CSE222-Homework3 Report

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Time Complexity Analysis:

    a) Basic Array Structure(HW1):

        Adding: O(1) because we assume fixed size array.

        Searching: O(n) because we have to traverse full array until finding.

        SharePost and Block functions: O(1) because we know the index we want to add.

        SendMessage: O(n) because we have one loop in function(inside of isfollowing() and isblocked()).

        Follow: O(n) because we have a loop inside of isalreadyfollow().

        viewProfile and viewPosts: O(n) because we have single loops to print.

        viewInteractions: O(n^3) because we have three nested loops.

        viewInbox and viewOutbox: O(n^2) because there is one nested loop. One is in functions and other one is inside of findaccname(..).

        checkinbox and checkoutbox: O(n) because we have single loops to count.

        likePost and addComment: O(n) because we have one loop to determine if there is post or not.

b) ArrayList Structure:

Adding: O(n) because after adding, shifting operation is done.

Searching: Same as basic array structure.

Removing: O(n) because after removing, shifting operation is done.

Get: O(1) because we know the index and return which is constant time.

SharePost, Block, sendMessage, follow, viewProfile and viewownprofile functions: O(n) because of adding operation.

viewProfile and viewPosts: Same as basic array structure.

viewInteractions: Same as basic array structure.

Checkinbox and checkoutbox: Same as basic array structure.

viewInbox and viewOutbox: Same as basic array structure.

likePost and addComment: O(n^2) because we have one nested loops. One is to determine if there is post or not. Second one is to add.

unlikePost and uncomment: O(n^2) because we have one nested loops. One is to determine if there is post or not. Second one is to remove.

viewHistory: O(n) because we have only one loop to print.

unblock and unfollow: O(n) because of removing operation.

c) LinkedList Structure:

Adding: if we add last O(1) because we add node end of the list which is constant time.

Searching: O(n) because we have to traverse linked list until finding.

Removing: if we remove last O(1) because we remove node end of the list which is constant time.

Get: O(n) because always we have to start with head node until reaching index we want to get.

sharePost: O(1) because there isn't any loop.

sendMessage and follow: O(n^2) because of isblocked and get functions.

Block: O(n) because of indexof function.

unBlock and unFollow: O(n) because of remove function.

viewProfile, viewownprofile, viewPosts: O(n^2) because there is a nested loop. One is for loop and the other one is get function.

viewInteractions: O(n^3) because there are two for loops and get function.

Checkoutbox, checkinbox, viewoutbox and viewinbox: O(n^2) because of one for loop and get function.

likePost and addComment: O(n^2) because we have one nested loops. One is to determine if there is post or not. Second one is get function.

unlikePost and unComment: O(n^2) because there is one for loop which has remove function.

d) LDLinkedList Structure:

Most of functions are same as above part except functions which have remove function.

unBlock and unFollow: if there is no marked obj, O(1). Otherwise O(n).

unlikePost and unComment: if there is no marked obj, O(n). Otherwise O(n^2).

Experimental Running Time Analysis:

Implementation Type	Scenario1	Scenario2	Scenario3	Scenario4
Basic Array Structure(HW1)	0,260s	0,234s	0,231s	Not Avaliable
ArrayList Structure	0,251s	0,309s	0,244s	0,321s
LinkedList Structure	0,275s	0,290s	0,279s	0,281s
LDLinkedList Structure	0,298s	0,286s	0,320s	0,346s

Theoretically(according to time complexities of functions), we expect that Basic Array and ArrayList structure works faster than LDLinkedList and LDLinkedList works faster than LinkedList (thanks to lazy deletion) . Some parts of table confirm that. Since the program doesn't deal with very large amount of data, our measurements are level of milliseconds which means we cannot observe their differences of running time very well.

