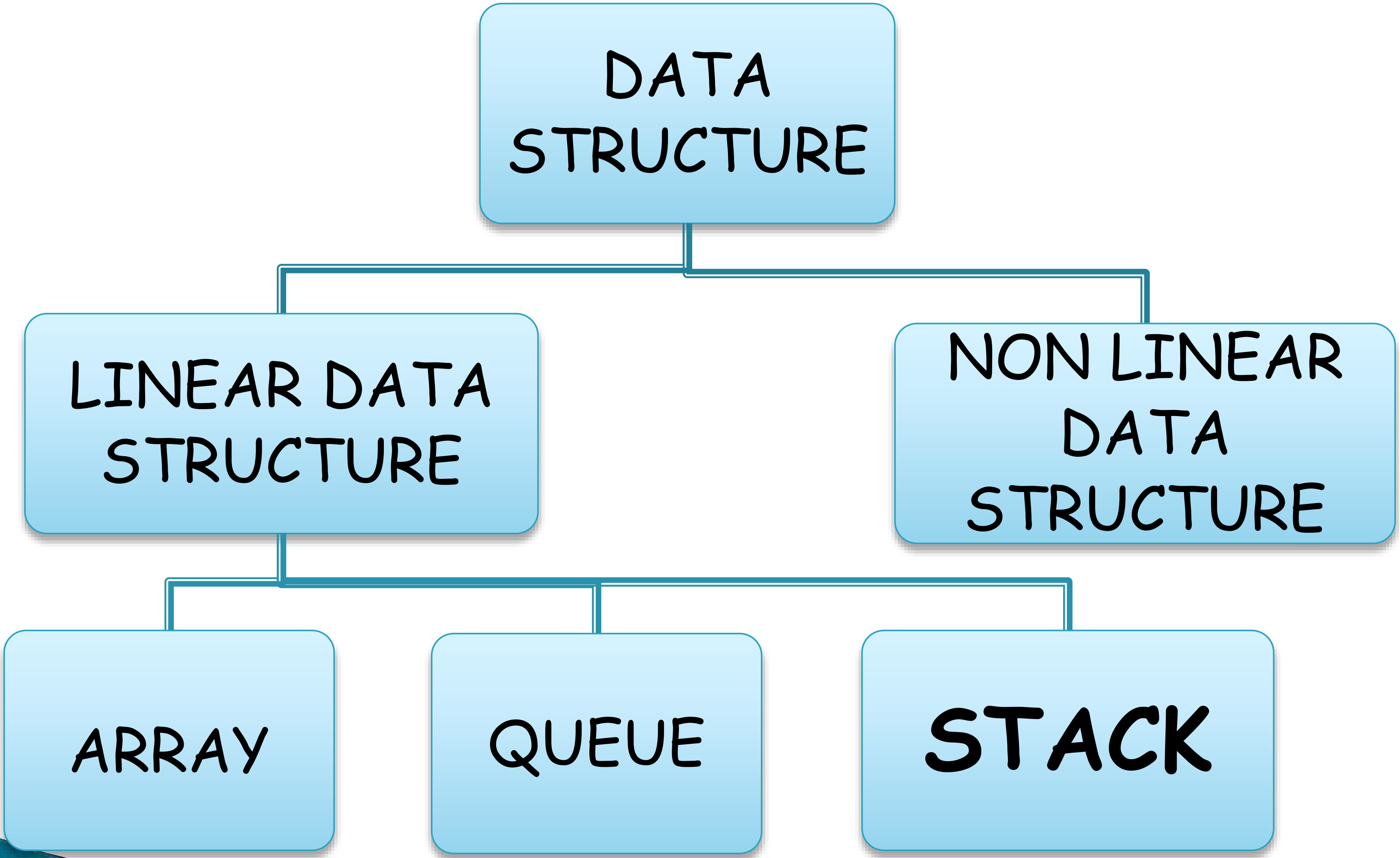

DATA STRUCTURE
LINEAR DATA STRUCTURE
NON LINEAR DATA STRUCTURE
ARRAY
QUEUE
STACK

What is Linear Data Structure

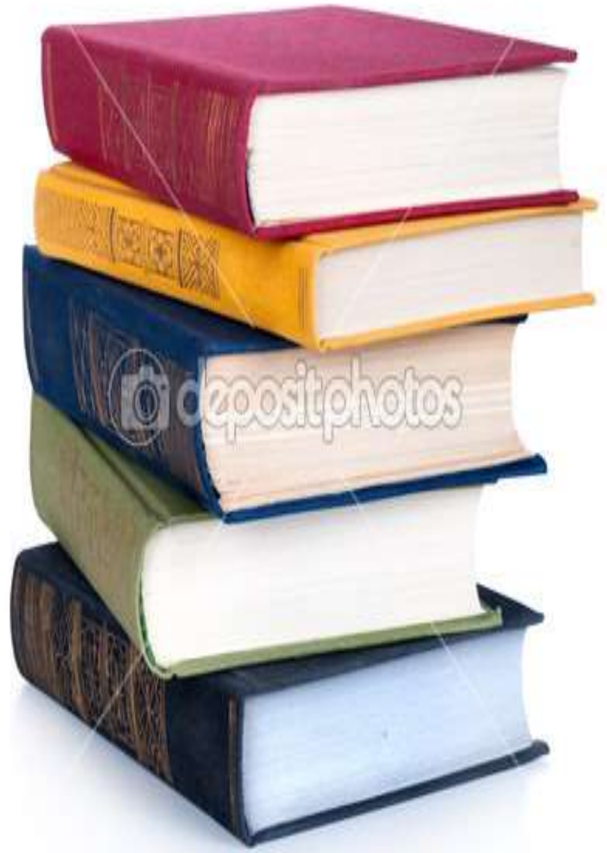
- In linear data structure, data is arranged in linear sequence.
- Data items can be traversed in a single run.
