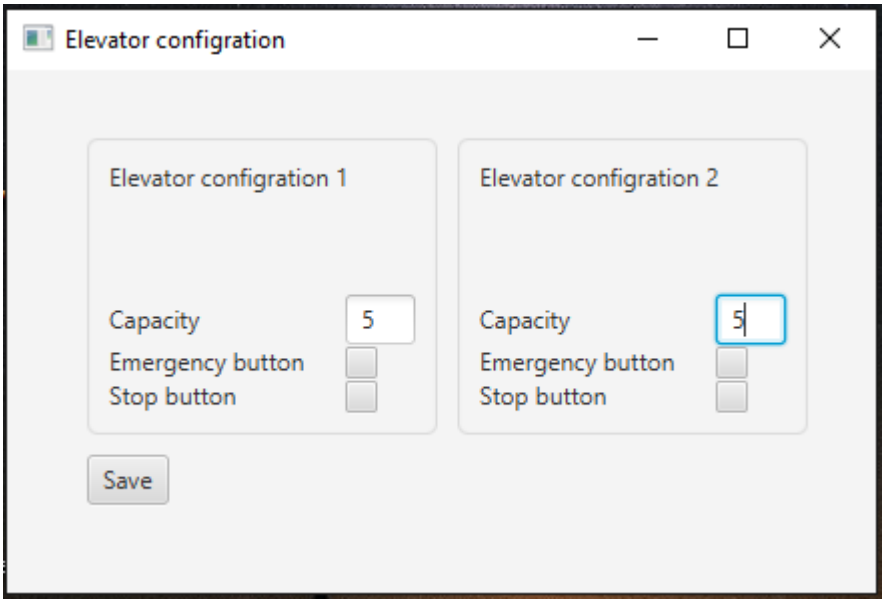
Every move of elevator and a traveler is logged in a file. This file contains time information of a processes and what happened at this time. You can see when a traveler got into to elevator and when a traveler got out from elevator. You can see when an elevator is idle.

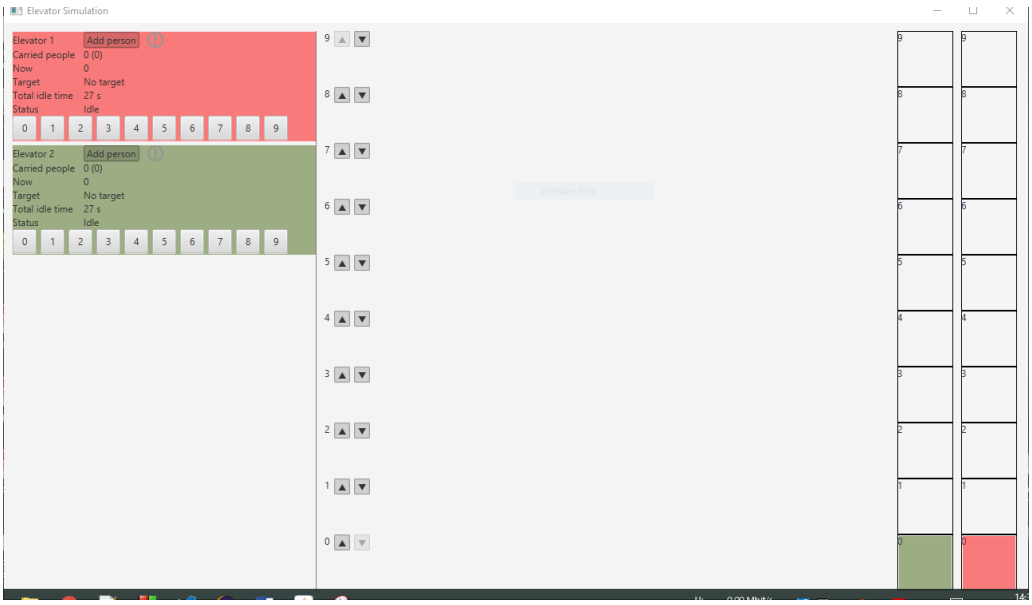
I used event handling techniques for button and label clicks. I used ArrayList for keeping objects. I used multi-threading technique to move of elevator separately. I used Labels, Buttons, Panes, VBoxes, HBoxes for GUI.

