

**GTU Department of Computer Engineering**  
**CSE 222 - Spring 2023**  
**Homework 3 Report**

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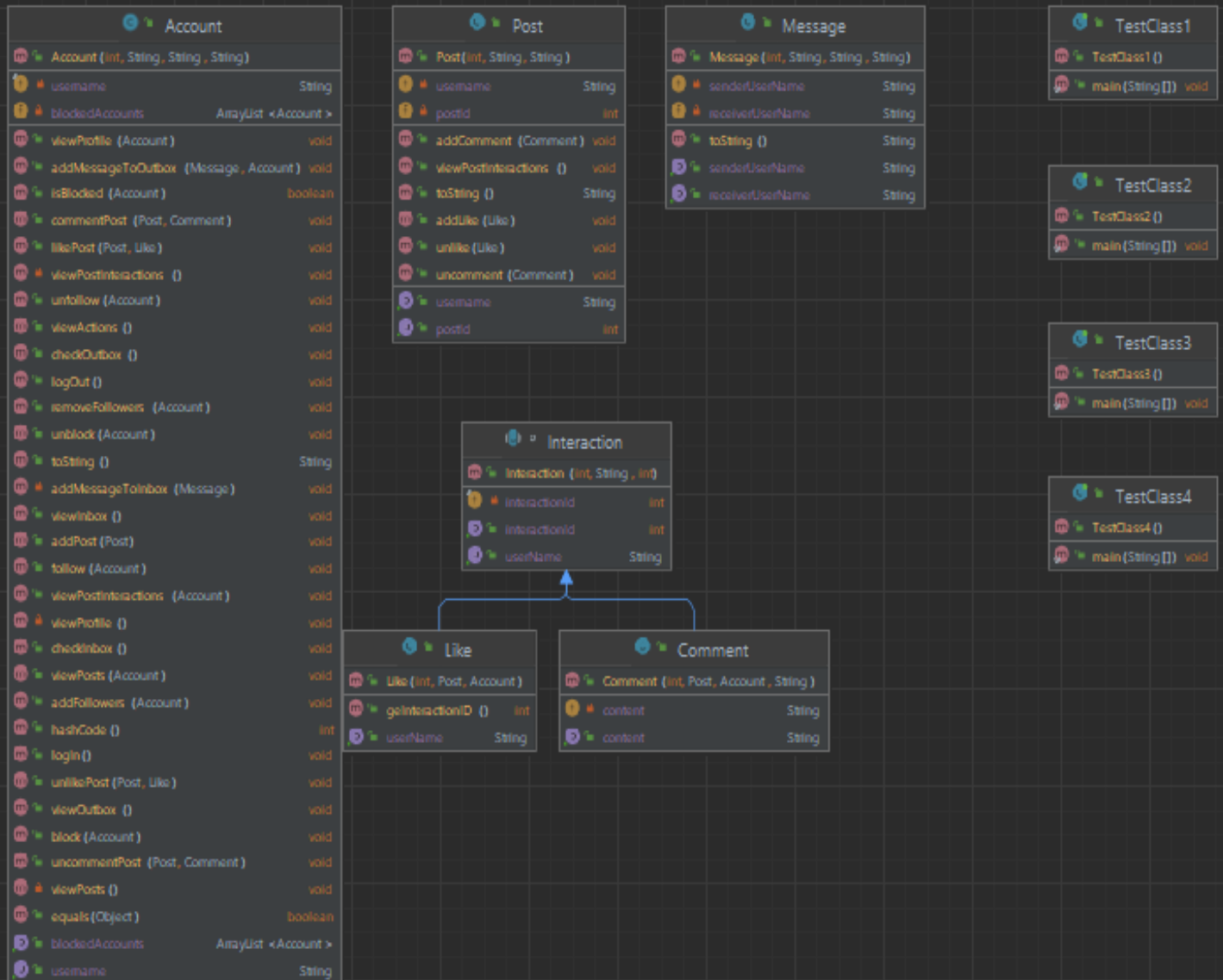
05.04.2023