Problem Solution Approach for LDLinkedList:

Since LDLinkedList should implement the List interface and extend the AbstractList in Java Collections Framework, Most of functions are same as LinkedList in Java Collections Framework. I only implemented some necessary functions and Node class as a inner class to be able to traversing. Add, get, getNode functions work same as LinkedList's functions. Remove function works different from LinkedList because of lazydeletion operation. After one removing operation, object that we want to remove is only marked, variable(deletednum) that keeps the numbers of marked object is increased by one. As we are removing another object secondly, invoked removeperm function to delete these two nodes physically.

Running Commands and Results:

```
Starting scenario1...

Creating Accounts.....
An account with username gizemsungu has been created.
An account with username sibelgulmez has been created.
An account with username gokhankaya has been created.
Logging into an account (username: sibelgulmez)
Sharing two posts...
Following gizemsungu and gokhankaya
Logging out from account 'sibelgulmez'
Logging into another account (username: gokhankaya)
Viewing sibelgulmez's profile...
----------------
UserID: 2
Username: sibelgulmez
Location: Istanbul
Birth Date: 10.03.1995
sibelgulmez is following 2 account(s) and has 0 follower(s)
The followers of sibelgulmez are :
sibelgulmez is following: gizemsungu, gokhankaya,
sibelgulmez has 2 post(s).
Viewing sibelgulmez's posts...
(Post ID: 1): I like Java.
(Post ID: 2): Java the coffee.
Liking a post of sibelgulmez
Adding a comment on a post of sibelgulmez
Following gizemsungu and sibelgulmez
Sending a message to gizemsungu
Logging out from account 'gokhankaya'
Logging into another account (username: gizemsungu)
Checking outbox.....
There is/are 0 message(s) in the outbox
Checking inbox......
There is/are 1 message(s) in the inbox
Viewing inbox...
----------------
Message ID: 1
From: gokhankaya
To: gizemsungu
Message: This homework is too easy!
Viewing sibelgulmez's profile...
----------------
UserID: 2
Username: sibelgulmez
Location: Istanbul
Birth Date: 10.03.1995
sibelgulmez is following 2 account(s) and has 1 follower(s)
The followers of sibelgulmez are : gokhankaya,
sibelgulmez is following: gizemsungu, gokhankaya,
sibelgulmez has 2 post(s).
Viewing sibelgulmez's posts...
(Post ID: 1): I like Java.
(Post ID: 2): Java the coffee.
Viewing sibelgulmez's interactions...
------------
(Post ID: 1): I like Java.
The post was liked by the following account(s): gokhankaya,
The post has 1 comment(s)...
Comment 1: 'gokhankaya' said 'me too!',
(Post ID: 2): Java the coffee.
The post has no likes.
The post has no comments.
Liking sibelgulmez's posts...
Viewing sibelgulmez's interactions...
------------
(Post ID: 1): I like Java.
The post was liked by the following account(s): gokhankaya, gizemsungu,
The post has 1 comment(s)...
Comment 1: 'gokhankaya' said 'me too!',
(Post ID: 2): Java the coffee.
The post was liked by the following account(s): gizemsungu,
The post has no comments.
Ending scenario1...
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Starting scenario2.........

Logging into another account (username: gizemsungu)
Shares a post...
Shares another post
Logging out from account 'gizemsungu'
Logging into another account (username: sibelgulmez)
Viewing gizemsungu's profile...
-----------------
UserID: 1
Username: gizemsungu
Location: Kocaeli
Birth Date: 13.01.1993
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are : sibelgulmez, gokhankaya,
gizemsungu is following:
gizemsungu has 2 post(s).
Likes post1
You have to first view gizemsungu's posts before liking
Logging out from account 'sibelgulmez'
gokhankaya logs in.
Viewing gizemsungu's profile...
