GIT Department of Computer Engineering
CSE 222/505 - Spring 2022
Homework #01 Report

Mert Gürşimşir
1901042646

1. SYSTEM REQUIREMENTS

Firstly, this is a city planning software that will be used for designing a small one street town. There should be a street:

```
street = new StreetArray(60);
```

Street needs to be given proper length. Proper means it cannot be negative otherwise there will be exception specifies that issue.

```
street.add(new House(0, 10, 0, 10, 5, "Blue", "Erdogan Hoca"));
street.add(new Office(0, 10, 10, 7, "Cyber Security", "Mert"));
street.add(new Market(0, 5, 25, 5, "08:00", "21:00", "Burak Hoca"));
street.add(new Playground(0, 10, 30));
street.add(new Market(0, 5, 40, 4, "09:00", "22:00", "Zuckerberg"));
street.add(new Office(0, 15, 45, 8, "Law Firm", "Mandela"));
street.add(new Market(1, 10, 5, 12, "07:00", "23:00", "Murakami"));
street.add(new Office(1, 15, 15, 14, "Quantum Computing", "Feynman"));
```

Then, system can accept buildings. They can be added to street with their length, position, side, height, and any other type specific properties. Here, buildings that does not fit in the street according to their position and length values will cause to an exception. Any other unproper values (like giving 5 as side value instead of 0 or 1) will also cause to an exception.