## **1-System Requirements**

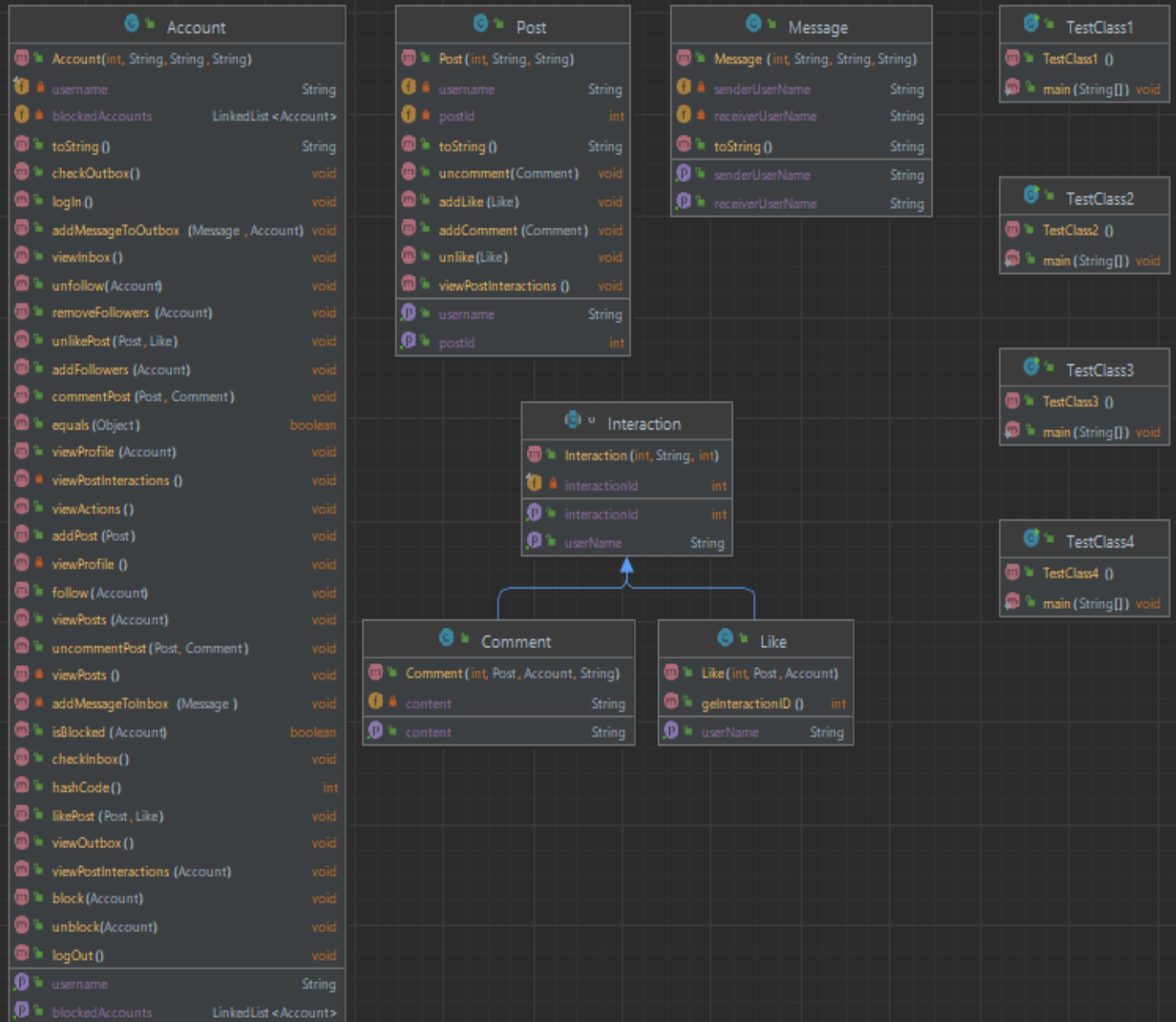
- Each account has a profile which contains username, birth date, location, posts (if exists), follower accounts (if exists), following accounts (if exists).
- Each account can follow or be followed by another accounts. The number of following/follower accounts can vary from zero to many.
- In order to do the following actions, the user must log into their accounts.
  - o Following another account
  - o Viewing the profile of another account (in order to view the profile, there is no need to follow the account.)
  - o Sharing a post.
  - o Interacting with a post which belongs to another account.
  - o Sending a message to another account (in order to send a message, the account must be followed.)
- The interaction with a post of another account can be as a like or a comment.
- The interaction information (number of likes/comments, the accounts that liked/commented, the content of the comments) of each post can be viewed by all users.
- Unlike a post they liked
- Unblock a blocked account
- Uncomment a post they commented
- Unfollow an account they followed
- Show their own action history. For instance, assume that gizemsungu logged and did some actions. When she wants to see her history, your program provides to show the following list related to her actions:
  - o You liked sibelgulmez's post id: 2
  - o You followed sibelgulmez
  - o You followed gokhankaya
  - o You unfollowed sibelgulmez
  - o You commented gokhankaya's post id:3
  - o You followed sibelgulmez

