Gebze Technical University Computer Engineering

CSE222/Homework 3 Report

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Part one : Definition of the problem and requirements

a)Definition of the problem:

There is a city which has only one straight street.For this city,there can be 4 types structures those are playgrounds and three kind of building types(offices,markets and houses).
For planning which structures will be build and which structures will be destroyed on this city,a city planning software is needed.

a)Requirements:

This software must be able to simulate the building and destruction operations.This simulation must show that how construction or destruction of the structure will effect the city or even if it can be done or not.This software also must show all simulated information and simulated image of the city. This program also must be able to run under 4 modes.These modes keeps Street information as:

-Simple array

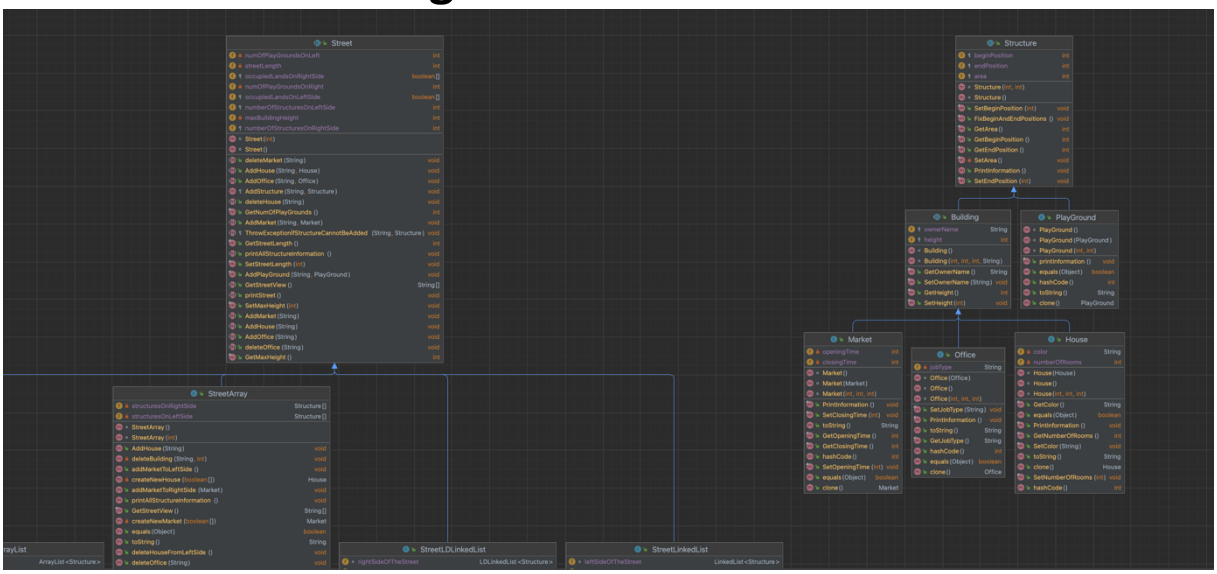
-Array List

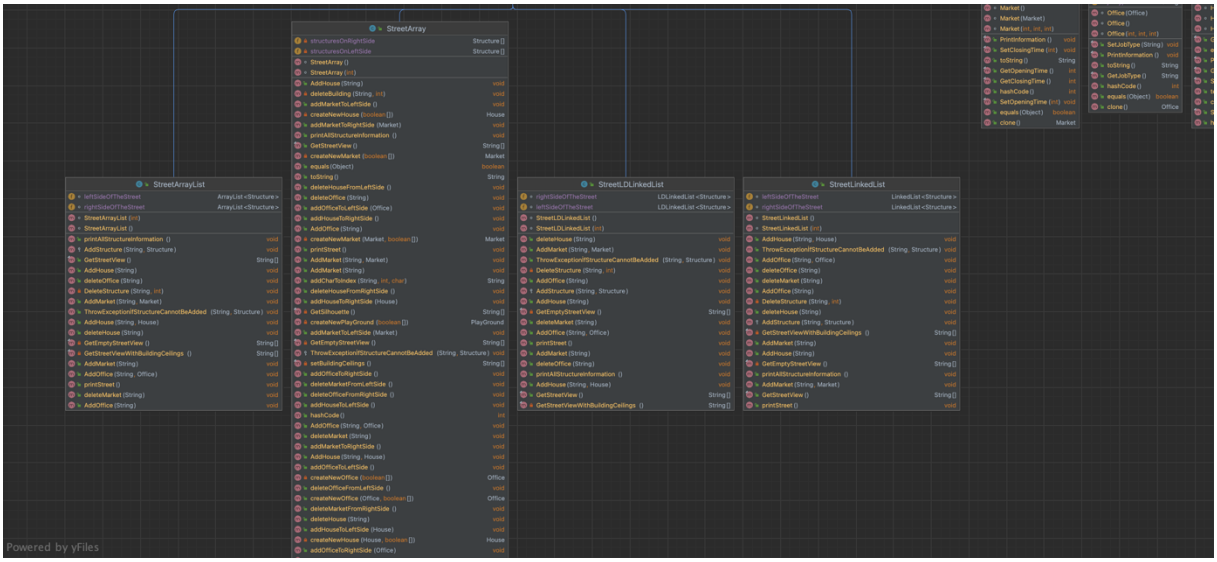
-Linked List

