CE205 Data Structures

Week-3

Stacks, Queue Structures, and Related Algorithms and Problems.

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Outline-1

- Stack ADT
  - Stack Using Array
  - Stack Using Linked List
- Expressions
  - Infix
  - Postfix
  - Prefix
  - Infix to Postfix Conversion
  - Postfix Expression Evaluation

Outline-2

- Queue ADT
  - First Come First Serve, FCFS, FIFO
  - Queue Data structure Using Array
  - Queue Using Linked List
  - Circular Queue Data structure
  - Double Ended Queue Data structure
  - Multilevel Queue (MLQ)
- Hanoi Tower

Stack ADT

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/stack-adt.html

Stack Using Array

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/stack-using-array.html

Stack Using Linked List

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/stack-using-linked-list.html

Expressions

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/expressions.html
    - Infix
    - Postfix
    - Prefix

Infix to Postfix Conversion

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/infix-to-postfix.html

Postfix Expression Evaluation

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/postfix-evaluation.html

Queue ADT

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/queue-adt.html

First Come First Serve, FCFS, FIFO

- BTech Smart Class
  - http://www.btechsmartclass.com/downloads/lab-manuals/Operating-System-Lab-Manual-R18-JNTUH.pdf

Queue Data structure Using Array

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/queue-using-array.html

Queue Using Linked List

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/queue-using-linked-list.html

Circular Queue Data structure

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/circular-queue.html

Double Ended Queue Data structure

- BTech Smart Class
  - http://www.btechsmartclass.com/data_structures/double-ended-queue.html

Multilevel Queue (MLQ)

- Geeks for Geeks
  - https://www.geeksforgeeks.org/multilevel-queue-mlq-cpu-scheduling/

Hanoi Tower

- Geeks for Geeks
  - Recursive Version
    - Program for Tower of Hanoi - GeeksforGeeks
  - Iterative Version
    - Iterative Tower of Hanoi - GeeksforGeeks

Hanoi Tower Iterative Algorithm:

S = Source

A = Aux

D = Dest

Calculate the total number of moves required i.e.

$pow(2, n) - 1$ here n is number of disks.

Hanoi Tower Iterative Algorithm:

- If number of disks (i.e. n) is even then interchange destination pole and auxiliary pole.
- for i = 1 to total number of moves:
  - if i%3 == 1:
    - legal movement of top disk between source pole and destination pole
  - if i%3 == 2:
    - legal movement top disk between source pole and auxiliary pole
  - if i%3 == 0:
    - legal movement top disk between auxiliary pole and destination pole

$$End - Of - Week - 3$$