Data Structure Homework C: Linked Lists

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Deadline: Oct. 23, 11:59pm

Implement Russian Roulette

This homework's objective is to use **a circular linked list** to Implement Russian Roulette.

Russian roulette is an illegal game of chance in which a player places a single round in a revolver, spins the cylinder, places the muzzle against his or her head, and pulls the trigger. "Russian" refers to the supposed country of origin, and roulette to the element of risk-taking and the spinning of the revolver's cylinder, which is reminiscent of a spinning roulette wheel. In this homework, just one player can survive. You can decide the number of players in the game. Each player has one in x chance of survival, where x is the number of spins in the revolver. For example, in this game, there are six players participated. The illustration of the processing about Russian roulette is shown in Figure 1. . The variable K is used as a specified number of players who are skipped. Therefore, in the first round, Tom is killed. The game keep going until the last player survives.
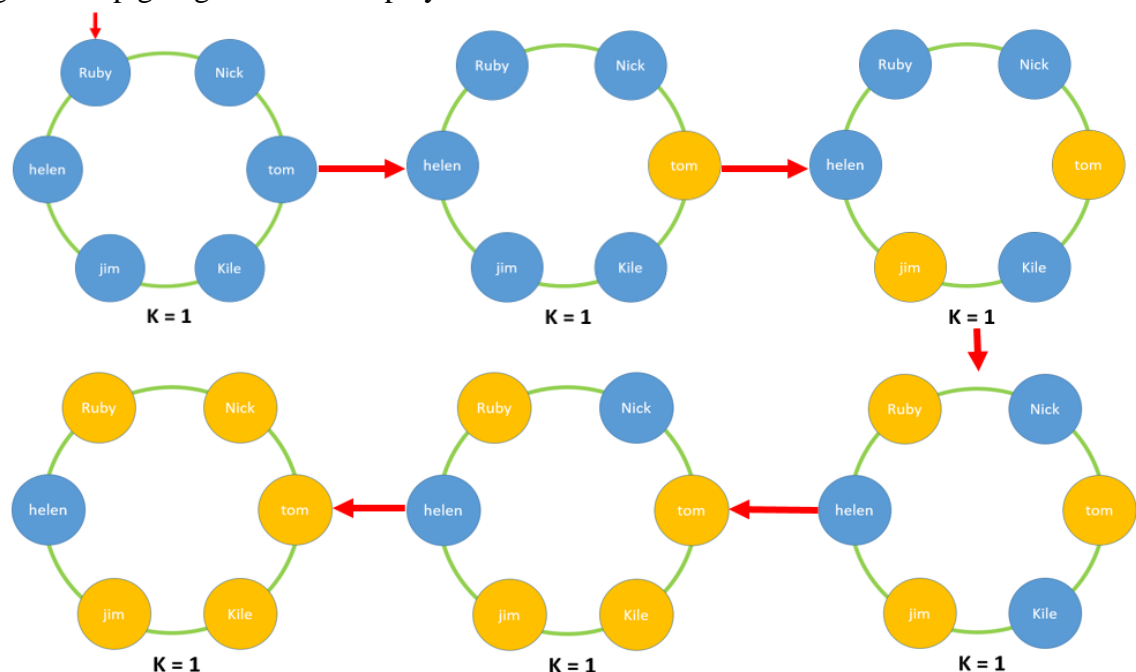

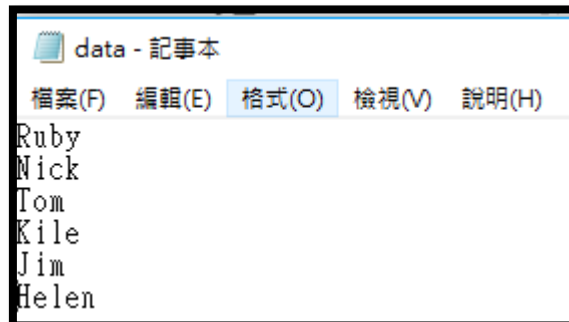Figure 1. An illustration of the Josephus problem.