## 2-Diagrams

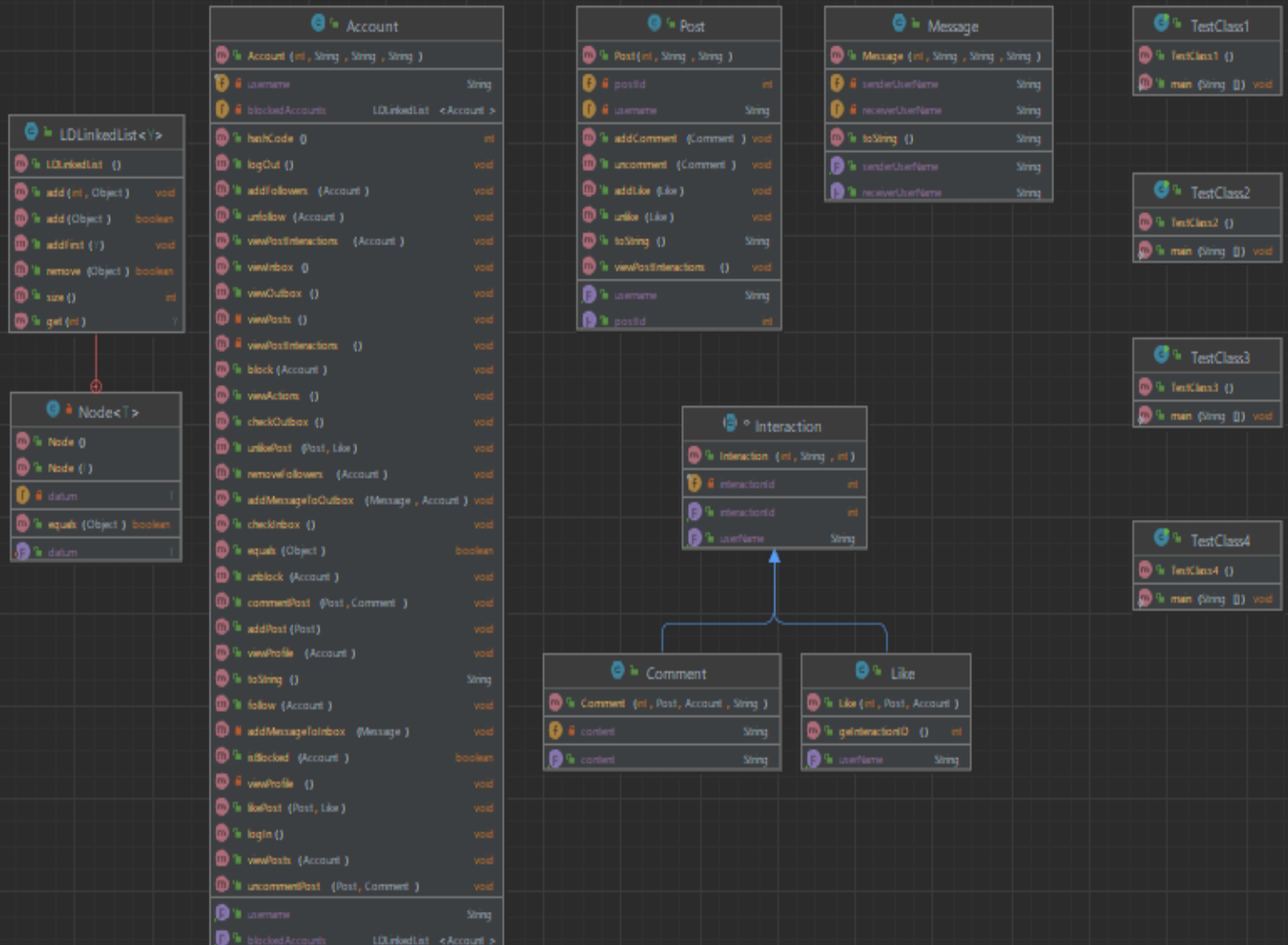
### a. ArrayList Class UML Diagram



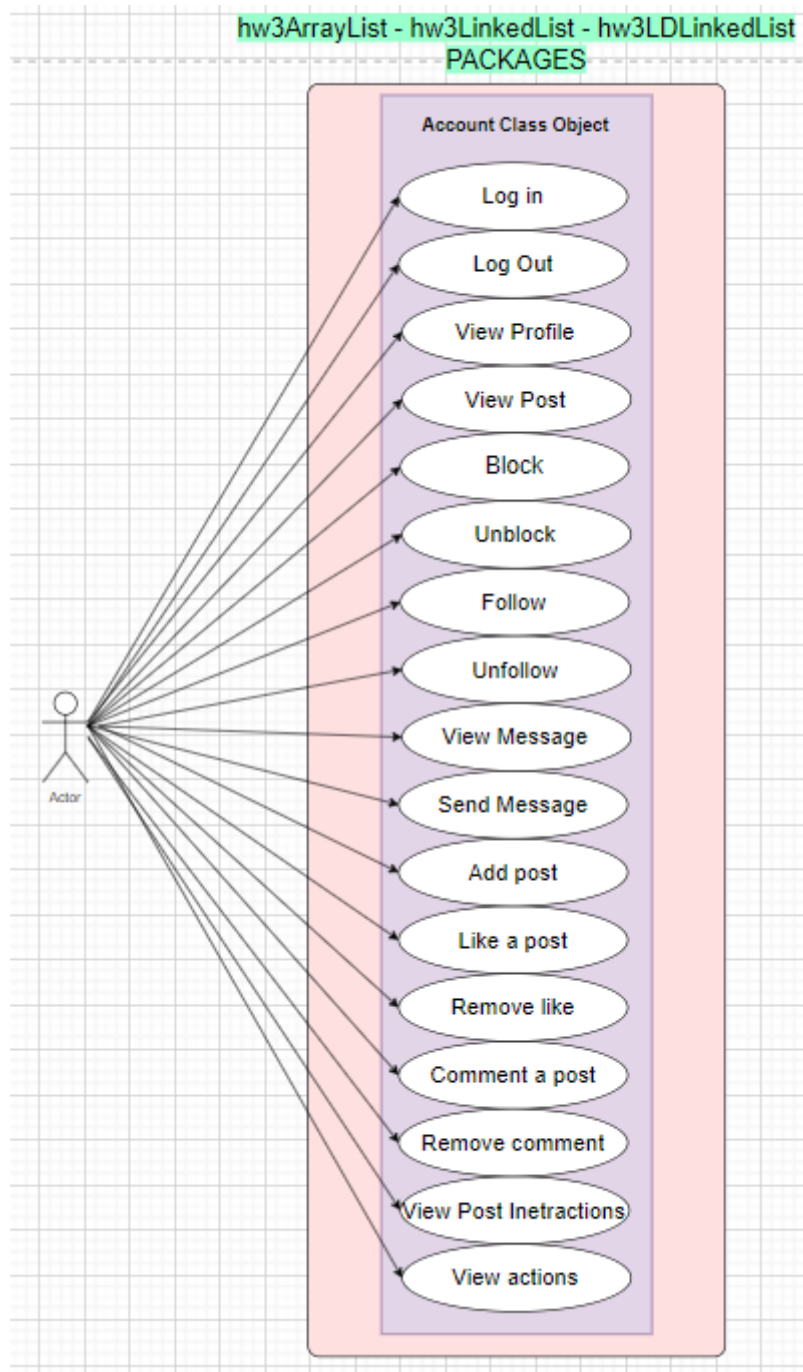
## **b. LinkedList Class UML Diagram**



## c.LDLinkedList Class UML Diagram



## ***d-All Classes Use Diagrams***



### **3-Problem Solution Approach**

As mentioned in the assignment pdf, we were asked to use a method called lazy deletion in the assignment. In this strategy, we are expected to perform the physical deletion (i.e. the actual deletion) every two times a delete operation is called. When physical deletion will not be performed, the node is marked as deleted. The get function skips the nodes marked as deleted, so it looks like the node has been deleted since the user does not have access to the marked nodes.

For this strategy, I redesign the get and remove methods. Get function looks the next node of the node is currently examining and check whether it is deleted, if the next node is deleted, get method skips that node without increasing the loop index.