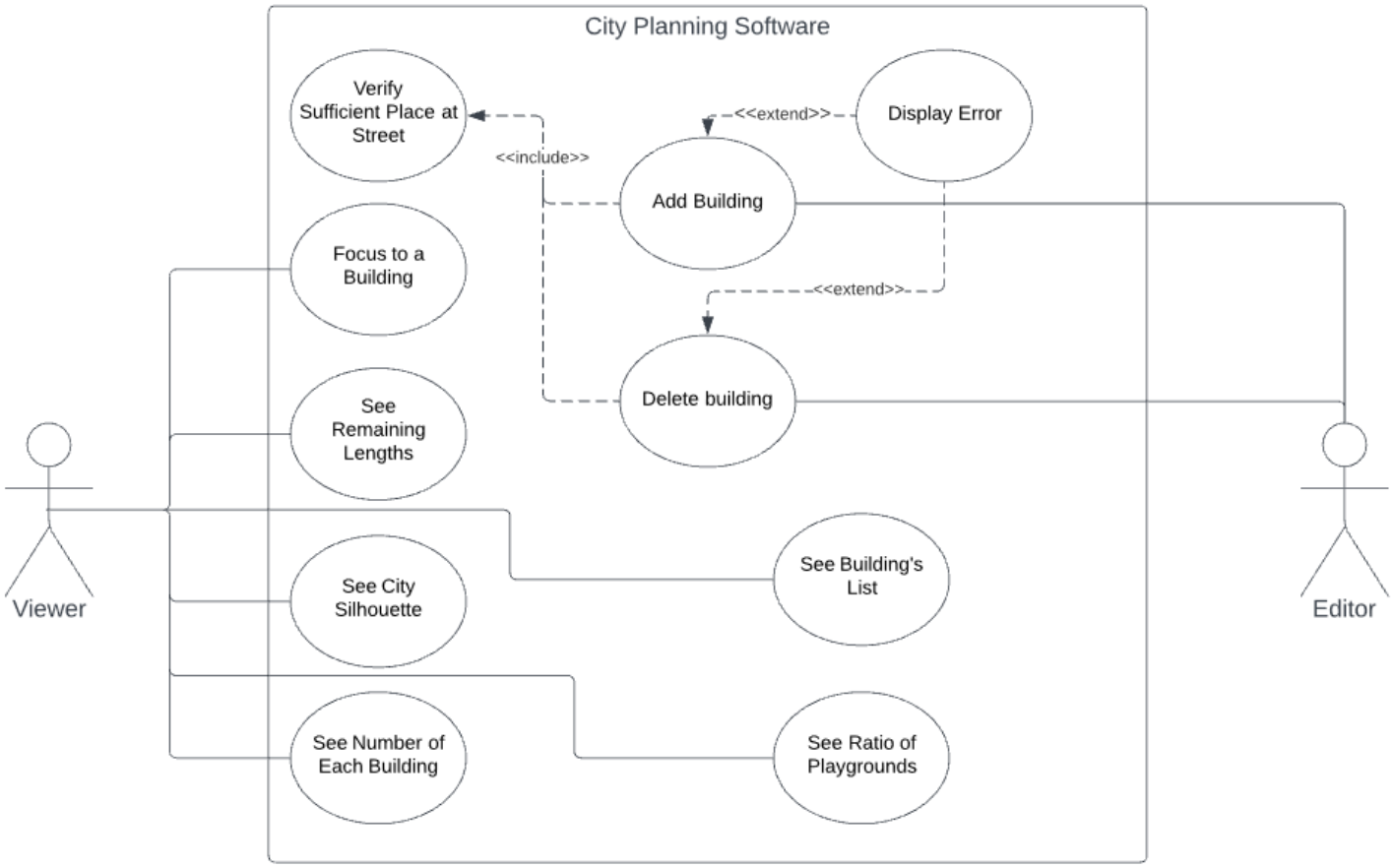
```
street.delete(0, 10);
```

As shown above, system can delete any of the buildings in the street by looking its side, and position value respectively. Here, empty spaces or any other unproper values will cause an exception.

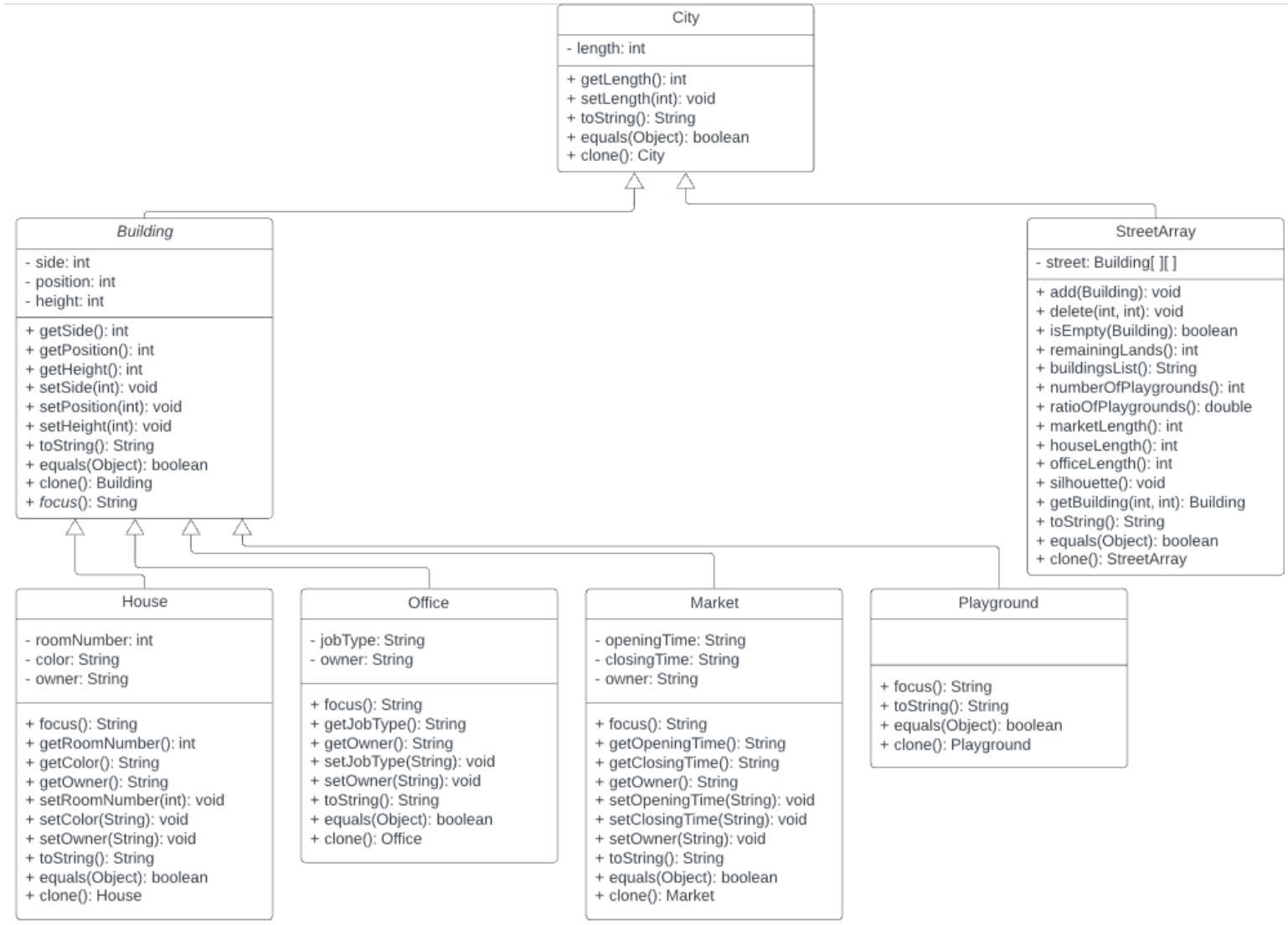
After these processes, your city planning software is ready to use.

