DATA STRUCTURES AND ALGORITHMS

Stack Data Structure

By
Zainab Malik

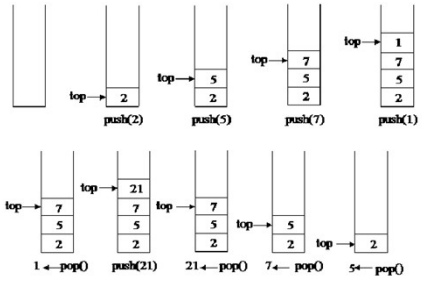
Content

- Introduction to Stack Data Structures
  - Properties of Stack
  - Operations of Stack
  - Applications of Stack
    - String reversal

Stack

- Stack is a linear data structure in which elements are added or removed from a single end that is known as the **top** of the stack.
- This single end entry ensures the first-in-last-out (FILO) or last-in-first-out (LIFO) order of insertion and deletion.
- By convention insertion and deletion in stack are termed as Push and Pop, respectively.

Stack



5

Operations of Stack

- The common operations of stack are as follow:
  - Push()
  - Pop()
  - isEmpty()
  - isFull()
  - topValue()

6

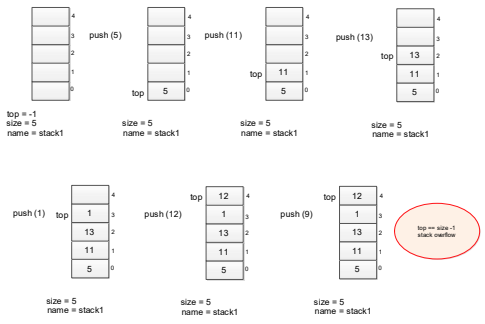
Operations of Stack-Push(item)

Push(item)

1. If Stack is already full:
2. Display an error of “overflow”
3. Otherwise:
4. Increment top
5. Insert value at top index

7

Operations of Stack-Push(item)



8

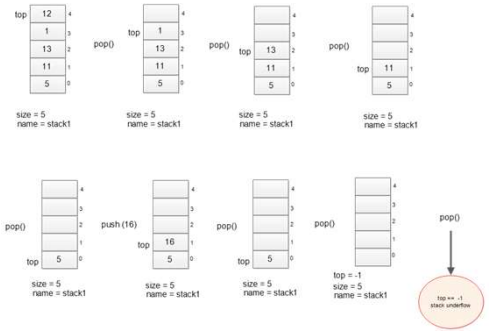
Operations of Stack-Pop()

Pop(stack):

1. If Stack is already empty:
2. Display an error of “underflow”
3. Otherwise:
4. Remove value from top index
5. Decrement top

9

Operations of Stack-Pop()

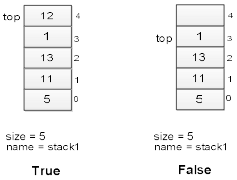


10

Operations of Stack-isFull()

isFull():

1. If top is at size-1:
2. Return true
3. Otherwise:
4. Return false

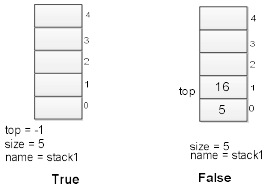


11

Operations of Stack-isEmpty()

isEmpty():

1. If top is at -1:
2. Return true
3. Otherwise:
4. Return false

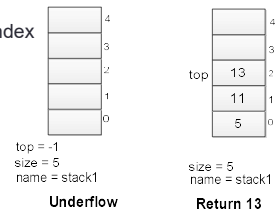


12

Operations of Stack-topValue()

topValue():

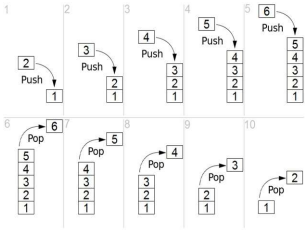
1. If top is at -1:
2. Display error “underflow”
3. Otherwise:
4. Return value at top index



13

Applications-String Reversal

1. Take input from user e.g. as text
2. Read input character by character till end
3. Push character on to the stack
4. Pop elements from stack till stack becomes empty



14

Thank You