



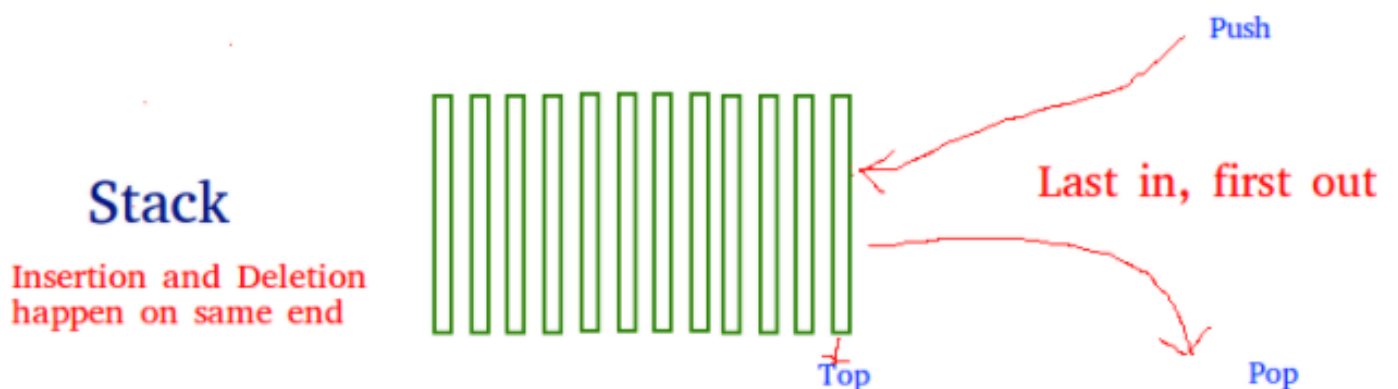
## Chapter 9:

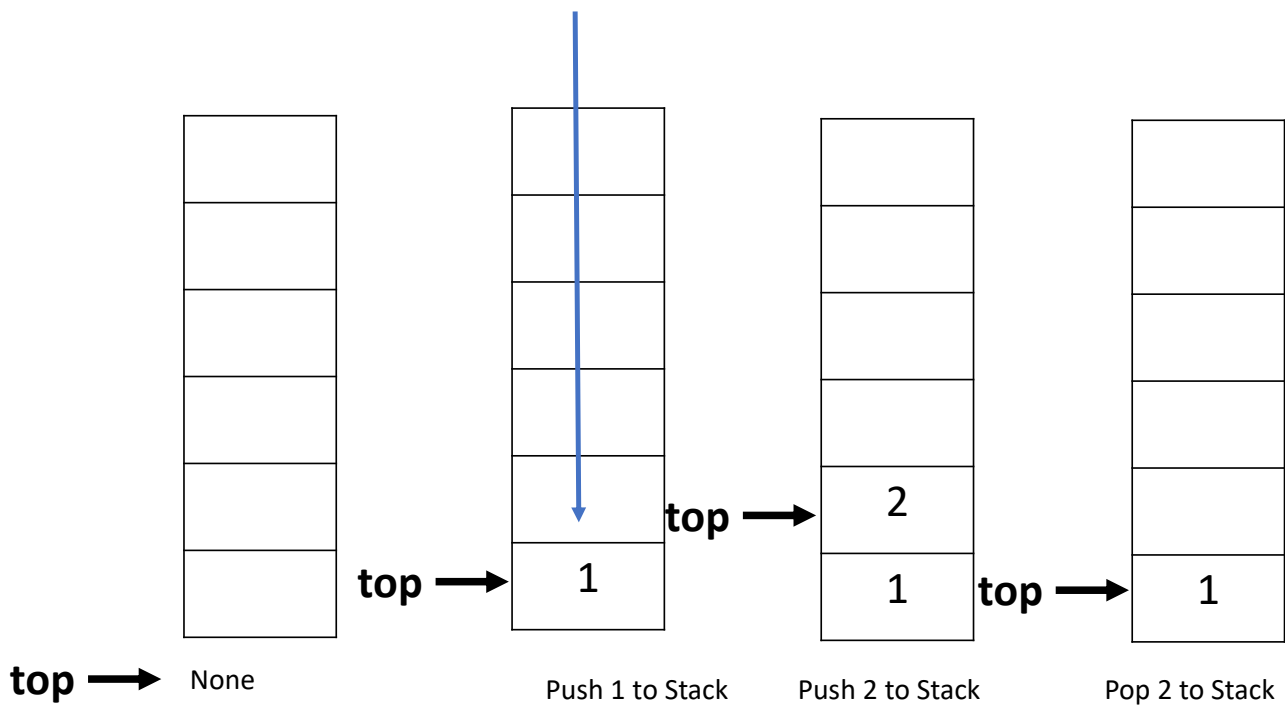
### Data Structure -2 Stacks Using Linear List