2. **USE CASE AND CLASS DIAGRAMS**

a. USE CASE DIAGRAM



b. CLASS DIAGRAM



3. PROBLEM SOLUTION APPROACH

Firstly, I can only use Arrays so it was not easy to not using the data structure. So I have implemented a StreetArray class which is kind of a container to keep an array for all the Building class types. All other types (like house) are “is-a” Building so I can easily put them in that array.

Before anything else, I have planned all the structure in my head and then draw my thoughts. It was not easy to find a way to use only 1 main class and derive others from it. After those thinking process, I found a way. Every item (street, house, office, market, playground) has 1 common property which is length. So I created 1 base class to keep this length and also getters, setters, etc. After that I have derived “Buildings” and “StreetArray” class from it. Then it was not so hard to using StreetArray as container and keep Buildings in it. There are also 4 subclasses of Buildings which are “House”, “Office”, “Market”, and “Playground”.

4. TEST CASES

Create a street

```
street = new StreetArray(60);
```

Adding buildings to street

```
street.add(new House(0, 10, 0, 10, 5, "Blue", "Erdogan Hoca"));
street.add(new Office(0, 10, 10, 7, "Cyber Security", "Mert"));
street.add(new Market(0, 5, 25, 5, "08:00", "21:00", "Burak Hoca"));
street.add(new Playground(0, 10, 30));
street.add(new Market(0, 5, 40, 4, "09:00", "22:00", "Zuckerberg"));
street.add(new Office(0, 15, 45, 8, "Law Firm", "Mandela"));
street.add(new Market(1, 10, 5, 12, "07:00", "23:00", "Murakami"));
street.add(new Office(1, 15, 15, 14, "Quantum Computing", "Feynman"));
```

Trying functionalities

```
System.out.println("A street whose length is 60 is created and 8 new buildings have been added to it.");
System.out.printf("List of the buildings: %s", street.buildingsList());
System.out.printf("\nSilhouette of the street:\n");
street.silhouette();
System.out.printf("Total remaining length of lands on street: %s\n", street.remainingLands());
System.out.printf("Number of playgrounds in the street: %d\n", street.numberOfPlaygrounds());
System.out.printf("Ratio of playgrounds in the street: %f\n", street.ratioOfPlaygrounds());
System.out.printf("Total length of the street occupied by markets: %d\n", street.marketLength());
System.out.printf("Total length of the street occupied by houses: %d\n", street.houseLength());
System.out.printf("Total length of the street occupied by offices: %d\n", street.officeLength());
```

Delete some buildings

```
System.out.println("Now delete buildings that belong to Mert, Zuckerberg, Mandela, and Murakami.");
street.delete(0, 10); street.delete(0, 40); street.delete(0, 45); street.delete(1, 5);
```

Retry functionalities

```
System.out.println("\nNow try functionalities again.\n------------------------------");
System.out.printf("List of the buildings: %s", street.buildingsList());
System.out.printf("\nSilhouette of the street:\n");
street.silhouette();
System.out.printf("Total remaining length of lands on street: %s\n", street.remainingLands());
System.out.printf("Number of playgrounds in the street: %d\n", street.numberOfPlaygrounds());
System.out.printf("Ratio of playgrounds in the street: %f\n", street.ratioOfPlaygrounds());
System.out.printf("Total length of the street occupied by markets: %d\n", street.marketLength());
System.out.printf("Total length of the street occupied by houses: %d\n", street.houseLength());
System.out.printf("Total length of the street occupied by offices: %d\n", street.officeLength());
```