- In linear data structure elements are accessed or placed in contiguous(together in sequence) memory location.

WHAT Is stack

- A stack is called a last-in-first-out (LIFO) collection. This means that the last thing we added (pushed) is the first thing that gets pulled (popped) off.

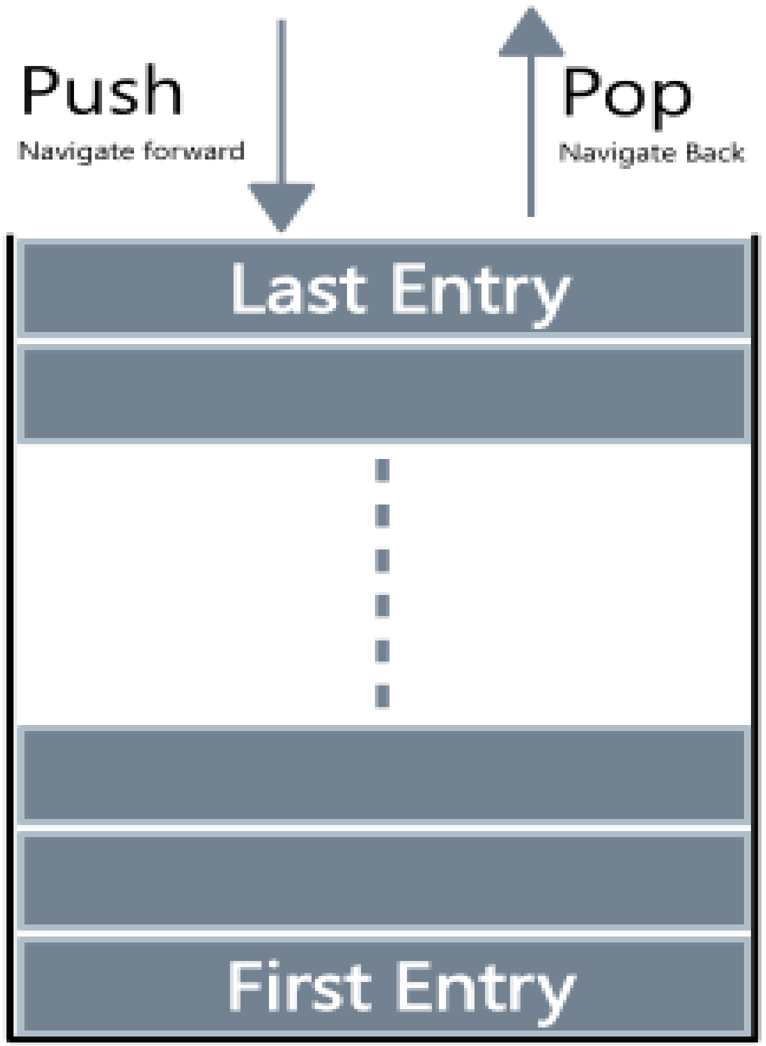
- A stack is a sequence of items that are accessible at only one end of the sequence.

