

DATA STRUCTURES

Stack Data Structure

By
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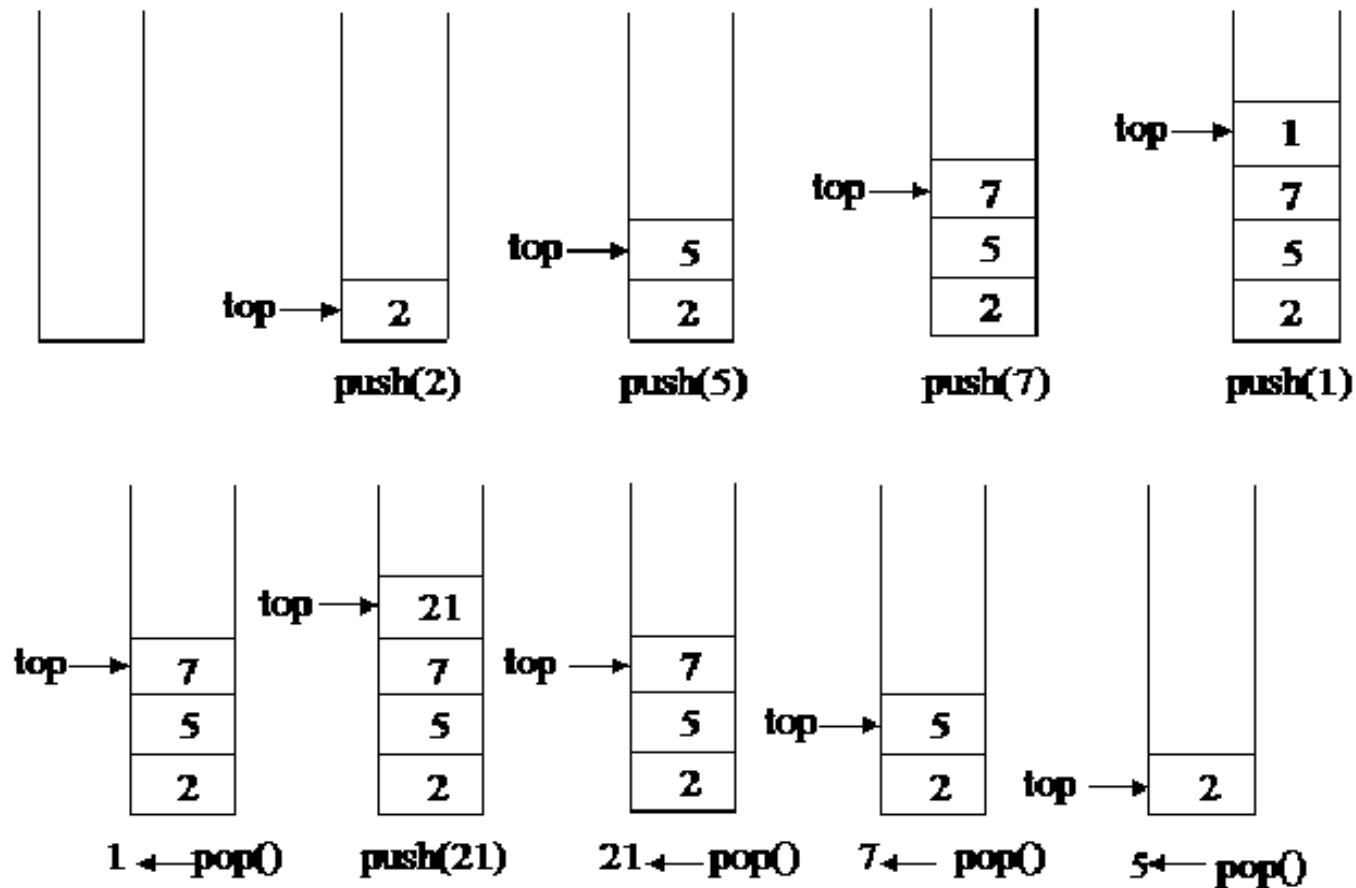
Content