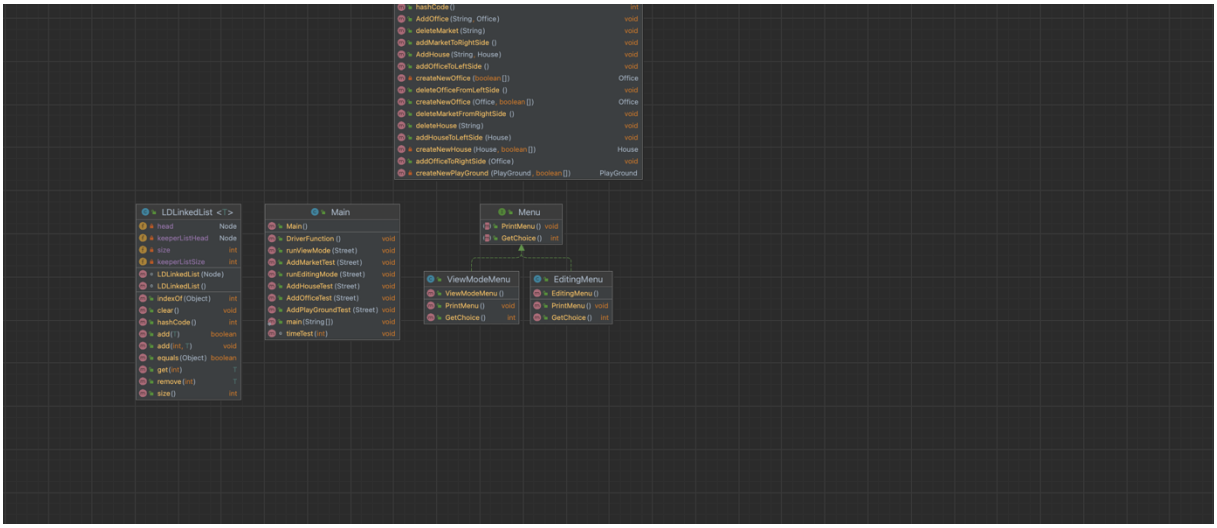
-LDLinkedList(User defined container class)

This program also must be checked for it’s time complexity.

Part two : Class Diagrams







Part three : Problem solution approach

I defined a Street abstract class and this class keeps occupied lands as boolean arrays,Street length , number of playgrounds added, maximum building height and number of the added structures for both sides.

I defined StreetArray,StreetArrayList,StreetLinkedList and StreetLDLinkedList classes and these extends Street class and these implements abstract methods from this class.These classes keeps structures in different types of containers.

I defined a LDLinkedList class as container for structure objects.

I defined a abstract Structure class because playgrounds are not building and has begin position,end position and area properties same with the three buildings.

I defined PlayGround class that inherits from Structure class that represents a playground.

I defined a abstract Building class for three type of the buildings.