EXAMPLES OF STACK:



Operations that can be performed on STACK:

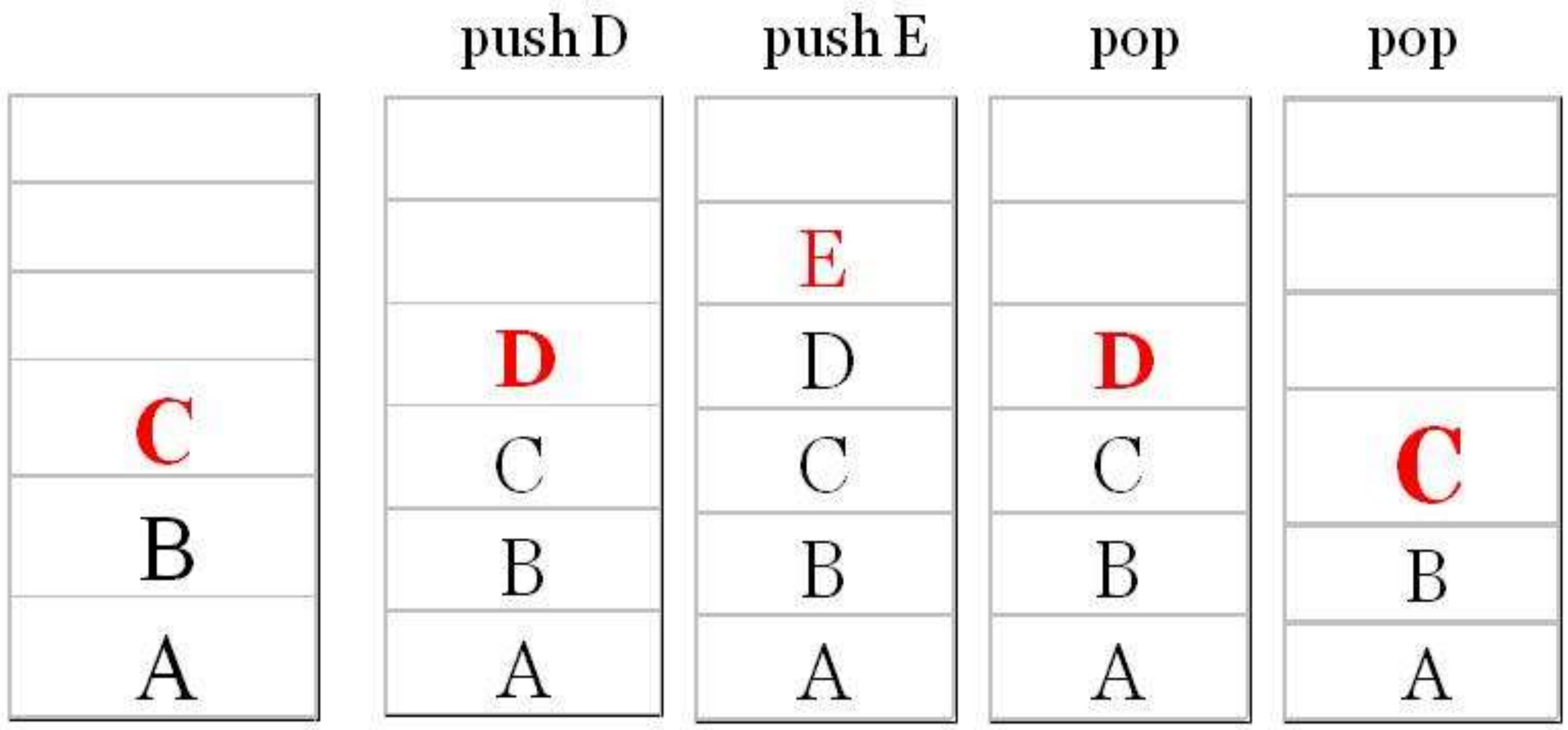
- PUSH.
- POP.



PUSH : It is used to insert items into the stack.