### **4-Test Cases**

- SCENARIO 1 :
  - Step 1: Create 3 accounts with usernames “gizemsungu”, “sibelgulmez”, and “gokhankaya”.
  - Step 2: Login to the account with username “sibelgulmez”.
    - o Step 3: Share two posts.
    - o Step 4: Follow “gizemsungu” and “gokhankaya”.
    - o Step 5: Log out from the account.
  - Step 6: Login to the account with username “gokhankaya”.
    - o Step 7: View “sibelgulmez”’s profile.
    - o Step 8: View “sibelgulmez”’s posts.
    - o Step 9: Like a post of “sibelgulmez”.
    - o Step 10: Comment on a post of “sibelgulmez”.
    - o Step 11: Follow “sibelgulmez” and “gizemsungu”.
    - o Step 12: Send a message to “gizemsungu”.
    - o Step 13: Log out from the account.
  - Step 14: Login to the account with username “gizemsungu”.
    - o Step 15: Check the number of messages in the outbox.
    - o Step 16: Check the number of messages in the inbox.

- o Step 17: View the messages in the inbox.
- o Step 18: View “sibelgulmez”’s profile.
- o Step 19: View “sibelgulmez”’s posts.
- o Step 20: View “sibelgulmez”’s posts’ interactions.
- o Step 21: Like “sibelgulmez”’s posts.
- o Step 22: View “sibelgulmez”’s posts’ interactions.

- SCENARIO 2 :

- o “gizemsungu” logs in. a. shares a post (let’s call it Post1).
  - shares another post (let’s call it Post2).
  - logs out.
- o 2. “sibelgulmez” logs in. a. views the profile of “gizemsungu”.
  - likes Post1.
  - logs out.
- o 3. “gokhankaya” logs in. a. views the profile of “gizemsungu”.
  - comments on Post2 (ex: Nice!).
  - sends a message to “gizemsungu” (ex: “Hello!”)
  - logs out.
- o 4. “gizemsungu” logs in. a. views her own profile.
  - reads the message from “gokhankaya”.

