CE205 Data Structures Week-3

Stacks, Queue Structures and Related Algorithms and Problems.

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# 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](https://www.geeksforgeeks.org/c-program-for-tower-of-hanoi/)
  + Iterative Version
    - [Iterative Tower of Hanoi - GeeksforGeeks](https://www.geeksforgeeks.org/iterative-tower-of-hanoi/)

### Hanoi Tower Iterative Algorithm:

S = Source

A = Aux

D = Dest

Calculate the total number of moves required i.e.

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