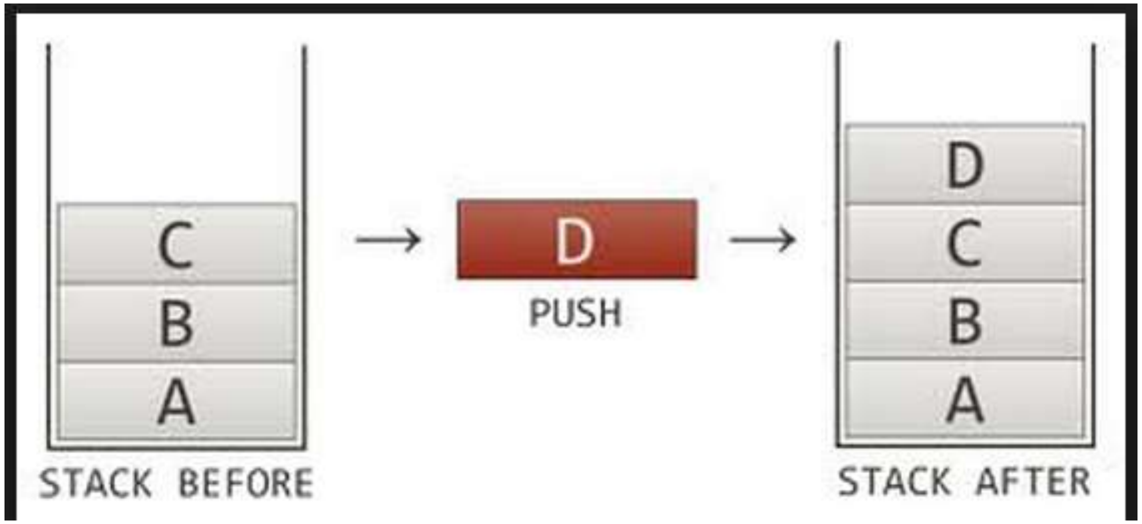
POP: It is used to delete items from stack.

TOP: It represents the current location of data in stack.



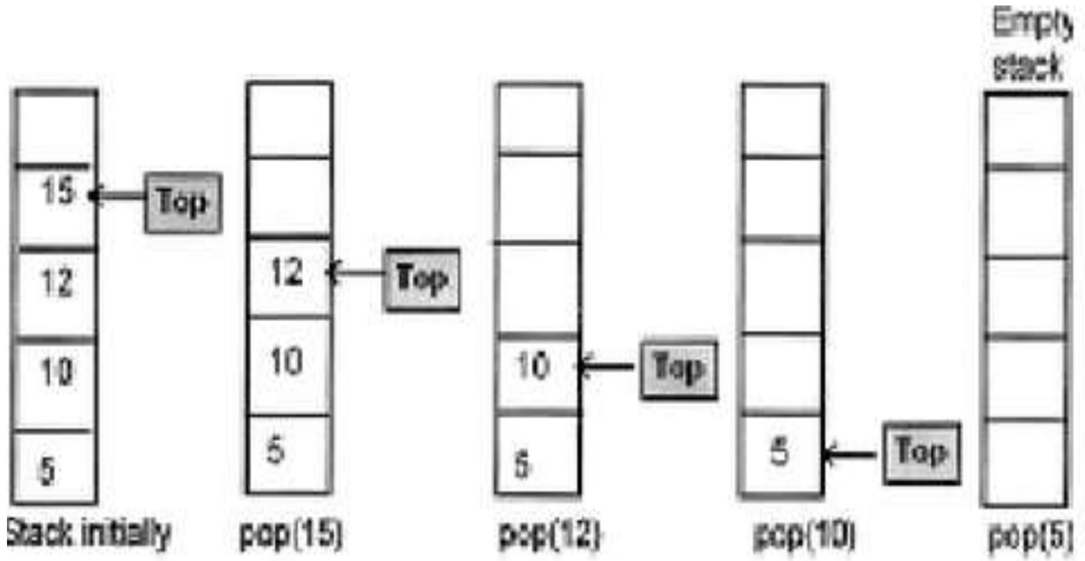
ALGORITHM OF INSERTION IN STACK: (PUSH)

```
1.  Insertion(a,top,item,max)
2.  If top=max then
    print 'STACK OVERFLOW'
    exit
    else
3.  top=top+1
    end if
4.  a[top]=item
5.  Exit
```



