GIT Department of Computer Engineering

CSE 222/505 - Spring 2022

Homework 3 Time Complexity Report

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Theoretical Time Complexity of First Homework

In the driver code

addBuilding function = $\Theta(1)$

print function = $O(n)$

removeBuilding function = $O(n)$

system out print function = $\Theta(1)$

isFree function = $O(n)$

totalBuildingLength function = $O(n)$

numberofPlayground function = $O(n)$

as a result theoretical time complexity of first home work is $O(n)$

Theoretical Time Complexity of ArrayList version

In the driver code

addBuilding function = $\Theta(1)$

print function = $O(n)$

removeBuilding function = $O(n)$

system out print function = $\Theta(1)$

isFree function = $O(n)$

totalBuildingLength function = $O(n)$

numberofPlayground function = $O(n)$

as a result theoretical time complexity of "ArrayList" version is $O(n)$

Theoretical Time Complexity of LinkedList version

In the driver code

addBuilding function = $O(n)$

print function = $O(n^2)$

removeBuilding function = $O(n)$

system out print function = $\Theta(1)$

isFree function = $O(n)$

totalBuildingLength function = $O(n^2)$

numberofPlayground function = $O(n^2)$

as a result theoretical time complexity of "LinkedList" version is $O(n^2)$

Theoretical Time Complexity of LDLinkedList version

In the driver code

addBuilding function = $O(n)$

print function = $O(n^2)$

removeBuilding function = $O(n)$

system out print function = $\Theta(1)$

isFree function = $O(n)$

totalBuildingLength function = $O(n^2)$

numberofPlayground function = $O(n^2)$

as a result theoretical time complexity of "LDLinkedList" version is $O(n^2)$

Experimental Time Complexity of versions

Note: Every version of the driver have same functions with same amount experimental time complexity of first homework

```
Consumed Time in miliseconds: 286.05527
```

```
Consumed Time in miliseconds: 323.856
```

experimental time complexity of ArrayList version

```
Consumed Time in miliseconds: 361.31213
```

```
Consumed Time in miliseconds: 369.93143
```

experimental time complexity of LinkedList version

```
Consumed Time in miliseconds: 444.5904
```

```
Consumed Time in miliseconds: 461.84436
```

experimental time complexity of LDLinkList version

```
Consumed Time in miliseconds: 413.90112
```

```
Consumed Time in miliseconds: 472.007
```

Result

As a result, we see that our experimental results support the theoretical results we found by calculating. Based on this, we can understand that the LinkedList structure is not an efficient solution for our problem here in terms of time management.