SECRENSHOTS

MANUAL MODE

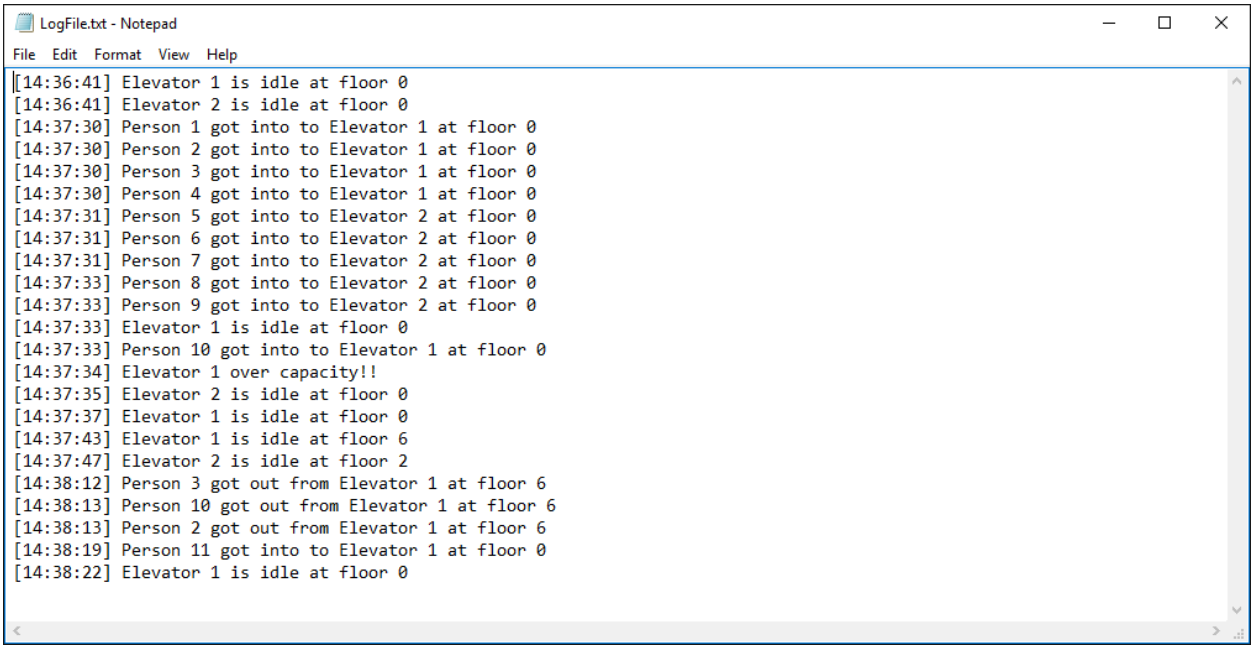






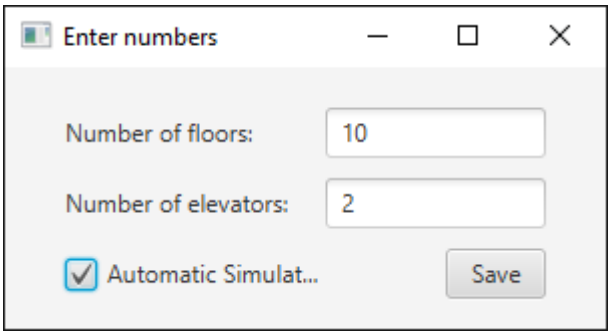
SECRENSHOTS

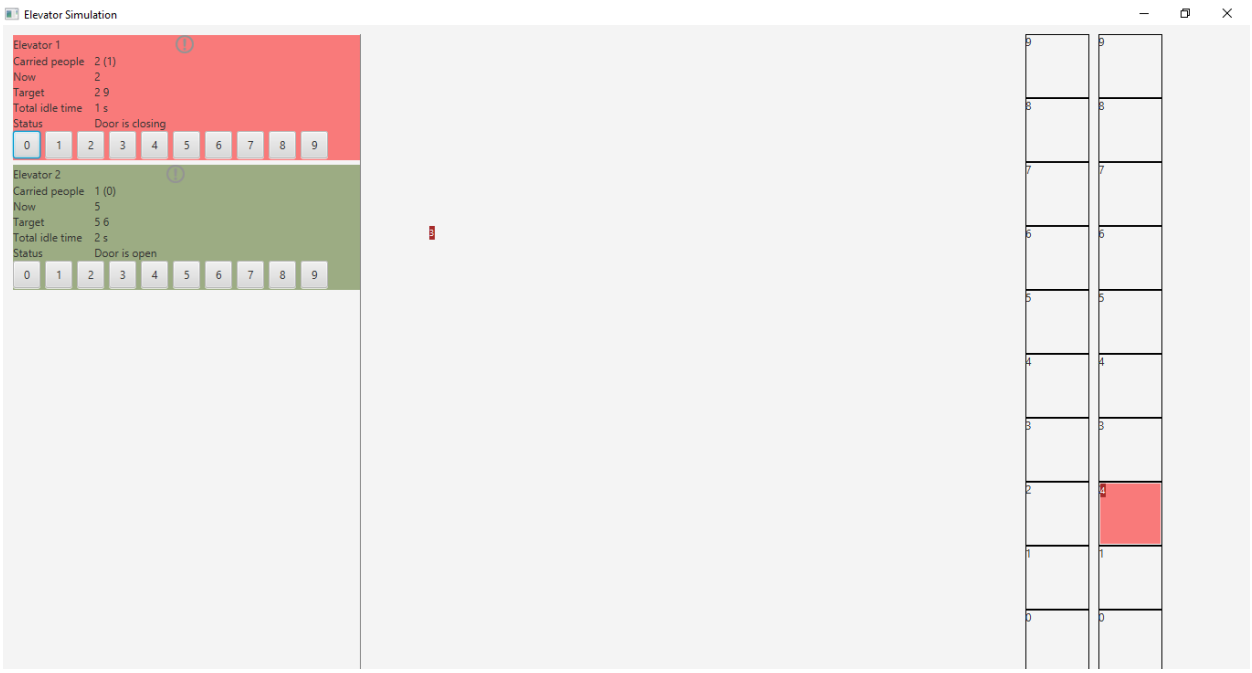
MANUAL MODE



SECRENSHOTS

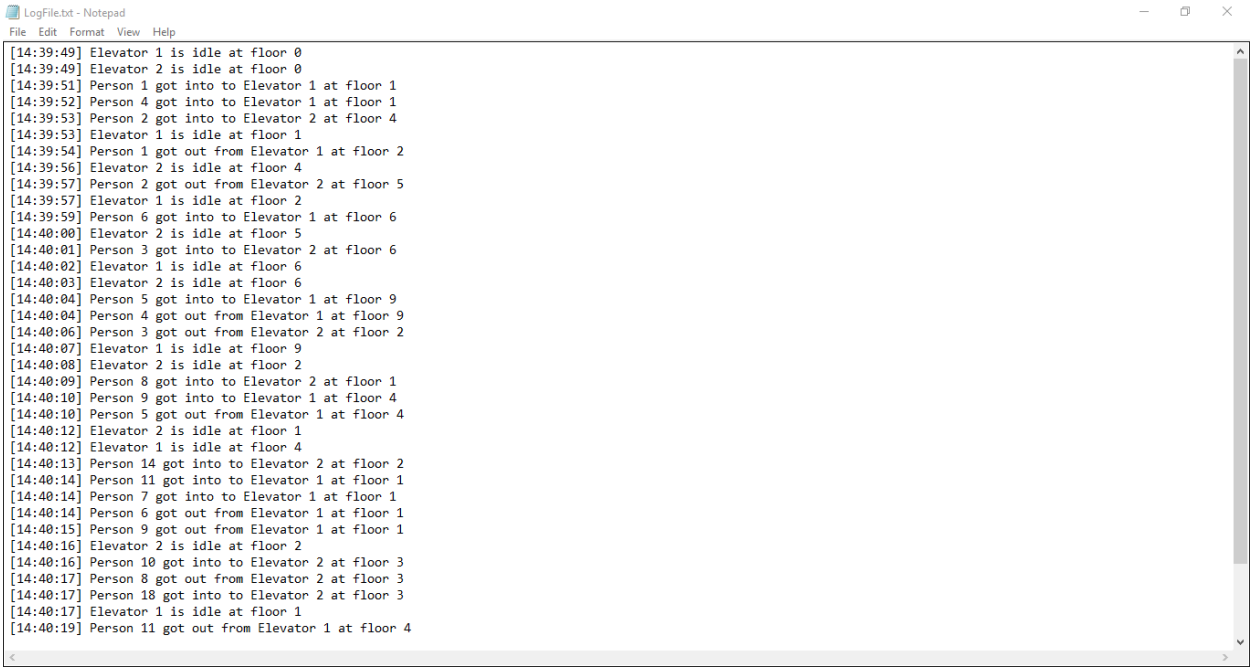
AUTOMATIC MODE





SECRENSHOTS

AUTOMATIC MODE



REFERENCES

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2- http://www.javatpoint.com/java-tutorial
3- http://www.tutorialspoint.com/java/
4- https://docs.oracle.com/javase/tutorial/
5- https://docs.oracle.com/javase/8/javafx/get-started-tutorial/jfx-overview.htm

ICONS

1- https://thenounproject.com/