Date : 30th - 09 - 2020
Morning Session : 9am – 11.00 PM
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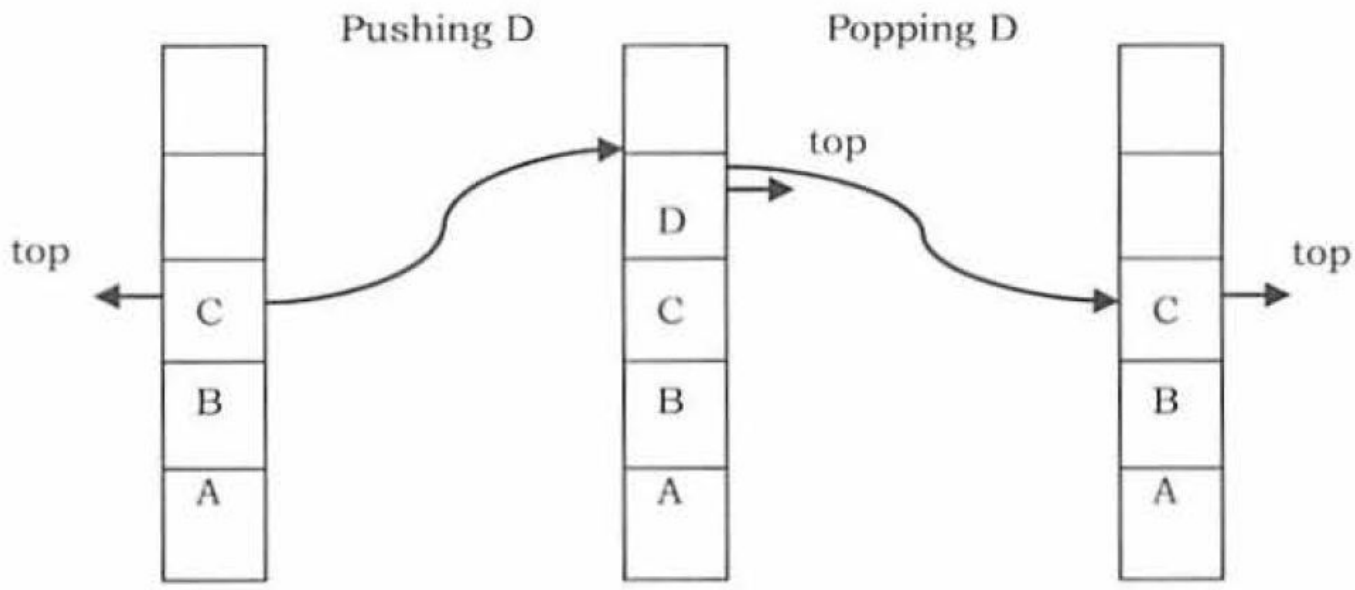
Topics: Stack Part-1

Stack :A stack is an ordered list in which insertion and deletion are done at the one end, called top. The last element inserted is the first one to be deleted. Hence, il is called the Last in First out (LIFO) or First in Last out (FILO) list.

An item in stack must be inserted or removed from the stack at the same end.



In the stack a list with insertion the restriction that insertion and deletion can be performed only from one end.

Types of Operations:

1) **Push:** Adds an item in the stack. If the stack is full, then it is said to be an Overflow condition.
2) **Pop:** Removes an item from the stack. The items are popped in the reversed order in which they are pushed. If the stack is empty, then it is said to be an Underflow condition.
3) **Peek or Top:** Returns top element of stack.
4) **isEmpty:** Returns true if stack is empty, else false.

to understand a stack practically?

There are many real-life examples of a stack. Consider the simple example of plates stacked over one another in a canteen. The plate which is at the top is the first one to be removed, i.e. the plate which has been placed at the bottommost position remains in the stack for the longest period of time. So, it can be simply seen to follow LIFO/FILO order.

Time Complexities of operations on stack:

push(), pop(), isEmpty() and peek() all take O(1) time. We do not run any loop in any of these operations.