- 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



Operations of Stack

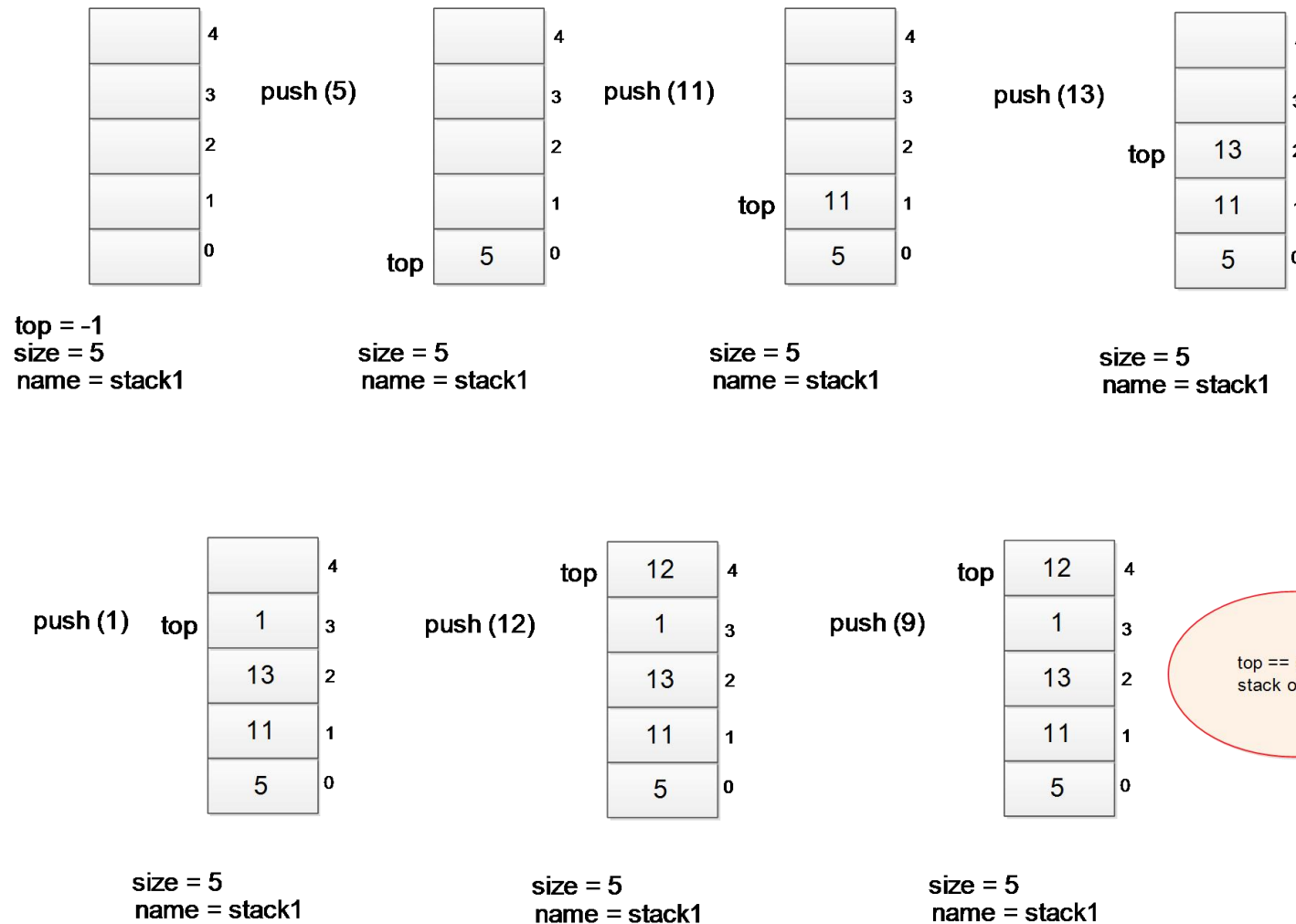
- The common operations of stack are as follow:
 - Push()
 - Pop()
 - isEmpty()
 - isFull()
 - topValue()

Operations of Stack-Push(item)

Push(stack, item)

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

Operations of Stack-Push(item)

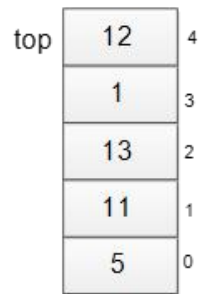


Operations of Stack-Pop()

Pop(stack):

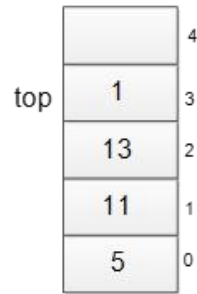
1. If Stack is already empty:
2. Display an error of “underflow”
3. Otherwise:
4. Remove value from top index
5. Decrement top

Operations of Stack-Pop()



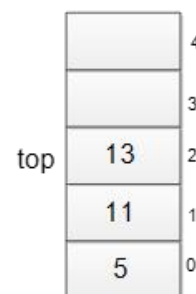
size = 5
name = stack1

pop()



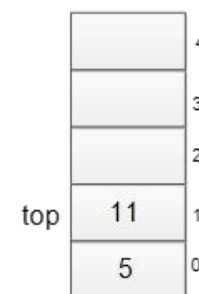
size = 5
name = stack1

pop()



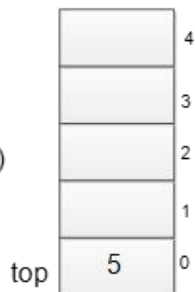
size = 5
name = stack1

pop()