- SCENARIO 3

- o 1. “gizemsungu” logs in. a. blocks “sibelgulmez”.
  - logs out.
- o 2. “sibelgulmez” logs in. a. tries to view the profile of “gizemsungu”.
  - b. tries to send a message to “gizemsungu”.

- SCENARIO 4

- o “sibelgulmez” logs in and ads 2 post
- o “sibelgulmez” follows “gokhankaya” and “gizemsungu” and logged out



- “gokhankaya” logs in and makes a comment and likes to sibel’s post
- “sibelgulmez” logs in views actions of her account and logs out
- gokhan logs in, unlikes and uncomments sibel's post, views actions and logs out
- “sibelgulmez” logs in, view interactions of her posts and logs out
- “gokhankaya” logs in, blocks “sibelgulmez” and “sibelgulmez” logs in, tries to send a message to “gokhankaya” and “gokhankaya” viewed his message inbox .
- “gokhankaya” unblocks “sibelgulmez” and “sibelgulmez” tries to send a message to “gokhankaya” again and “gokhankaya” views his message inbox.
- “gokhankaya” followed “gizemsungu” and views her profile, then “gokhankaya” unfollows “gizemsungu” and views “gizemsungu”’s profile again, there is one fewer follower due to gokhan's unfollowing.
- “account0” likes “sibelgulmez” 's post and “account1” likes and comments “sibelgulmez” 's post twice, removed one of them and viewed her post interactions again

## 5-Running and Results

### a. Scenario 1

```
SCENARIO 1
STEP 1...

*****

STEP 2...
STEP 3...
STEP 4...
STEP 5...

*****

STEP 6...
STEP 7...
Viewing account...
-----
accountId is : 2
location is : istanbul
username is : sibelgulmez
birth date is : 10.03.1800
There is not any followers of this account.

sibelgulmez is following : gokhankaya gizemsungu
sibelgulmez has 2 post(s)
STEP 8...
Viewing posts ...
-----
(Post ID : 1) sibelgulmez:This is my first post guyss!!

(Post ID : 2) sibelgulmez:This is my second post and Im not excited now :(

STEP 9...
STEP 10...
STEP 11...
STEP 12...
Message is sent!
STEP 13...

*****

STEP 14...
STEP 15...
...Checking inbox...
-----
There is/are 1 message(s) in the inbox
STEP 16...
.....Checking outbox.....
-----
There is/are 0 message(s) in the outbox
STEP 17...
...Viewing inbox...
-----
Message : content= 'Hey gizem, look how funny the comment I made to sibel's post
'senderUserName='gokhankaya'
'receiverUserName='gizemsungu'
```

```
STEP 18...
Viewing account...
-----
accountId is : 2
location is : istanbul
username is : sibelgulmez
birth date is : 10.03.1800
sibelgulmez is following 2 account(s) and has 1 follower(s)
The followers of sibelgulmez are :gokhankaya
sibelgulmez is following : gokhankaya gizemsungu
sibelgulmez has 2 post(s)
STEP 19...
Viewing posts ...
-----
(Post ID : 1) sibelgulmez:This is my first post guyysss!!

(Post ID : 2) sibelgulmez:This is my second post and Im not excited now :(

STEP 20...
Viewing post interactions
-----
(Post ID : 1) This is my first post guyysss!!.
The post was liked by the following account(s) : gokhankaya,
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post has no likes
The post has no comments
Viewing posts ...
-----
(Post ID : 1) sibelgulmez:This is my first post guyysss!!

(Post ID : 2) sibelgulmez:This is my second post and Im not excited now :(

STEP 21...
STEP 22...
Viewing post interactions
-----
(Post ID : 1) This is my first post guyysss!!.
The post was liked by the following account(s) : gokhankaya, gizemsungu,
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post has no likes
The post has no comments
```

```
*****
```