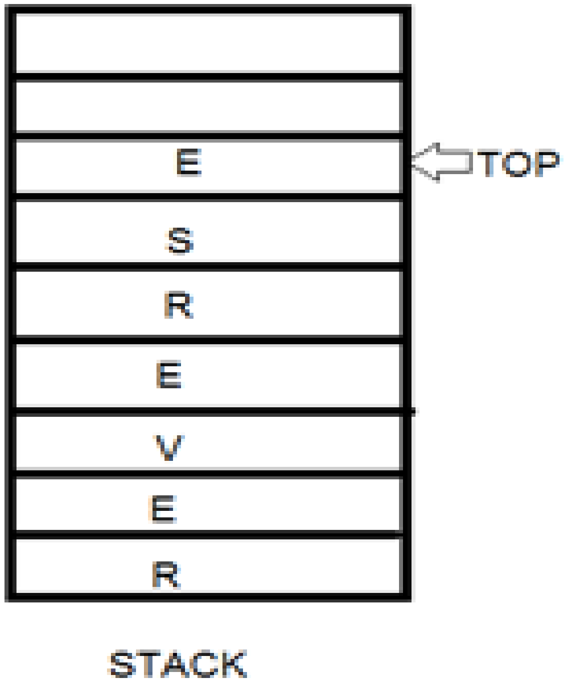
ALGORITHM OF DELETION IN STACK: (POP)

```
1. Deletion(a,top,item)
2. If top=0 then
      print 'STACK UNDERFLOW'
      exit
      else
3.    item=a[top]
      end if
4. top=top-1
5. Exit
```



ALGORITHM OF DISPLAY IN STACK:

```
1.Display(top,i,a[i])
2.If top=0 then
 Print 'STACK EMPTY'
 Exit
 Else
3.For i=top to 0
  Print a[i]
  End for
4.exit
```



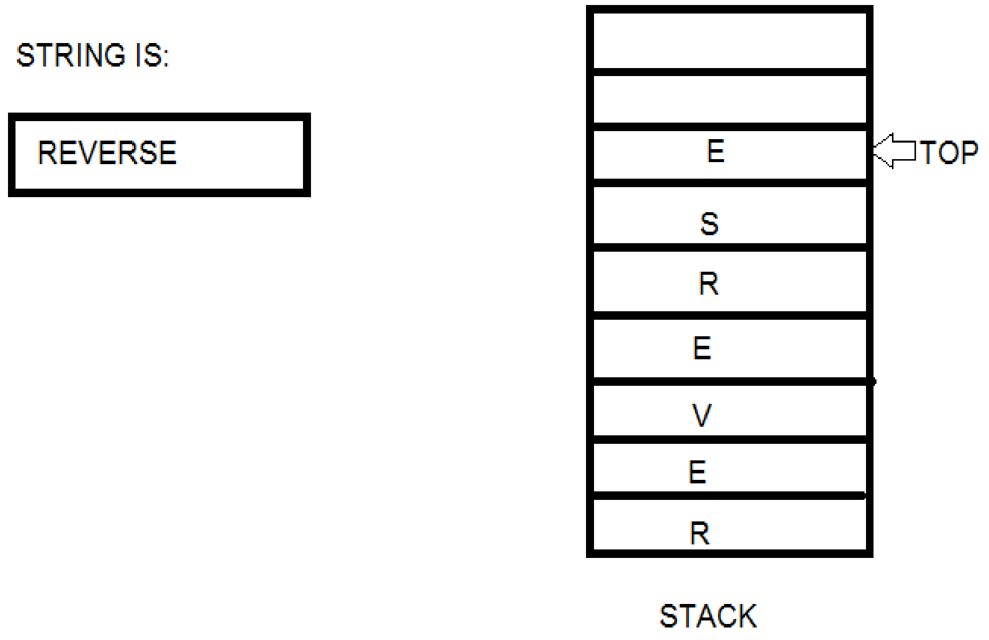
APPLICATIONS OF STACKS ARE:

I. Reversing Strings:

- A simple application of stack is reversing strings. To reverse a string , the characters of string are pushed onto the stack one by one as the string is read from left to right.
- Once all the characters of string are pushed onto stack, they are popped one by one. Since the character last pushed in comes out first, subsequent pop operation results in the reversal of the string.

For example:

To reverse the string 'REVERSE' the string is read from left to right and its characters are pushed . LIKE:



II. Checking the validity of an expression containing nested parenthesis:

- Stacks are also used to check whether a given arithmetic expressions containing nested parenthesis is properly parenthesized.
- The program for checking the validity of an expression verifies that for each left parenthesis braces or bracket ,there is a corresponding closing symbol and symbols are appropriately nested.

