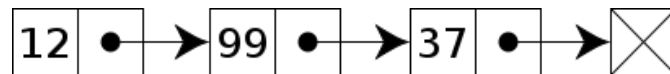


**Hacettepe University**  
**Department Of Computer Engineering**  
**BBM203 Programming Laboratory**  
**Experiment 3**

**Subject** : A hypothetical Twitter App / Linked Lists & OOP  
**Submission Date** : 13.11.2015  
**Due Date** : 30.11.2015  
**Programming Environment:** C++ (minGW)  
**Advisors** : Asist. Prof. Adnan ÖZSOY  
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## INTRODUCTION

In computer science, a linked list is a data structure consisting of a group of nodes which together represent a sequence. Under the simplest form, each node is composed of data and a reference (in other words, a link) to the next node in the sequence; more complex variants add additional links. This structure allows for efficient insertion or removal of elements from any position in the sequence [1].



*Fig.1 A linked list whose nodes contain two fields: an integer value and a link to the next node. The last node is linked to a terminator used to signify the end of the list. Adopted from [1]*

Linked lists are among the simplest and most common data structures. They can be used to implement several other common abstract data types, including lists (the abstract data type), stacks, queues, associative arrays, , though it is not uncommon to implement the other data structures directly without using a list as the basis of implementation [1] .

The principal benefit of a linked list over a conventional array is that the list elements can easily be inserted or removed without reallocation or reorganization of the entire structure because the data items need not be stored contiguously in memory or on disk, while an array has to be declared in the source code, before compiling and running the program. Linked lists allow insertion and removal of nodes at any point in the list, and can do so with a constant number of operations if the link previous to the link being added or removed is maintained during list traversal. On the other hand, simple linked lists by themselves do not allow random access to the data, or any form of efficient indexing. Thus, many basic operations — such as obtaining the last node of the list (assuming that the last node is not maintained as separate node reference in the list structure), or finding a node that contains a given datum, or locating the place where a new node should be inserted — may require sequential scanning of most or all of the list elements [1].

## AIM & DESIGN

In this experiment you are supposed to develop a console based hypothetical Twitter application. Your homework will be implemented as a console application. Moreover, it will read an input file named “input.txt” and will output the results at both screen and the file “out.txt” The input file will be provided for you just after your class hour.

The program logic and the commands lying in the input file is given below. The parameters of each line are delimited by blank space. Therefore long strings (e.g. sentences) were filled with underscore ‘\_’ character. The italic names are unique in system wide. In other words, the values of these parameters are completely unique.

- **AddUser**

This command adds a user to your system. It has 2 parameters (username and personal comment). Without the existence of a user, no other users can follow or do other operations.

Format - Example / Possible messages	Parameter Number
AddUser <i>username1</i> <i>personal comment</i>	2
AddUser traveler We are traveling to everywhere	
User 'traveler' has been created	
Errors:	
Err: The user <i>username</i> has already been created.	

- **FollowUser**

For the operation of following, this command has been used. It has 2 parameters (username1 and username2). According to syntax, username1 follows username2.

Format / Example	Parameter Number
FollowUser <i>username1</i> <i>username2</i>	2
FollowUser traveler canonturk	
traveler followed canonturk	
Errors:	
Err: traveler has already followed canonturk!	
Err: the user 'traveler' could not be found!	
Err: the user 'canonturk' could not be found!	
Err: the user 'canonturk' had blocked 'traveler'.	
Err: canonturk cannot follow itself (for the sample command of FollowUser canonturk canonturk)	

- **AddPost**

In order to add a post for a user, this command has been designed. Note that, there exist two kinds of posts. A post may either be TextPost or ImagePost. Every post contains an id and a comment field. However, image posts also contains a size information which has been formatted in *widthxheight*. This means that image posts must involve width and height information. It is ensured that width and height values will be supplied in correct order. As a consequence, AddPost command has two variations.