-----------------
UserID: 1
Username: gizemsungu
Location: Kocaeli
Birth Date: 13.01.1993
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are : sibelgulmez, gokhankaya,
gizemsungu is following:
gizemsungu has 2 post(s).
Adding a comment on a post of gizemsungu
You have to first view gizemsungu's posts before commenting.
Sends a message to gizemsungu
Logging out from account 'gokhankaya'
gizemsungu logs in.
Viewing gizemsungu's profile...
-----------------
UserID: 1
Username: gizemsungu
Location: Kocaeli
Birth Date: 13.01.1993
gizemsungu is following 0 account(s) and has 2 follower(s)
The followers of gizemsungu are : sibelgulmez, gokhankaya,
gizemsungu is following:
gizemsungu has 2 post(s).
Viewing inbox...
-----------------
Message ID: 1
From: gokhankaya
To: gizemsungu
Message: This homework is too easy!
Message ID: 2
From: gokhankaya
To: gizemsungu
Message: Hello!
Ending scenario2 ...........
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Starting scenario3.........

gizemsungu logs in.
blocks sibelgulmez
logs out.
sibelgulmez logs in.
Tries to view the profile of 'gizemsungu'
You can't view the profile because you are blocked by gizemsungu.
Tries to send a message to 'gizemsungu'
You can't send a message because you are blocked by gizemsungu.
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```
Starting scenario4...

Creating Accounts.....
An account with username LoganRoy1 has been created.
An account with username SamWinchester2 has been created.
An account with username DeanWinchester3 has been created.
An account with username Walter White4 has been created.
An account with username JessePinkman5 has been created.
An account with username ElliotAlderson6 has been created.
An account with username SadieDunhill7 has been created.
An account with username MichealScott8 has been created.
An account with username SeverusSnape9 has been created.
An account with username Neo10 has been created.
LoganRoy1 logs in.
 Tries to send a message to SamWinchester2.
You can't send a message to account you dont follow.
 Follows SamWinchester2.
 Sends a message SamWinchester2. ('Hi, How is the family business.')
 Shares a post. 'I am gonna win!'
 Views history
Viewing History......
You followed SamWinchester2
You sent a message to SamWinchester2
You shared a post. Post id: 1
 Blocks WalterWhite4
 Shares a post. ('Eventually!')
 Views history
Viewing History......
You followed SamWinchester2
You sent a message to SamWinchester2
You shared a post. Post id: 1
You blocked Walter White4
You shared a post. Post id: 2
 Logs out.
SadieDunhill7 logs in.
 Follows SamWinchester2.
 Views SamWinchester2's profile.
Viewing SamWinchester2's profile...
----------------
UserID: 2
Username: SamWinchester2
Location: Kansas
Birth Date: 10.03.1985
 you are following 0 account(s) and have 2 follower(s)
The followers of SamWinchester2 are : LoganRoy1, SadieDunhill7,
SamWinchester2 is following:
SamWinchester2 has 0 post(s).
 Views own profile.
Viewing own profile...
----------------
UserID: 7
Username: SadieDunhill7
Location: Texas
Birth Date: 11.09.1943
 you are following 1 account(s) and have 0 follower(s)
The followers of you are :
You are following: SamWinchester2,
Blocked account(s):
You have 0 post(s).
 Unfollows SamWinchester2.
 Views SamWinchester2's profile.
Viewing SamWinchester2's profile...
----------------
UserID: 2
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UserID: 2
Username: SamWinchester2
Location: Kansas
Birth Date: 10.03.1985
 you are following 0 account(s) and have 1 follower(s)
The followers of SamWinchester2 are : LoganRoy1,
SamWinchester2 is following:
SamWinchester2 has 0 post(s).
 Views own profile.
Viewing own profile...
----------------
UserID: 7
Username: SadieDunhill7
Location: Texas
Birth Date: 11.09.1943