Focusing on the buildings

```
System.out.printf("\nNow focus on the buildings on the street.\n");
System.out.printf("Erdogan Hoca's house's focus method:\n     %s\n", street.getBuilding(0,0).focus());
System.out.printf("Burak Hoca's market's focus method:\n     %s\n", street.getBuilding(0,25).focus());
System.out.printf("Playground's focus method:\n     %s\n", street.getBuilding(0,30).focus());
System.out.printf("Feynman's office's focus method:\n     %s\n", street.getBuilding(1,15).focus());
```

Trying error cases

```
try{
    System.out.println("\nNow let's try to add a building to a position that is not empty.");
    System.out.println("We will add to the side 0, position 0, to the place of house that belongs to Erdogan Hoca.");
    street.add(new House(0, 10, 0, 10, 5, "Red", "No-one"));
}
catch(Exception e){
    System.err.printf("Exception: %s\n", e);
    System.out.println("This one gave an error as you see.\n");
}
try{
    System.out.println("\nNow let's try to add a building to a position that exceeds the boundaries of the street.");
    System.out.println("We will add to the side 0, position 100.");
    street.add(new House(0, 10, 100, 10, 5, "Red", "No-one"));
}
catch(Exception e){
    System.err.printf("Exception: %s\n", e);
    System.out.println("This one gave an error as you see.\n");
}
try{
    System.out.println("\nNow let's try to add a building to an unproper side, for example to side 4.");
    street.add(new House(4, 10, 1, 10, 5, "Red", "No-one"));
}
catch(Exception e){
    System.err.printf("Exception: %s\n", e);
    System.out.println("This one gave an error as you see.\n");
}
try{
    System.out.println("\nNow let's try to add a building that has unproper height like -5.");
    street.add(new House(1, 10, 40, -5, 5, "Red", "No-one"));
}
catch(Exception e){
    System.err.printf("Exception: %s\n", e);
    System.out.println("This one gave an error as you see.\n");
}
try{
    System.out.println("\nNow let's try to delete an empty space.");
    System.out.println("We will try to delete position at the end of the side 1 which is empty.");
    street.delete(1, 59);
}
catch(Exception e){
    System.err.printf("Exception: %s\n", e);
    System.out.println("This one gave an error as you see.\n");
}
```

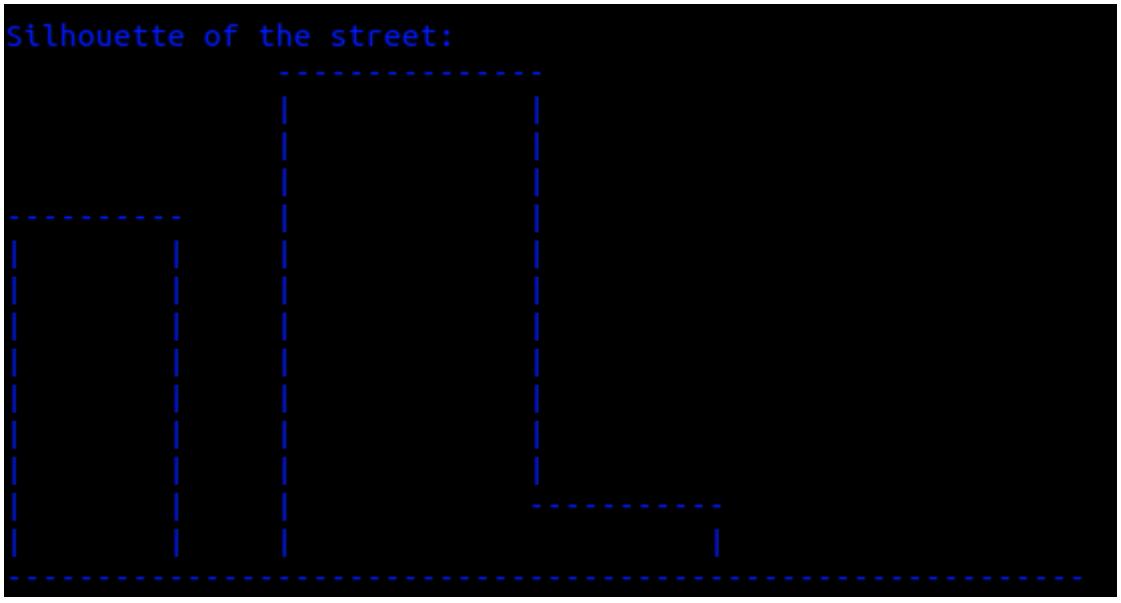
5. RUNNING AND RESULTS

```
~~~QUICK CHECK ALL FUNCTIONALITIES~~~
-------------------------------------
A street whose length is 60 is created and 8 new buildings have been added to it.
List of the buildings:
SIDE 0
======