Applications of Stack:

1) **Recursions() / Function call**
2) **Undo Operation/ Text Editor,**
3) **Balanced parentheses in code editor**
4) **Matching tags in HTML**
5) **Page visited history (back button)**

1) **Reverse a String using Stack String = “hello world”**

```python
def createStack():
    stack=[]
    return stack
def size(stack):
    return len(stack)
def isEmpty(stack):
    if size(stack) == 0:
        return true
def push(stack,item):
    stack.append(item)
def pop(stack):
    if isEmpty(stack): return
    return stack.pop()
def reverse(string):
    n = len(string)
    stack = createStack()
    for i in range(0,n,1):
        push(stack,string[i])
    string=""
    for i in range(0,n,1):
        string+=pop(stack)
    return string
string="Hello World"
string = reverse(string)
print("Reversed string is " + string)
```

Check whether string is palindrome or not

```python
def isPalindrome(s):
    return s == s[::-1]
s = "malayalam"
ans = isPalindrome(s)

if ans:
    print("Yes")
else:
    print("No")
```

Implement 2 stacks in an array

https://www.youtube.com/watch?v=BjODIZvW4no&feature=emb_logo

Question 1

Stack in Data Structure is _____.

A LIFO

B FIFO

C None of these

D LILO

Answer: A , LIFO

Question 2

In the stack process of inserting an element in the stack is called as _____.

A Create

B Push

C Evaluation

D Pop

Answer: B, Push

MCQ 3:

In the stack, If user try to remove element from the empty stack then it called as _____.

A Underflow of Stack

B Empty Collection

C Garbage Collection

D Overflow of Stack

Answer: A, Underflow of Stack

MCQ 4:

User perform following operations on stack of size 5 then -

```
push(1);
pop();
push(2);
push(3);
pop();
push(4);
pop();
pop();
push(5);
```

at the end of last operation, total number of elements present in the stack are -

A 2

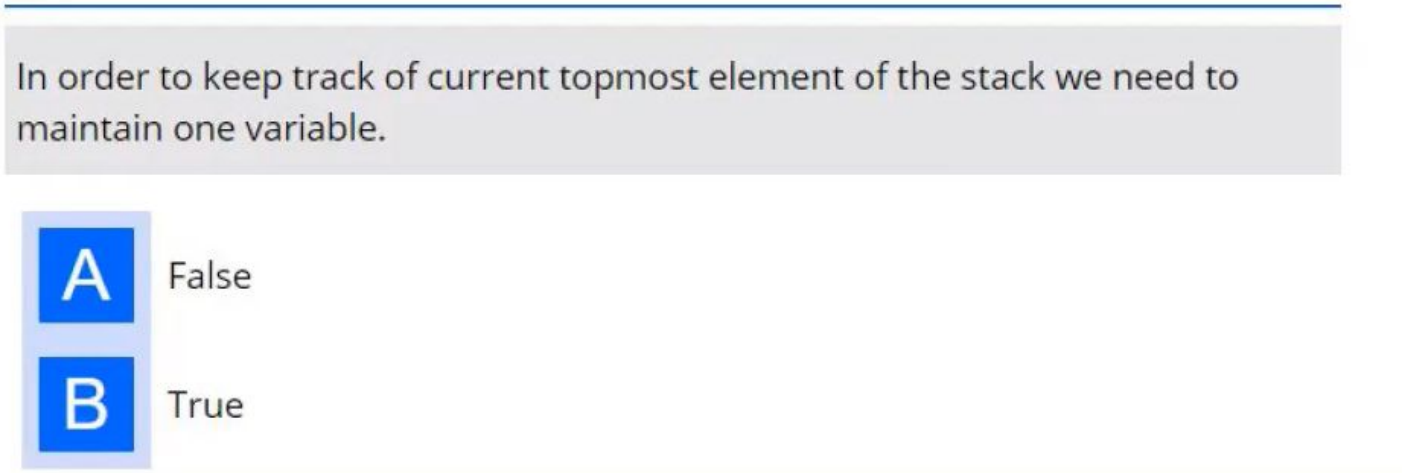
B 4

C 1

D 3

Answer: C, 1

MCQ 5:



Answer: B, True

Resource:

https://www.geeksforgeeks.org/stack-data-structure-introduction-program/