For example:

VALID INPUTS	INVALID INPUTS

{ }
({ [ ] })
{ [ ] ( ) }
[{ ({ } [ ] ({ })}]
	{ (}
	([(( )])
	{ } [ ])
	[{) } ( ] }]

III. Evaluating arithmetic expressions:

<u>INFIX notation:</u>

The general way of writing arithmetic expressions is known as infix notation.

e.g, (a+b)

<u>PREFIX notation:</u>

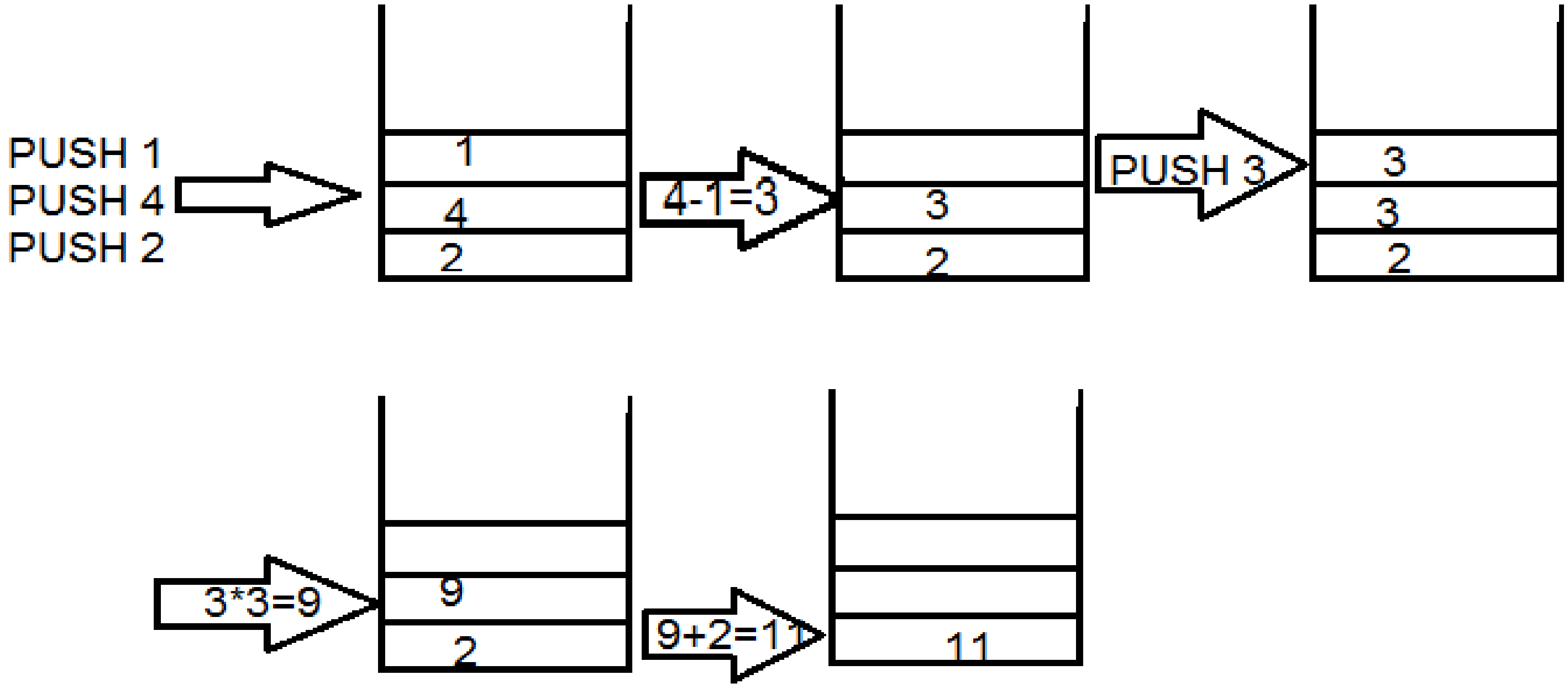
e.g, +AB

<u>POSTFIX notation:</u>

e.g: AB+

Conversion of INFIX to POSTFIX conversion:

Example:	2+(4-1)*3	step1
	2+41-*3	step2
	2+41-3*	step3
	241-3*+	step4



CONVERSION OF INFIX INTO POSTFIX

2+(4-1)*3 into 241-3*+

CURRENT SYMBOL	ACTION PERFORMED	STACK STATUS	POSTFIX EXPRESSION
(	PUSH C	C	2
2			2
+	PUSH +	(+	2
(	PUSH (	(+(	24
4			24
–	PUSH –	(+(–	241
1	POP		241–
)		(+	241–
*	PUSH *	(+*	241–
3			241–3
	POP *		241–3*
	POP +		241–3*+
)			

THANK YOU ☺