House
-----
Length: 10
Side: 0
Position: 0
Height: 10
Room Number: 5
Color: Blue
Owner: Erdogan Hoca

Office
------
Length: 10
Side: 0
Position: 10
Height: 7
Job Type: Cyber Security
Owner: Mert

Market
------
Length: 5
Side: 0
Position: 25
Height: 5
Opening Time: 08:00
Closing Time: 21:00
Owner: Burak Hoca

Playground
----------
Length: 10
Side: 0
Position: 30
Height: 2
```

```
Market
------
Length: 5
Side: 0
Position: 40
Height: 4
Opening Time: 09:00
Closing Time: 22:00
Owner: Zuckerberg

Office
------
Length: 15
Side: 0
Position: 45
Height: 8
Job Type: Law Firm
Owner: Mandela

SIDE 1
======

Market
------
Length: 10
Side: 1
Position: 5
Height: 12
Opening Time: 07:00
Closing Time: 23:00
Owner: Murakami

Office
------
Length: 15
Side: 1
Position: 15
Height: 14
Job Type: Quantum Computing
Owner: Feynman
```

```
Total remaining length of lands on street: 40
Number of playgrounds in the street: 1
Ratio of playgrounds in the street: 0.083333
Total length of the street occupied by markets: 20
Total length of the street occupied by houses: 10
Total length of the street occupied by offices: 40
Now delete buildings that belong to Mert, Zuckerberg, Mandela, and Murakami.
```

```
Now try functionalities again.
------------------------------
List of the buildings:
SIDE 0
======

House
-----
Length: 10
Side: 0
Position: 0
Height: 10
Room Number: 5
Color: Blue
Owner: Erdogan Hoca

Market
------
Length: 5
Side: 0
Position: 25
Height: 5
Opening Time: 08:00
Closing Time: 21:00
Owner: Burak Hoca

Playground
----------
Length: 10
Side: 0
Position: 30
Height: 2

SIDE 1
======

Office
------
Length: 15
Side: 1
Position: 15
Height: 14
Job Type: Quantum Computing
Owner: Feynman
```




```
Total remaining length of lands on street: 80
Number of playgrounds in the street: 1
Ratio of playgrounds in the street: 0.083333
Total length of the street occupied by markets: 5
Total length of the street occupied by houses: 10
Total length of the street occupied by offices: 15

Now focus on the buildings on the street.
Erdogan Hoca's house's focus method:
     House's owner is -> Erdogan Hoca
Burak Hoca's market's focus method:
     Market's closing time is -> 21:00
Playground's focus method:
     Playground's length is -> 10
Feynman's office's focus method:
     Office's job type is -> Quantum Computing

Now let's try to add a building to a position that is not empty.
We will add to the side 0, position 0, to the place of house that belongs to Erdogan Hoca.
Exception: java.lang.Exception: That place is not empty.
This one gave an error as you see.


Now let's try to add a building to a position that exceeds the boundaries of the street.
We will add to the side 0, position 100.
Exception: java.lang.Exception: Building exceeds the limit of the street.
This one gave an error as you see.


Now let's try to add a building to an unproper side, for example to side 4.
Exception: java.lang.Exception: Unproper side.
This one gave an error as you see.


Now let's try to add a building that has unproper height like -5.
Exception: java.lang.Exception: Unproper height.
This one gave an error as you see.