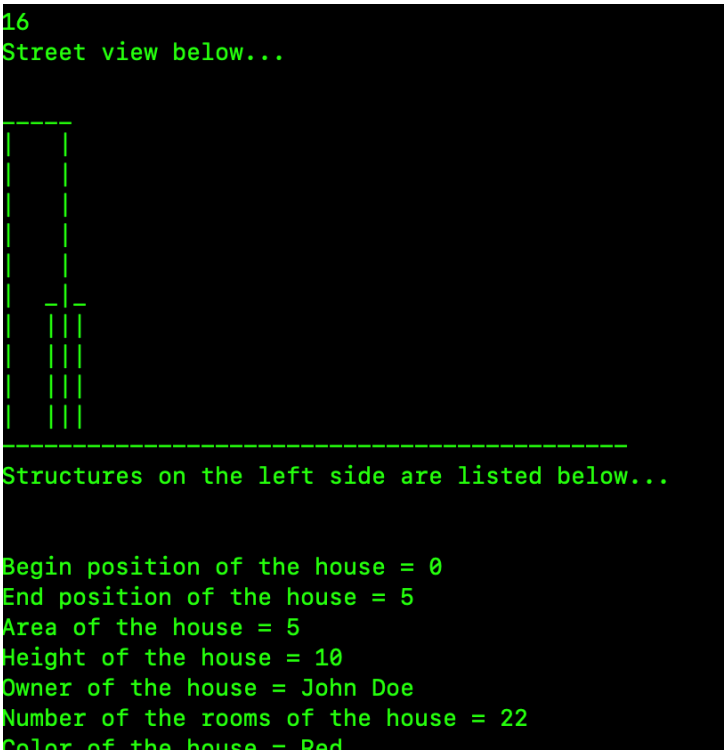
I defined Office,House and Market classes with necessary data, setters and getters.

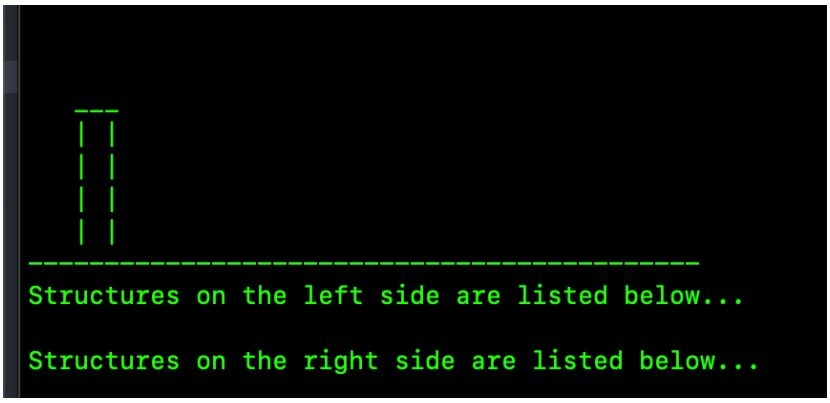
I made functions to throw error within the child classes of the Street class.If user wants to add structure to the city which is not possible,error occurs. Add functions in child classes of Street class throws exception if there is an error and if there is no problem with the object,created/given object gets added to the corresponding side of the Street.