## **b.Scenario 2**

```
STEP 23...
STEP 24...
STEP 25...
STEP 26...
STEP 27...
STEP 28...
STEP 29...
STEP 30...
Viewing account...
-----
accountId is : 1
location is : istanbul
username is : gizemsungu
birth date is : 10.03.1900
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are :sibelgulmez gokhankaya
This account does not following any account.
gizemsungu has 2 post(s)
STEP 31...
STEP 32...
Message is sent!
STEP 33...
STEP 34...
STEP 35...
Viewing account...
-----
accountId is : 1
location is : istanbul
username is : gizemsungu
birth date is : 10.03.1900
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are :sibelgulmez gokhankaya
This account does not following any account.
gizemsungu has 2 post(s)
STEP 36...
...Viewing inbox...
-----
Message : content= 'Hey gizem, look how funny the comment I made to sibel's post
'senderUserName='gokhankaya'
'receiverUserName='gizemsungu'

Message : content= 'Hello!
'senderUserName='gokhankaya'
'receiverUserName='gizemsungu'
```

```

STEP 37...
STEP 38...
STEP 39...
STEP 40...
You can not view this account because this account has blocked you. :(
STEP 41...
You can not send a message to this account because this account has blocked you. :(

*****

```

### **c.Scenario 3**

### **d.Scenario 4**

```

SCENARIO 4
THIS SCENARIO IS SEPARATE FROM THE PREVIOUS SCENARIOS !!!
*****STEP 1 : 10 account has been created*****
*****STEP 2 : sibelgulmez add 2 post*****
*****STEP 3 : sibelgulmez followed gokhan and gizem and logged out*****
*****STEP 4 : gokhan logged in, comment and like the sibel's post *****
-----Viewing Actions -----
You add a post. PostID : 1
You add a post. PostID : 2
An account named gokhankaya has been followed...
An account named gizemsungu has been followed...
*****STEP 5 : sibel logged in and viewed actions of her account and logged out*****
-----Viewing Actions -----
An account named sibelgulmez followed you
You liked a post. PostID : 1
You commented a post. Post id : 2
You commented a post. Post id : 1
You unliked a post belongs to sibelgulmez PostID : 1
You uncommented a post. Post id : 1
*****STEP 6 : gokhan logged in, unliked and uncommented sibel's post, viewed actions and logged out*****
Viewing post interactions
-----
(Post ID : 1) This is my first post guyss!!
The post has no likes
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post has no likes
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Nice!,

*****STEP 7 : sibel logged in view interactions of her posts*****
You can not send a message to this account because this account has blocked you. :(
There is not a message in the inbox.
*****STEP 8 : gokhan blocked sibel and sibel tried to send a message to him and gokhan viewed his message inbox
Message is sent!
...Viewing inbox...
-----
Message : content= 'I always hate Java gokhan, I love Python you should know that
'senderUserName='sibelgulmez'
'receiverUserName='gokhankaya'

```

```

*****STEP 9 : gokhan unblocked sibel and sibel tried to send a message to him again and gokhan viewed his message inbox
Viewing account...
-----
accountId is : 0
location is : istanbul
username is : gizemsungu
birth date is : 10.03.1900
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are :sibelgulmez gokhankaya
This account does not following any account.
gizemsungu has 0 post(s)
Viewing account...
-----
accountId is : 0
location is : istanbul
username is : gizemsungu
birth date is : 10.03.1900
gizemsungu is following 0 account(s) and has 1 follower(s)
The followers of gizemsungu are :sibelgulmez
This account does not following any account.
gizemsungu has 0 post(s)
*****STEP 10 : gokhan followed gizem and viewed her profile, then gokhan
unfollowed gizem and view her profile again, there is
one fewer follower due to gokhan's unfollowing*****
Viewing account...
-----
accountId is : 2
location is : istanbul
username is : sibelgulmez
birth date is : 10.03.1900
sibelgulmez is following 2 account(s) and has 2 follower(s)
The followers of sibelgulmez are :account0 account1
sibelgulmez is following : gokhankaya gizemsungu
sibelgulmez has 2 post(s)
Viewing post interactions
-----
(Post ID : 1) This is my first post guyyss!!
The post was liked by the following account(s) : account1,
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post was liked by the following account(s) : account0,
The post has 4 comment(s)
Comment 1 : ( from : gokhankaya )Nice!,
Comment 2 : ( from : account1 )I'm new here, is this message box or everyone can see this?,
Comment 3 : ( from : account0 )Ahh, I'm always tired you know, Im jealous of you actually, probably gokhan is too,
Comment 4 : ( from : account1 )I'm so sorry, I didnt know everyone can see these, I'm deleting right now my comments,

