Sunbeam Institute of Information Technology
Pune and Karad
PreCAT

Module – Data Structures

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Postfix Evaluation

- Process each element of postfix expression from left to right
- If element is operand
  - Push it on a stack
- If element is operator
  - Pop two elements (Operands) from stack, in such a way that
    - Op2 – first popped element
    - Op1 – second popped element
  - Perform current element (Operator) operation between Op1 and Op2
  - Again push back result onto the stack
- When single value will remain on stack, it is final result
- e.g. 4 5 6 * 3 / + 9 + 7 -

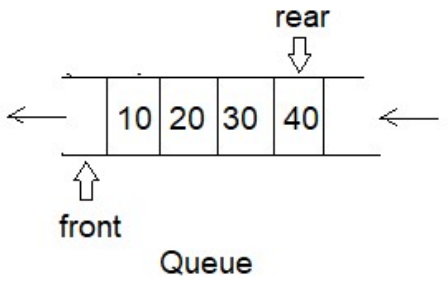
Prefix Evaluation

- Process each element of prefix expression from right to left
- If element is operand
  - Push it on a stack
- If element is operator
  - Pop two elements (Operands) from stack, in such a way that
    - Op1 – first popped element
    - Op2 – second popped element
  - Perform current element (Operator) operation between Op1 and Op2
  - Again push back result onto the stack
- When single value will remain on stack, it is final result
- e.g. - + + 4 / * 5 6 3 9 7

Stack and Queue

Queue

- Queue is First-In-First-Out structure.
- Queue Operations:
  - enqueue()
  - dequeue()
  - peek()
  - is_empty()
  - is_full()



Queue

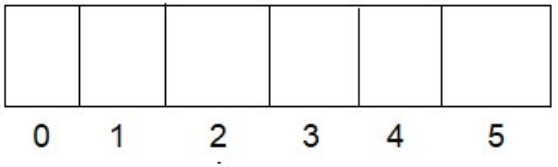
- Types of queue:
  - Linear Queue
  - Circular Queue
  - Deque
  - Priority Queue

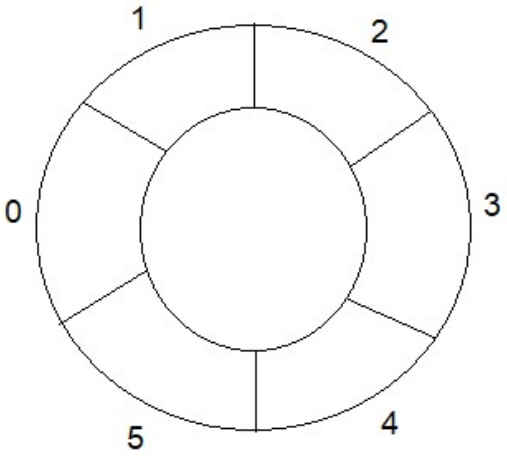
Queue Applications

- Jobs submitted to printer
- In Network setups – file access of file server machine is given to First come First serve basis
- Calls are placed on a queue when all operators are busy
- Used in advanced data structures to give efficiency.
- Process waiting queues in OS

Circular Queue

- In linear queue (using array) when *rear* reaches last index, further elements cannot be added, even If space is available due to deletion of elements from *front*. Thus space utilization is poor.
- Circular queue allows adding elements at the start of array if rear reaches last index and space is free at the start of the array.
- Thus rear and front can be incremented in circular fashion i.e. 0, 1, 2, 3, …, n-1, 0, 1, …n-1. So they are said to be circular queue.
- However queue full and empty conditions become tricky.

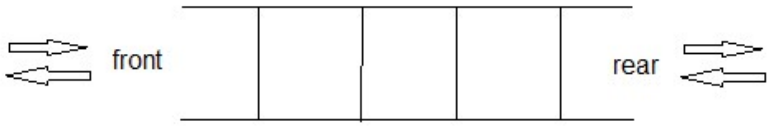




Deque and Priority Queue

Deque

- Double Ended Queue
- Insert and remove operations are possible from both end of queue.
- Operations can be performed as
  - Push front
  - Pop front
  - Push rear
  - Pop rear



Double Ended Queue

Priority Queue

- Each element is associated with priority.
- Elements are added by their priority.
- This queue is not FIFO
- Element with highest priority comes out first.

Thank you!

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