Format / Example	Parameter Number
AddPost <i>username postid posttext</i>	3 – text posts
AddPost desktop 25 'New GeForceFX graphics processor'	
AddPost desktop 44 'Ultra_4K_Screens' 300x500	4 -- image posts
In normal cases this command does not produce any informing message	
Errors: Err: the user 'desktop' could not be found!	

- **LikePost**

Whenever a user wants to like a post another user, LikePost command can be used. This command has 3 parameters. Note that, if the liker (userA) of a post is blocked by another user (e.g. userB) the number of likes for the respective post decreases one. One another meaning of this is, userB has to be accessible by userA. Otherwise, userA cannot like a post of userB. Moreover, all posts belong to their original owners. Therefore, if the original poster deletes a tweet, the others cannot like it anymore. Another fact of

Format / Example	Parameter Number
LikePost <i>username liker username liked postid of liked item</i>	3
LikePost walkingdead desktop 25	
walkingdead has liked desktop's post	
Errors:	
Err: desktop's post could not be found!	
Err: the user 'desktop' could not be found!	
Err: the user 'walkingdead' could not be found!	
Err: desktop's post had already been liked!	
Err: the user 'desktop' had blocked 'walkingdead'. You cannot like a post of 'desktop'!	

- **ViewUser**

This command is designed to view a user's profile. It has one parameter. Note that it prints all the summary information belonging to respective user. The number of following and blocked users as well as liked posts must be printed. The next line should contain the personal comment of the user. The next lines will involve the tweets and their like numbers. It should be noted that total pixel count will be printed for *imageposts*.

Format / Example	Parameter Number
ViewUser <i>username</i>	1
ViewUser desktop	
<pre>----- desktop following [2] - blocked [0] users - [3] posts. Home_is_where_hard_drive_is -----Tweets----- 'Intel_launches_the_new_9nm_chips' - Likes: 1 'New_GeForceFX_graphics_processor' - TotalSize: [120000 pixels] - Likes: 0 'The_upcoming_Windows:_Windows_10' - Likes: 1 -----  Errors: Err: the user 'desktop' could not be found!</pre>	

- **Repost**

For reposting, this command can be used. It is similar to *LikePost* command but with one difference. Reposting a tweet creates an exact copy the post and makes its owner to new user. Therefore, new upcoming likes will affect the new reposted tweet instead of the first user's tweet. On the other hand, a post may be reposted several times by the same user. However this is not possible in *LikePost* command.

Format / Example	Parameter Number
Repost <i>username</i> reposter <i>username</i> tobereposted <i>postid</i> reposteditem	1
Repost desktop culture_art 47	
desktop has reposted culture_art's post	
Errors:	
Err: desktop's post could not be found!	
Err: the user 'desktop' could not be found!	
Err: the user 'culture_art' could not be found!	
Err: the user 'culture_art' had blocked 'desktop'. You cannot repost a post of 'culture art'!	

- **BlockUser**

For blocking the command of blockuser can be used. When a user (e.g. userA) blocks another one (userB), all the likes of userB are removed. Moreover, if userA was following userB, this connection is completely removed and vice versa. Besides, userB cannot repost or like a tweet of userA.

Format / Example	Parameter Number
BlockUser <i>username1</i> <i>username2</i>	2
BlockUser desktop culture art	
desktop has blocked culture_art	
Errors:	
Err: desktop has already blocked culture_art!	
Err: the user 'desktop' could not be found!	
Err: the user 'culture art' could not be found!	

- **UnfollowUser**

Similar to *FollowUser* command, *Unfollowuser* just unfollows the specified user. It does not remove any like relationship.

Format / Example	Parameter Number
UnfollowUser <i>username1</i> <i>username2</i>	2
UnfollowUser ig canonturk olympics	
olympics has been unfollowed by ig_canonturk	
Errors:	
Err: olympics has already been unfollowed by you! You cannot unfollow again.	
Err: the user 'olympics could not be found!	
Err: the user 'ig canonturk art' could not be found!	

