

Assignment 1

Dated: 23/10/2022

Task: Simulating Josephus Problem using circular linked lists

Submission Method:

You will submit the code files (.c, .h) zipped together along with a report describing your solution via the Teams-Portal. This is a group assignment (max 3 members) and you will make and deliver a presentation as well.

The Josephus problem:

In computer science and mathematics, the Josephus problem (or Josephus permutation) is a theoretical problem related to a certain counting-out game.

People are standing in a circle waiting to be executed. Counting begins at a specified point in the circle and proceeds around the circle in a specified direction. After a specified number of people are skipped, the next person is executed. The procedure is repeated with the remaining people, starting with the next person, going in the same direction, and skipping the same number of people, until only one person remains, and is freed.

The problem — given the number of people (**n**), starting point (**i**), direction, and number to be skipped (**k**) — is to choose the position in the initial circle to avoid execution.

The task:

Your task is to develop a circular linked-list based simulation of the Josephus problem. The simulation will be text based. The user should be presented with a text-based menu asking him to enter the total number of people (**n**), starting point (**i**), direction (clockwise/anti-clockwise) and number to be skipped (**k**). Your program then must populate a circular linked list with **n** nodes where data of each node should be their position in the circle (starting from 1), and their name. The names should be read randomly from the list of names provided (names.txt) and no names should be repeated.

Your program should then work iteratively printing the remaining persons after each iteration (round of killing). After the last iteration only the node with the winning initial position should be left in the list.

Example:

Let's take an example.

- For $n = 15$ (i.e. number of people is 15)
- $k = 2$ (i.e. every 2nd person is killed)
- starting point (i) = 1
- direction = clockwise

Initial scenario: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

After 1st iteration: 1 3 5 7 9 11 13 15

After 2nd iteration: 3 7 11 15

After 3rd iteration: 7 15

After 4th iteration: 15 (15 remains in the end). Program stops here.

Submission Deadline:

Sunday 23rd October 2022

References:

1. https://en.wikipedia.org/wiki/Josephus_problem
2. <https://www.geogebra.org/m/ExvvrBbR>
3. <https://youtu.be/uCsD3ZGzMgE>