PES University
Dept of CSE
Data Structures and its Applications Lab
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Lab 4 - Circular Singly Linked list

Josephus problem simulation with a circular linked list. Insert and delete at an offset.

Write a program to implement a Circular Singly Linked List and perform the following operations:

1. Insert at a specified position
2. Delete at a specified position
3. Josephus problem simulation
4. Display the list

Also, write a function to solve the Josephus Problem using a Circular List. Following is the problem statement:

N people are standing in a circle. The process begins at some point k in the circle and proceeds around the circle in a clockwise direction. The person at position k is skipped and the person at position k+1 is executed, then the person at position k+2 is skipped and the person at position k+3 is executed, and so on.
The execution proceeds around the circle (which is becoming smaller and smaller as the executed people are removed) until only one person remains.
Given the total number of people ‘n’ and a number ‘k’ which indicates the first person who is skipped, the task is to find the place in the initial circle so that you are the last one remaining.

Input Format:
Every new line has one of the following operation code and any data needed for the operation (For ex: The element that needs to be inserted):

0 - Exit the program
1 x p - Insert element 'x' at position p. If p is 0, insert it before the first element, and if p is length, insert it after the last element. No insertion is required if p is out of this range.
2 p - Delete node at position p. If p is 0, delete the first element and if p is length-1, delete the last element. No deletion is required if p is out of this range.
3 k - Find the safe position in the current linked list according to the Josephus problem. Delete alternate nodes starting from the node at offset 'k+1', until only one node remains. Print the data present in this node. k will always be given within the range 0 to length-1.
4 - Display the entire list. Print the elements space-separated. Print “EMPTY” in case of an empty list.

Output Format:
If the operation code is 3 (Josephus Problem), print the data in the last remaining node.
If the operation code is 4 (display list), print all the elements of the linked list in a space-separated manner. If the list is empty, just print “EMPTY”.

Note: If operation code 3 is executed correctly, the circular linked list should be reduced to size 1, containing only the safe node.