```

```

Viewing post interactions
-----
(Post ID : 1) This is my first post guyyss!!
The post was liked by the following account(s) : account1,
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post was liked by the following account(s) : account0,
The post has 4 comment(s)
Comment 1 : ( from : gokhankaya )Nice!,
Comment 2 : ( from : account1 )I'm new here, is this message box or everyone can see this?,
Comment 3 : ( from : account0 )Ahh, I'm always tired you know, Im jealous of you actually, probably gokhan is too,
Comment 4 : ( from : account1 )I'm so sorry, I didnt know everyone can see these, I'm deleting right now my comments,

Viewing post interactions
-----
(Post ID : 1) This is my first post guyyss!!
The post was liked by the following account(s) : account1,
The post has 1 comment(s)
Comment 1 : ( from : gokhankaya )Keep calm sibel, it is not that exciting :|,

(Post ID : 2) This is my second post and Im not excited now :(.
The post was liked by the following account(s) : account0,
The post has 2 comment(s)
Comment 1 : ( from : gokhankaya )Nice!,
Comment 2 : ( from : account1 )No sibel keep being excited !!! Love you <3 ,

```

```

*****STEP 11 : account0 liked sibel's post and account1 liked and comment sibel's post twice, removed one of them and viewed her post again*****
*****

```

## **5-Running Times and Complexity Analysis**

Data Structure	Scenario1	Scenario2	+ Scenario3	Scenario4
Array List Structure	0.034	0.036	0.037	0.036
Linked List Structure	0.041	0.041	0.042	0.042
LD Linked List Structure	0.044	0.046	0.046	0.045
Basic Array Structure(HW1)	0.039	0.041	0.042	Not Available

## **ArrayList methods' time complexity**

**$O(1)$**

**$O(n)$**

Login	Follow
Logout	viewProfile
addPost	viewPosts
Unfollow	addMesageToOutbos (because of isBlocked method)
addFollowers	ViewOutbox
removeFollowers	viewInbox
likePost, unlikePost	viewPostInteractions
commentPost, uncommentPost	isBlocked
addMessageToInbox	viewActions
checkInbox	
Block	

unlock	
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### **LinkedList methods' time complexity**

**$O(1)$**

**$O(n)$**

**$O(n^2)$**

Login	addPost	Follow ( because of isBlocked method)
Logout	unfollow	AddMessageToOutbox (Because of isBlocked method)
checkInbox	addFollowers, removeFollowers	
checkOutbox	likePost, unlikePost	
	commentPost, uncommentPost	
	addMessageToInbox	
	Block, unlock	
	viewPosts, viewProfile	
	viewInbox, viewOutbox	
	viewPostInteractions	
	isBlocked	
	viewActions	
	addMessageToOutbox	



### **LDLinkedList methods' time complexity**

**$O(1)$**

**$O(n)$**

**$O(n^2)$**

Login	addPost	Follow ( because of isBlocked method)
Logout	unfollow	AddMessageToOutbox (Because of isBlocked method)
checkInbox	addFollowers, removeFollowers	
checkOutbox	likePost, unlikePost	
	commentPost, uncommentPost	
	addMessageToInbox	
	Block, unblock	
	viewPosts, viewProfile	
	viewInbox, viewOutbox	
	viewPostInteractions	
	isBlocked	
	viewActions	
	addMessageToOutbox	