## SAMPLE I/O

### Input file

```
AddUser walkingDead I_never_sleep
AddUser olympics sport_news
AddUser culture_art Eternal_sunshine
AddUser traveler We_are_traveling_to..
AddUser desktop Home_is_where_hard_drive_is
AddUser ig_canonturk We_hate_from_Nikon_users
FollowUser walkingDead olympics
FollowUser walkingDead desktop
FollowUser olympics traveler
FollowUser olympics walkingDead
FollowUser olympics ig_canonturk
FollowUser traveler ig_canonturk
FollowUser traveler walkingDead
FollowUser desktop culture_art
FollowUser ig_canonturk desktop
FollowUser culture_art culture_art
FollowUser culture_art ig_canonturk
FollowUser desktop olympics
FollowUser ig_canonturk traveler
FollowUser ig_canonturk olympics
FollowUser desktop olympics
FollowUser culture_art desktop
AddPost olympics 11 'World_cup_has_started'
AddPost olympics 13 'The_match_between_Barcelona_and_Manchester'
AddPost walkingDead 14 'Episode 12' 500x500
AddPost desktop 25 'New_GeForceFX_graphics_processor' 300x400
AddPost ig_canonturk 18 'Canon_11-25_lens_has_been_announced'
AddPost culture_art 19 'The_new_bond_movie_is_in_theaters!'
AddPost traveler 27 'Pegasus_airlines_raised_the_flight_prices'
AddPost traveler 33 'This_week_we_are_exploring_the_Grand_Canyon!'
AddPost olympics 44 'The_legend: Ali'
AddPost culture_art 7 'Full_Metal_Jacket: a Stanley_Kubrick_masterpiece' 340x560
AddPost desktop 12 'Intel_launches_the_new_9nm_chips'
AddPost walkingDead 67 'Episode_13_will_be_shown_at_channel_Starz'
AddPost culture_art 47 'Art_night_at_NYC: tonight'
AddPost traveler 81 'The_new_Bianchi_mountain_bikes_are_awesome'
AddPost ig_canonturk 34 'Nikon_announces_the_world's_first_100MP_sensor'
AddPost ig_canonturk 453 'Samyang_8mm_fisheye_lens_tests'
AddPost traveler 54 'Travel_with_a_rucksack_or_a_car?' 250x500
AddPost desktop 111 'The_upcoming_Windows:_Windows_10'
FollowUser traveler olympics
LikePost culture_art traveler 27
LikePost ig_canonturk olympics 44
LikePost walkingDead desktop 12
LikePost olympics traveler 81
LikePost desktop traveler 33
LikePost culture_art ig_canonturk 34
LikePost ig_canonturk olympics 13
LikePost olympics traveler 27
LikePost traveler desktop 111
FollowUser desktop olympics
ViewUser traveler
BlockUser olympics traveler
ViewUser traveler
ViewUser desktop
Repost desktop culture_art 47
ViewUser desktop
BlockUser desktop culture_art
ViewUser desktop
UnfollowUser ig_canonturk olympics
```

