St. Francis Institute of Technology, Mumbai-400 103
Department of Information Technology

A.Y. 2023-24
Class: SE-ITA/B, Semester: III
Subject: DATA STRUCTURE LAB

Experiment – 9 Study of Josephus problem using circular linked list

1. Aim: Write a C program to implement Josephus problem using circular linked list.

2. Objectives: After study of this experiment, the student will be able to
- To learn the principles of queue and its various operations
- Implement an algorithm using computer to solve the given problem
- To learn the applications of queues and linked lists

3. Outcomes: After study of this experiment, the student will be able to

- Illustrate and examine the methods of queues to various real time problems

- Develop an algorithm for various problem on queues and linked lists

4. Prerequisite: Queue and its operations, Linked list and its types

5. Requirements: PC and Turbo C compiler version 3.0

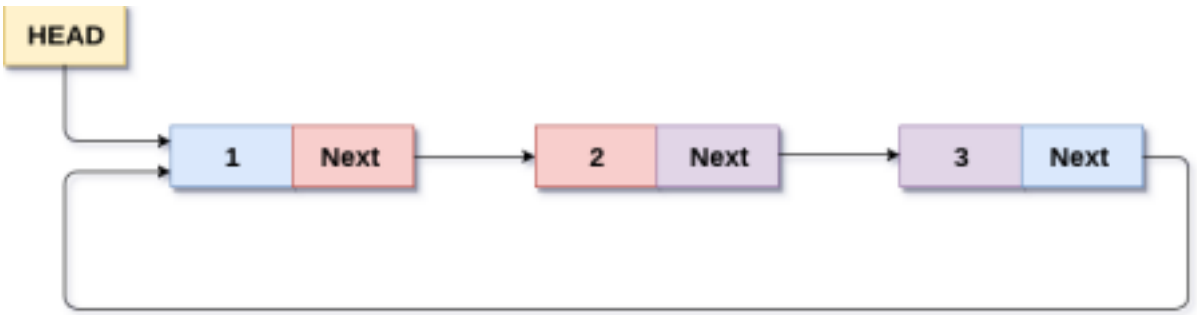
6. Pre-Experiment Exercise:

Brief Theory:

A. Circular Linked List

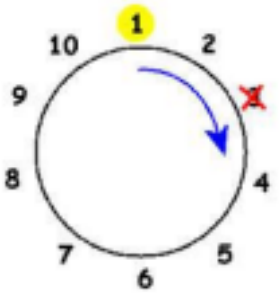
This mechanism is called First-In-First-Out (FIFO).

Circular Linked List is a variation of Linked list in which the first element points to the last element and the last element points to the first element. Both Singly Linked List and Doubly Linked List can be made into a circular linked list.



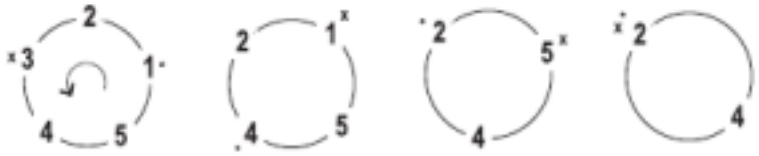
Circular Singly Linked List

D. Josephus Problem (application of queue)



- n number of people stand in a circle to be executed
- Counting starts at some point in circle
- Proceeds in a specific direction
- In each step k-1 number of people are skipped and k'th person is executed (deleted)
- At last step only one person remains and declared as winner.
- Example

  n = 5 and k =3



7. Laboratory Exercise

A. Procedure

Write a C program to implement Josephus problem using circular linked list.

B. Result/Observation/Program code:

Observe the output for the above code and print it.

8. Post-Experiments Exercise

A. Questions:

1. Solve the given example using Josephus problem considering there are 10 number of people in a circle. Start the process from 1st person, and at every step 4th person is to be executed. Show all the steps and identify the winner.

B. Conclusion:

1. Summary of Experiment
2. Importance of Experiment

C. References:

1. S. K Srivastava, Deepali Srivastava; Data Structures through C in Depth; BPB Publications; 2011.
2. Reema Thareja; Data Structures using C; Oxford.

3. Data Structures A Pseudocode Approach with C, Richard F. Gilberg & Behrouz A. Forouzan, second edition, CENGAGE Learning.
4. https://www.youtube.com/watch?v=uCsD3ZGzMgE&t=570s