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## Introduction

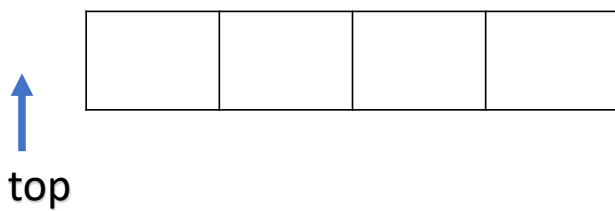
A stack is a linear data structure that stores items in a Last-In/First-Out (LIFO) or First-In/Last-Out (FILO) manner. In stack, a new element is added at one end and an element is removed from that end only. The insert and delete operations are often called *push* and *pop*.



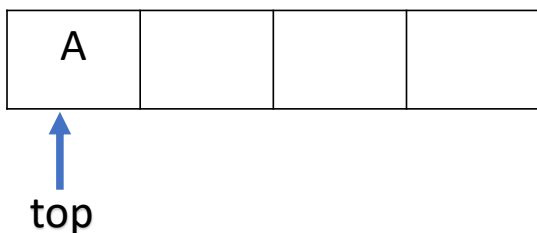


Given a Bounded Stack of capacity 4 which is initially empty, draw pictures of the stack after each of the following steps. Initially the stack is empty.

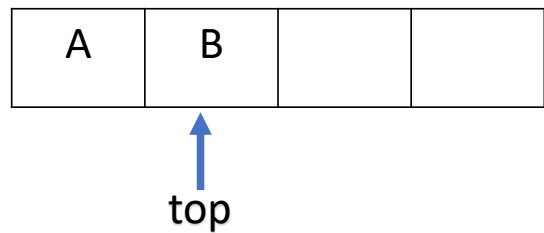
1. stack is empty.



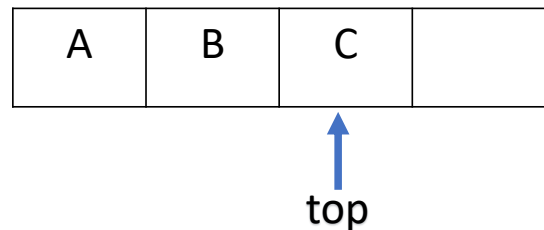
2. Push A.



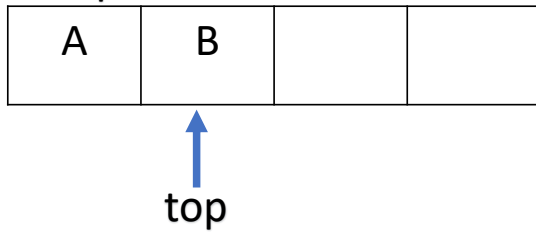
3. Push B.



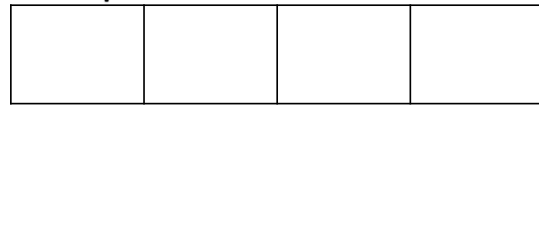
4. Push C.