Now let's try to delete an empty space.
We will try to delete position at the end of the side 1 which is empty.
Exception: java.lang.Exception: Attempting to delete empty space.
This one gave an error as you see.
```

USER TESTS & MENU

```
~~~NOW STREET OF BEAUTIFUL THINGS WELCOMES YOU~~~
--------------------------------------------------

Please enter length of the street: 30

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 1

Welcome to editing mode!
Please choose from the menu:
1 -> Add to street
2 -> Delete from street
Choice: test
Exception: java.util.InputMismatchException
Please try again.

Please choose from the menu:
1 -> Add to street
2 -> Delete from street
Choice: 1

Which side of the street do you want to add (0 or 1): 0

Which of the followings do you want to add to street:
1 -> House
2 -> Office
3 -> Market
4 -> Playground
Choice: 1

Please enter length of the house: 7
Please enter position of the house: 3
Please enter height of the house: 11
Please enter number of rooms of the house: 3
Please enter color of the house: Black
Please enter owner of the house: James Hetfield

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 1
```

```
Welcome to editing mode!
Please choose from the menu:
1 -> Add to street
2 -> Delete from street
Choice: 1

Which side of the street do you want to add (0 or 1): 1

Which of the followings do you want to add to street:
1 -> House
2 -> Office
3 -> Market
4 -> Playground
Choice: 4

Please enter length of the playground: 7
Please enter position of the playground: 7

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 1

Welcome to editing mode!
Please choose from the menu:
1 -> Add to street
2 -> Delete from street
Choice: 1

Which side of the street do you want to add (0 or 1): 0

Which of the followings do you want to add to street:
1 -> House
2 -> Office
3 -> Market
4 -> Playground
Choice: 3

Please enter length of the market: 12
Please enter position of the market: 12
Please enter height of the market: 9
Please enter owner of the market: Carl Sagan
Please enter opening time of the market (HH:MM): 07:07
Please enter closing time of the market (HH:MM): 22:22
```

```
Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 1

Welcome to editing mode!
Please choose from the menu:
1 -> Add to street
2 -> Delete from street
Choice: 1

Which side of the street do you want to add (0 or 1): 1

Which of the followings do you want to add to street:
1 -> House
2 -> Office
3 -> Market
4 -> Playground
Choice: 2

Please enter length of the office: 10
Please enter position of the office: 15
Please enter height of the office: 20
Please enter job type: Law Firm
Please enter owner of the office: Adalet Agaoglu

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 1

Total remaining length of lands on the street -----> 24
```

```
Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 2

SIDE 0
======

House
-----
Length: 7
Side: 0
Position: 3
Height: 11
Room Number: 3
Color: Black
Owner: James Hetfield

Market
------
Length: 12
Side: 0
Position: 12
Height: 9
Opening Time: 07:07
Closing Time: 22:22
Owner: Carl Sagan
```

```
SIDE 1
======

Playground
----------
Length: 7
Side: 1
Position: 7
Height: 2

Office
------
Length: 10
Side: 1
Position: 15
Height: 20
Job Type: Law Firm
Owner: Adalet Agaoglu


Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2
```

```
Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 3

Number of playgrounds ----> 1

Ratio of playgrounds  ----> 0.116667

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 4
Please choose which of the building's total length you want to see:
1 -> House
2 -> Office
3 -> Market
Choice: 1

Total length of street occupied by houses: 7

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2
```

```
Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 4
Please choose which of the building's total length you want to see:
1 -> House
2 -> Office
3 -> Market
Choice: 2

Total length of street occupied by offices: 10

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 4
Please choose which of the building's total length you want to see:
1 -> House
2 -> Office
3 -> Market
Choice: 3
```

```
Total length of street occupied by markets: 12

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 5
              -----------
              |         |
              |         |
              |         |
              |         |
              |         |
              |         |
              |         |
              |         |
   -------    |         |
   |     |    |         |
   |     | ---- -       |
   |     | |            |
   |     | |            |
   |     | |            |
   |     | |            |
   |     | |            |
   |     | |            |
   |     ---            |
   |                    |
------------------------------
```

```
Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 2

Welcome to viewing mode!
Please choose from the menu:
1 -> Display the total remaining length of lands on the street
2 -> Display the list of buildings on the street
3 -> Display the number and ratio of length of playgrounds in the street
4 -> Calculate the total length of street occupied by the markets, houses or offices
5 -> Display the skyline silhouette of the street
6 -> Focus on a building
Choice: 6
Please enter the side your building exists: 0
Please enter the position of your building: 3
House's owner is -> James Hetfield

Please choose from the menu:
1 -> Editing Mode
2 -> Viewing Mode
3 -> Exit
Choice: 3
~~~So long! See you next time.~~~
```