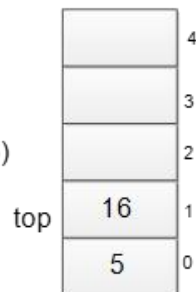
size = 5
name = stack1

pop()



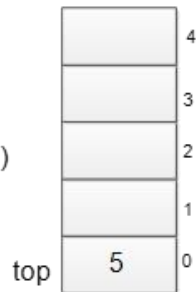
size = 5
name = stack1

push (16)



size = 5
name = stack1

pop()



size = 5
name = stack1

pop()



top = -1
size = 5
name = stack1

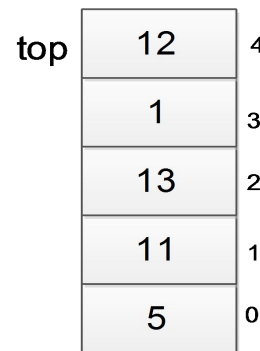
pop()

top == -1
stack underflow

Operations of Stack-isFull()

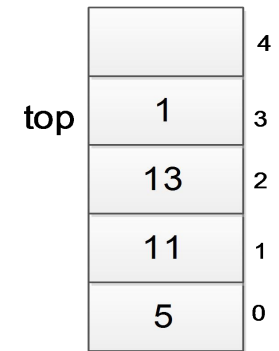
isFull():

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



size = 5
name = stack1

True



size = 5
name = stack1

False

Operations of Stack-isEmpty()

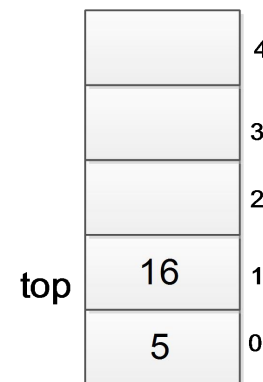
isEmpty():

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



top = -1
size = 5
name = stack1

True



size = 5
name = stack1

False

Operations of Stack-topValue()

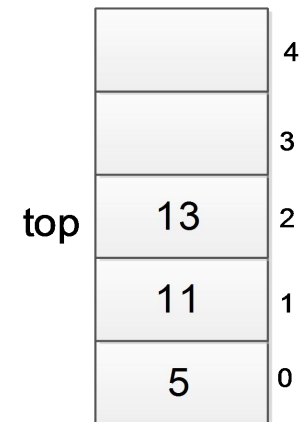
topValue():

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



top = -1
size = 5
name = stack1

Underflow

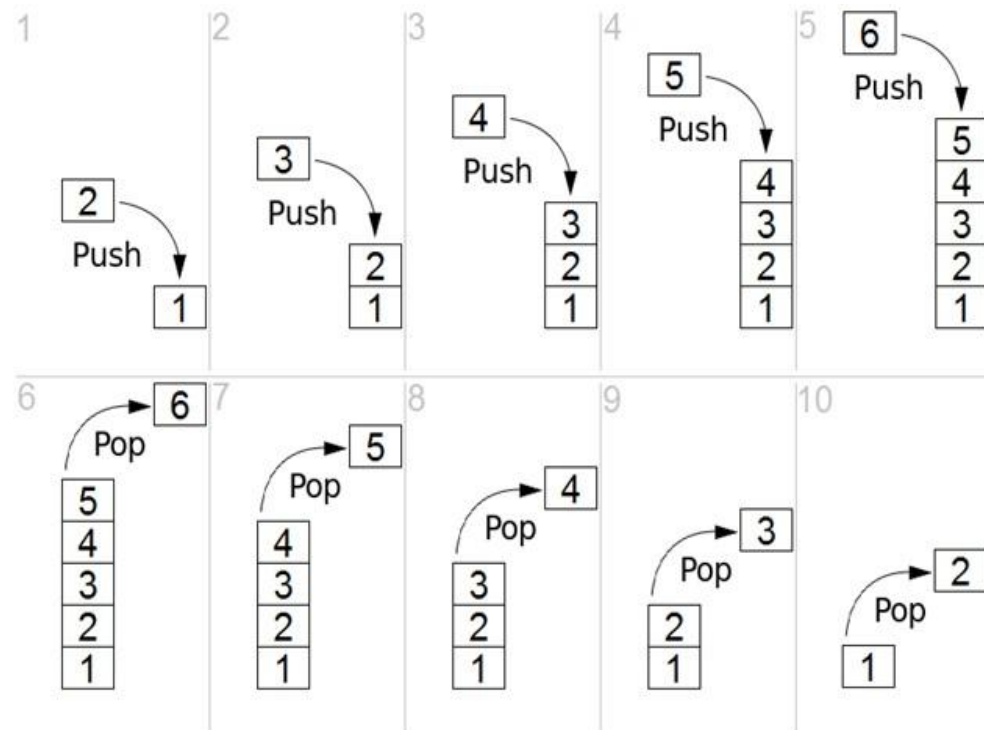


size = 5
name = stack1

Return 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



Thank You