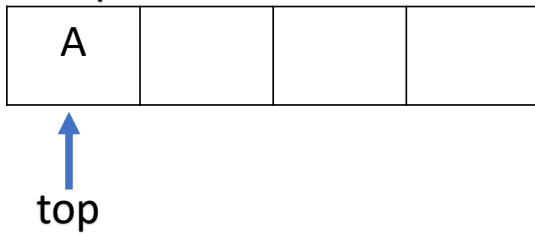
5. Pop C.



7. Pop A.



6. Pop B.



```
#WAP to perform the following operation in a
#Stack using List
#          1. Push
#          2. Pop
#          3. Display
#          4. exit

def isEmpty(stk):
    if (stk==[]):
        return True
    else:
        return False

def Push(stk,item):
    global top
    stk.append(item)
    if top==None:
        top=0
    else:
        top=top+1
```

```

def Pop(stk):
    global top
    if isEmpty(stk):
        return "Underflow"
    else:
        item=stk.pop()
        if(len(stk)==0):
            top=None
        else:
            top=top-1
        return item

def Display(stk):
    global top
    if (isEmpty(stk)):
        print("Underflow stack is empty can not display")
    else:
        for i in range(top,-1,-1):
            print (stk[i])

```

```

#_main_
Stack=[]
top=None
ans='y'
while (ans=='y'):
    print("Stack Operations")
    print("Press 1 to Push")
    print("Press 2 to Pop")
    print("Press 3 to Display")
    print("Press 4 to exit")
    ch=int(input("Enter your choice"))
    if (ch==1):
        item=int(input("Enter Item Value"))
        Push(Stack,item)

```

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elif(ch==2):
    item=Pop(Stack)
    if (item=="Underflow"):
        print("Underflow ! Stack is Empty")
    else:
        print("Popped item is ",item)
elif(ch==3):
    Display(Stack)
elif(ch==4):
    break
else:
    print("Invalid choice")

ans=input("Do you wish to continue")

```

## Evaluate the expression

Expression: 5 6 2 + \* 12 4 / -

Input	Operation	Stack	Intermediate Calculation
5	PUSH	5	
6	PUSH	5 6	
2	PUSH	5 6 2	
+	POP	5 8	6+2=8
*	POP	40	5*8=40
12	PUSH	40 12	
4	PUSH	40 12 4	
/	POP	40 3	12/4=3
-	POP	37	40-3=37

## Evaluate the expression

Expression: 4 10 5 + \* 15 3 / -

Input	Operation	Stack	Intermediate Calculation
4	PUSH	4	
10	PUSH	4 10	
5	PUSH	4 10 5	
+	POP	4 15	10 +5 =15
*	POP	60	4*15=60
15	PUSH	60 15	
3	PUSH	60 15 3	
/	POP	60 5	15/3=5
-	POP	55	60-5=55

## Evaluate the expression


Expression: F T NOT OR T F AND OR

Input	Operation	Stack	Intermediate Calculation
F	PUSH	F	
T	PUSH	F T	
NOT	POP	F F	NOT T=F
OR	POP	F	F OR F =F
T	PUSH	F T	
F	PUSH	F T F	
AND	POP	F F	T AND F= F
OR	POP	F	F OR F=F

## INFIX TO POSTFIX EXPRESSION

Operator's Precedence High to low

	( )	
	^	
	* , /	
	+ , -	



## INFIX TO POSTFIX EXPRESSION

$(X+Y)/(Z*Y)-R$

Expression:  $A+(B-C)*D/E^F$

(  $A+(B-C)*D/E^F$  )

INPUT	STACK	EXPRESSION
(	(	
A	(	A
+	(+	A
(	(+(	A
B	(+(	AB
-	(+(-	AB
C	(+(-	ABC
)	(+(-)	ABC-
*	(+*	ABC-
D	(+*	ABC-D
/	(+*/	ABC-D*
E	(+/*	ABC-D*E
^	(+/*	ABC-D*E
F	(+/*	ABC-D*EF
)	(+/*)	ABC-D*EF^/+



# Thank You

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