UnfollowUser ig\_canonturk olympics

## Output file

```
User 'walkingDead' has been created
User 'olympics' has been created
User 'culture_art' has been created
User 'traveler' has been created
User 'desktop' has been created
User 'ig_canonturk' has been created
walkingDead followed olympics
walkingDead followed desktop
olympics followed traveler
olympics followed walkingDead
olympics followed ig_canonturk
traveler followed ig_canonturk
traveler followed walkingDead
desktop followed culture_art
ig_canonturk followed desktop
culture_art followed culture_art
culture_art followed ig_canonturk
desktop followed olympics
ig_canonturk followed traveler
ig_canonturk followed olympics
Err: desktop has already followed olympics
culture_art followed desktop
traveler followed olympics
culture_art has liked traveler's post
ig_canonturk has liked olympics's post
walkingDead has liked desktop's post
olympics has liked traveler's post
desktop has liked traveler's post
culture_art has liked ig_canonturk's post
ig_canonturk has liked olympics's post
olympics has liked traveler's post
traveler has liked desktop's post
Err: desktop has already followed olympics

-----
traveler following [3] - blocked [0] users - [4] posts.
We_are_traveling_to..
-----Tweets-----
'Pegasus_airlines_raised_the_flight_prices' - Likes: 2
'This_week_we_are_exploring_the_Grand_Canyon!' - Likes: 1
'Travel_with_a_rucksack_or_a_car?' - TotalSize: [125000 pixels] - Likes: 0
'The_new_Bianchi_mountain_bikes_are_awesome' - Likes: 1
-----
olympics has blocked traveler

-----
traveler following [3] - blocked [0] users - [4] posts.
We_are_traveling_to..
-----Tweets-----
'Pegasus_airlines_raised_the_flight_prices' - Likes: 1
'This_week_we_are_exploring_the_Grand_Canyon!' - Likes: 1
'Travel_with_a_rucksack_or_a_car?' - TotalSize: [125000 pixels] - Likes: 0
'The_new_Bianchi_mountain_bikes_are_awesome' - Likes: 0
-----

-----
desktop following [2] - blocked [0] users - [3] posts.
Home_is_where_hard_drive_is
-----Tweets-----
'Intel_launches_the_new_9nm_chips' - Likes: 1
'New_GeForceFX_graphics_processor' - TotalSize: [120000 pixels] - Likes: 0
'The_upcoming_Windows:_Windows_10' - Likes: 1
```

```

-----
desktop has reposted culture_art's post
-----
desktop following [2] - blocked [0] users - [4] posts.
Home_is_where_hard_drive_is
-----Tweets-----
'Intel_launches_the_new_9nm_chips' - Likes: 1
'New_GeForceFX_graphics_processor' - TotalSize: [120000 pixels] - Likes: 0
'Art_night_at_NYC:_tonight' - Likes: 0
'The_upcoming_Windows:_Windows_10' - Likes: 1
-----
desktop has blocked culture_art
-----
desktop following [2] - blocked [1] users - [4] posts.
Home_is_where_hard_drive_is
-----Tweets-----
'Intel_launches_the_new_9nm_chips' - Likes: 1
'New_GeForceFX_graphics_processor' - TotalSize: [120000 pixels] - Likes: 0
'Art_night_at_NYC:_tonight' - Likes: 0
'The_upcoming_Windows:_Windows_10' - Likes: 1
-----
olympics has been unfollowed by ig_canonturk
Err: olympics has already been unfollowed by you! You cannot unfollow again.

```

## IMPORTANT

- Your input file will be at the same directory of your executable. Therefore ensure that your application is ready to read the input.txt where ever it exists. On the other hand, the output will be reflected to both screen and “out.txt” file. Furthermore, your “out.txt” file will be placed at the same directory of your executable. This is important! If your application does not read and write in the appropriate folder, then your mark will be degraded by -40 points.
- SAVE all your work until the experiment is graded.
- The assignment **must be original**, INDIVIDUAL work. Downloaded or modified source codes will be considered as cheating. Also the students who share their works will be punished in the same way.
- You can ask your question via course’s piazza group.

## SUBMISSIONS

- The experiment code will be tested in MinGW or a compatible C++ development environment.
- Your submission will be in the format below  
 <BBM203\_1516\_3\_StudentID>  
   |-- report  
       |-- report.pdf  
   |-- source  
       |-- All your solution folder
- You have to use “Online Experiment Submission System”.  
<http://submit.cs.hacettepe.edu.tr> Other type of submissions especially by e-mail WILL NOT BE ACCEPTED.
- Submission deadline is 30.11.2015 17.05 pm. **No further extension will be given!!!**

## REFERENCES

[1] [https://en.wikipedia.org/wiki/Linked\\_list](https://en.wikipedia.org/wiki/Linked_list)