Part four : Test Cases

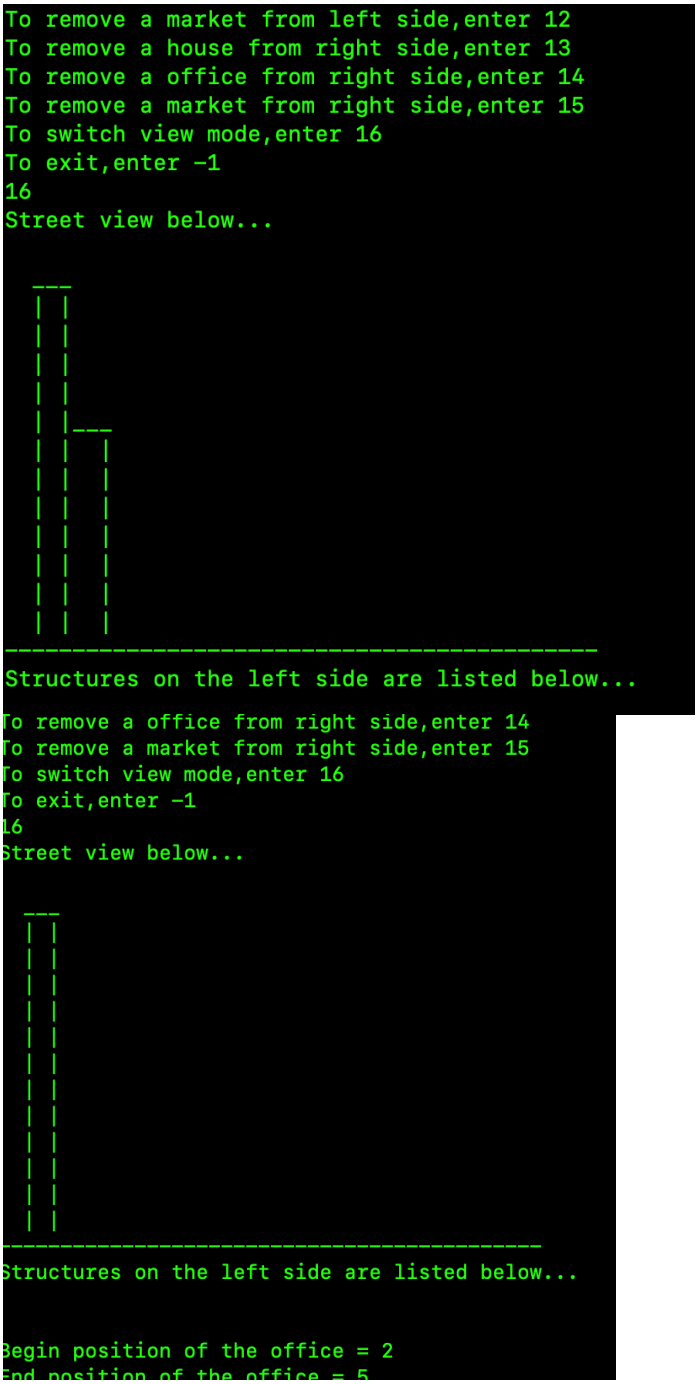
```
To start program in LDLinkedList mode,enter 3
To start program in ArrayList mode,enter 4
To start program in time test mode,enter 5
Your choice -->5
1190337 time elapsed for multiplier 1 for simple array
390860 time elapsed for multiplier 1 for array list
404092 time elapsed for multiplier 1 for linked list
397327 time elapsed for multiplier 1 for LDLinkedList


7190640 time elapsed for multiplier 10 for simple array
1688840 time elapsed for multiplier 10 for array list
1997267 time elapsed for multiplier 10 for linked list
4083221 time elapsed for multiplier 10 for LDLinkedList


190429406 time elapsed for multiplier 100 for simple array
2019613 time elapsed for multiplier 100 for array list
2095785 time elapsed for multiplier 100 for linked list
117434578 time elapsed for multiplier 100 for LDLinkedList
```

Experimental results fort the program's time complexity.