1. Implementation

1.1 Read data from a file

Your program should read the input file and correctly display values with circular linked lists. Besides, please add an action menu so that user can choose (1) reading data from a file or (2) appending new nodes. Figure 2 shows an example for an action menu. If you choose (1) Read data from a file, the program reads a txt file directly and prints out the nodes. After that, the program requires the user to input a direction (left or right) and the program then randomly generates a number of players to be skipped (i.e. K) to start the algorithm. On the other hand, if you choose (2) appending new nodes, the program requires the user to input the members of players to be added, a direction, and the value of K. Figures 3and 4 show the above-mentioned processes. Figure 5 shows how to create nodes and input a skipped number.

```
What do you want to do?

        (1)Read data from a file
        (2)Append new nodes
        (0)Exit
```

Figure 2: An action menu

```
data - 記事本
檔案(F)  編輯(E)  格式(O)  檢視(V)  說明(H)
Ruby
Nick
Tom
Kile
Jim
Helen
```

```
1
Start read data from a file
Ruby is appended
Nick is appended
Tom is appended
Kile is appended
Jim is appended
Helen is appended
the list datas are :
[Ruby, Nick, Tom, Kile, Jim, Helen]
choose direction

        (1)rigth
        (2)left
```

Figure 3: Read data from a file

```
          (1)rigth
          (2)left
          1
the skip number is : 2
list length is : 6
the data is poped : Kile
list length is : 5
the data is poped : Ruby
list length is : 4
the data is poped : Jim
list length is : 3
the data is poped : Tom
list length is : 2
the data is poped : Helen
the last data is  : Nick
```

Figure 4: Choose a direction (left or right) by a user and random a skipped
number by the program as an input and

```
What do you want to do?

        (1)Read data from a file
        (2)Append new nodes
        (0)Exit
2
how many nodes do you want to append.
3
tom
tom is appended
patty
patty is appended
jim
jim is appended
[tom, patty, jim]
choose direction

        (1)rigth
        (2)left
```

```
[tom, patty, jim]
choose direction

        (1)rigth
        (2)left
        2
Input skip number
2
the skip number is : 2
list length is : 3
the data is poped : jim
list length is : 2
the data is poped : patty
the last data is  : tom
what do you want to do?
```
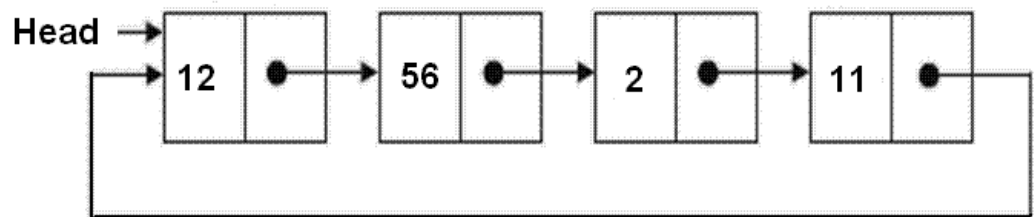
Figure5: Create nodes and input a skip number.

1.2   Circular Linked List

A circular linked list is a variation of a linked list in which the first element points to the last element and the last element points to the first element. There is no NULL at the end. Both a singly linked list and a doubly linked list can be used to make a circular linked list.

Please implement a program which creates a circular linked list and displays the elements in the list. Finally, use it to solve the Josephus problem.

2. Test case examples

Sample Input:	Sample Output:

1 (read a txt file)
For example, the random skipped number is 2 and the direction is 1 (right).
	``
	          (1)rigth
	          (2)left
	          1
	the skip number is : 2
	list length is : 6
	the data is poped : Kile
	list length is : 5
	the data is poped : Ruby
	list length is : 4
	the data is poped : Jim
	list length is : 3
	the data is poped : Tom
	list length is : 2
	the data is poped : Helen
	the last data is : Nick
	``

2 (input numbers)
For example,
Input Tom patty jim, the skipped number is 2 and the direction is 2 (left).
	``
	[tom, patty, jim]
	choose direction
	
	          (1)rigth
	          (2)left
	          2
	Input skip number
	2
	the skip number is : 2
	list length is : 3
	the data is poped : jim
	list length is : 2
	the data is poped : patty
	the last data is : tom
	What do you want to do?
	``

3. Submit

To submit your files electronically, enter the following command from the csie workstation:

　　turnin DS_I_2018.hw2 [your files…]

To check the files you turnin, enter the following command from the csie workstation:

　　turnin –ls DS_I_2018

You can see other description about turnin from following link:

https://www.cs.ccu.edu.tw/lab401/doku.php?id=turninhowto

4.

5% - Action menu.

15% - Read file and input new numbers.

45% - Circular Linked list and Russian roulette

30% - Result of examples.

5% - Readme file, coding style, and comments in the source code.

A document named "readme.txt". You should describe the details of your project in your readme file in English.