 you are following 0 account(s) and have 0 follower(s)
The followers of you are :
You are following:
Blocked account(s):
You have 0 post(s).
 Follows LoganRoy1.
 Tries to follow LoganRoy1 again.
You already followed LoganRoy1.
 Views LoganRoy1's profile.
Viewing LoganRoy1's profile...
----------------
UserID: 1
Username: LoganRoy1
Location: Dundee
Birth Date: 15.04.1958
 you are following 1 account(s) and have 1 follower(s)
The followers of LoganRoy1 are : SadieDunhill7,
LoganRoy1 is following: SamWinchester2,
LoganRoy1 has 2 post(s).
 Views LoganRoy1's posts.
Viewing LoganRoy1's posts...
(Post ID: 1): I am gonna win!
(Post ID: 2): Eventually!
 Likes LoganRoy1's posts.
 Comments LoganRoy1's posts.
 Views LoganRoy1's posts' interactions.
Viewing LoganRoy1's interactions...
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(Post ID: 1): I am gonna win!
The post was liked by the following account(s): SadieDunhill7,
The post has 1 comment(s)...
 Comment 1: 'SadieDunhill7' said 'I don't think so.'

(Post ID: 2): Eventually!
The post was liked by the following account(s): SadieDunhill7,
The post has 1 comment(s)...
 Comment 1: 'SadieDunhill7' said 'Never.'

 Unlike LoganRoy1's post(id:1)
 Uncomment LoganRoy1's post(id:2)
 Views LoganRoy1's posts' interactions.
Viewing LoganRoy1's interactions...
--------------
(Post ID: 1): I am gonna win!
The post has no likes.
The post has 1 comment(s)...
 Comment 1: 'SadieDunhill7' said 'I don't think so.'

(Post ID: 2): Eventually!
The post was liked by the following account(s): SadieDunhill7,
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The post was liked by the following account(s): SadieDunhill7,
The post has 1 comment(s)...
 Comment 1: 'SadieDunhill7' said 'Never.'

 Unlike LoganRoy1's post(id:1)
 Uncomment LoganRoy1's post(id:2)
 Views LoganRoy1's posts' interactions.
Viewing LoganRoy1's interactions...
-------------
(Post ID: 1): I am gonna win!
The post has no likes.
The post has 1 comment(s)...
 Comment 1: 'SadieDunhill7' said 'I don't think so.'

(Post ID: 2): Eventually!
The post was liked by the following account(s): SadieDunhill7,
The post has no comments.
 Views History.
Viewing History......
You followed SamWinchester2
You viewed SamWinchester2's profile
You viewed your own profile
You unfollowed SamWinchester2
You viewed SamWinchester2's profile
You viewed your own profile
You followed LoganRoy1
You viewed LoganRoy1's profile
You viewed LoganRoy1's posts
You liked LoganRoy1's post. Post id: 1
You liked LoganRoy1's post. Post id: 2
You commented LoganRoy1's post. Post id: 1
You commented LoganRoy1's post. Post id: 2
You viewed LoganRoy1's posts interactions
You unliked LoganRoy1's post. Post id: 1
You uncommented LoganRoy1's post. Post id: 2
You viewed LoganRoy1's posts interactions
 Logs out.
WalterWhite4 logs in.
 Tries to view LoganRoy1's Profile.
You can't view the profile because you are blocked by LoganRoy1.
 Tries to follow LoganRoy1.
You can't follow LoganRoy1 because. You are blocked by LoganRoy1.
 Tries to send a message to LoganRoy1.
You can't send a message because you are blocked by LoganRoy1.
 Blocks ElliotAlderson6
 Tries to view ElliotAlderson6's posts.
You have to first view ElliotAlderson6's profile before viewing posts
 Tries to view ElliotAlderson6's profile.
You can't view the profile because you have blocked ElliotAlderson6.
 Unblocks ElliotAlderson6
 Views ElliotAlderson6's profile.
Viewing ElliotAlderson6's profile...
----------------
UserID: 6
Username: ElliotAlderson6
Location: Chicago
Birth Date: 06.09.1994
 you are following 0 account(s) and have 0 follower(s)
The followers of ElliotAlderson6 are :
ElliotAlderson6 is following:
ElliotAlderson6 has 0 post(s).
 Logs out.

Ending Scenario 4............
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