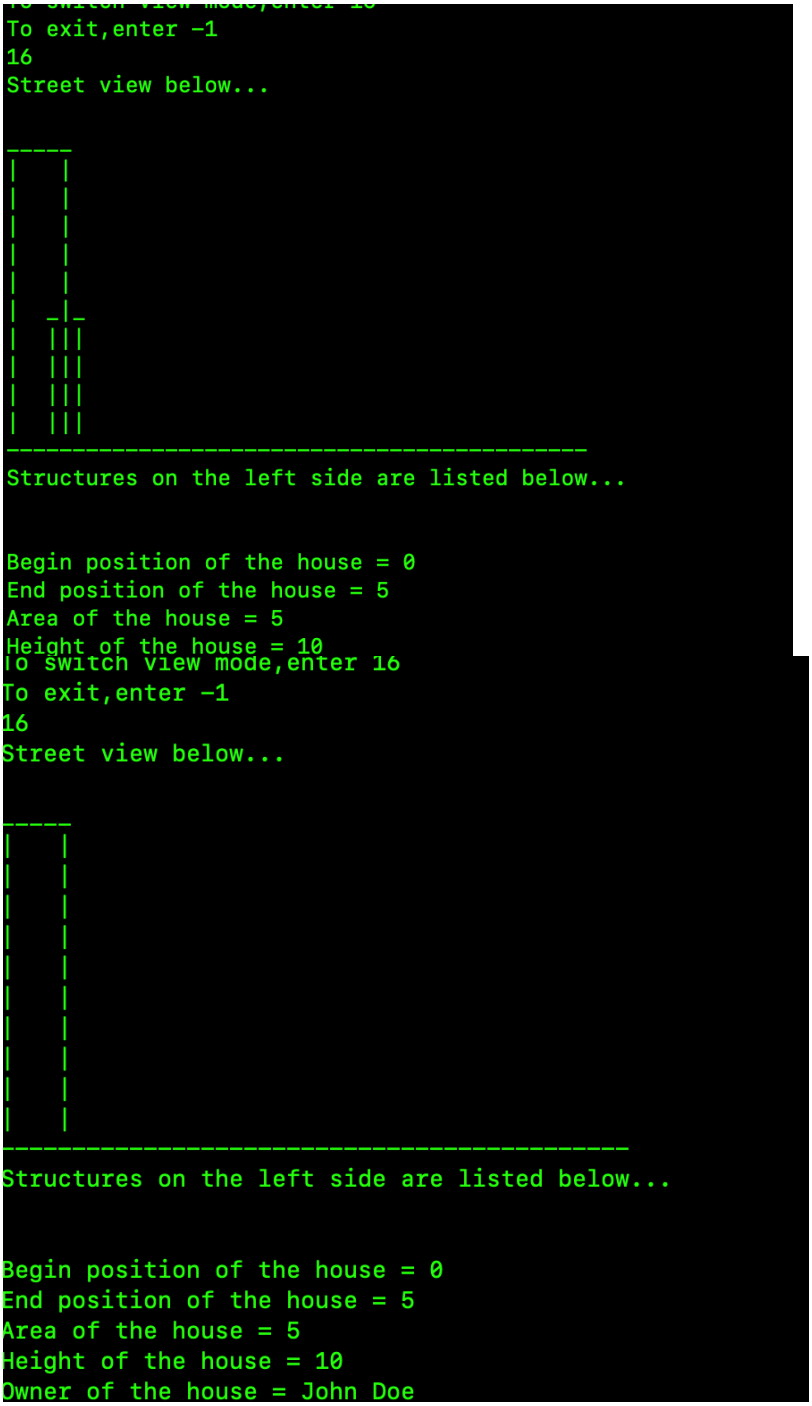




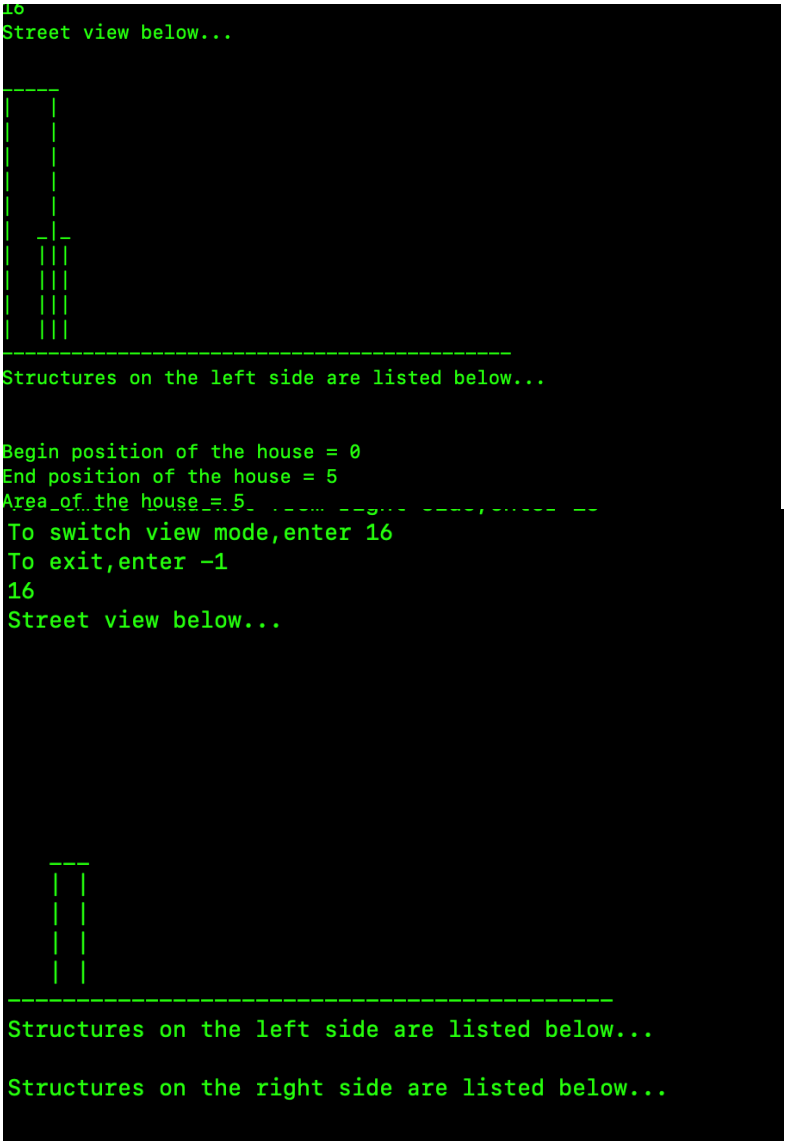
Add and remove functions tested for simple array.



Add and remove functions tested for array list.



Add and remove functions tested for LinkedList



Add and remove functions tested for LDLinkedList