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DSA LAB - 6

Theory

1) A. Stack is an ordered list of the same type of elements. It is linear list where all insertions and deletions are permitted only at one end of the list. The order may be LIFO (Last in First out) or FILO (First in Last out).

It has two main principal operations:

(i) Push, which adds an element to the collection.

(ii) Pop, which removes the most recently added element that was not yet removed.

2) A. Operations can be performed on stack:

i) PUSH:

This operation performs inserting an element in the stack. The inserted new element is appended at the top of the stack.

2) POP:

This operation performs removing an element from the stack. The element at the top of the stack will be removed always.

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3) PEEK:

This operations allows the user to see the element on the top of the stack. The stack is not modified in any manner.

4) isEmpty:

To prevent performing operations on an empty stack, the programmer is required to internally maintain the size of the stack which will be updated during push and pop. So, isEmpty returns a boolean value; True if size is 0, else False.

3)A. Applications of Stack:

1) Used in expression evaluation.
2) Used to check parenthesis matching in an expression.
3) Used for conversion from one form of expression to another
4) Used for Memory management.
5) Used in backtracking problems.

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4)A. Stack is formed by using array is called array implementation. All the operations regarding the stack are performed using arrays.

Stack operations using arrays.

Push:

1) Increment the variable top so that it can now refere to the next memory location.
2) Add element at the top of incremented toop. This is referred to as adding new element at the top of stacks.

POP:

This is deletion of element from the top of the stack. The valve of the variable top will be incremented by 1 whether an item is deleted from the stack. The top most element of the stack is stored in an another variable and then top is decremented by 1, the operation returns deleted valve that was stored in another variable as the result.

PEEK:

This is visiting each element of the stack. Peek returns the element which is at the top of the stack without deleting it.

5) A. Algorithm for PUSH operation:

Step 1: Start
Step 2: IF TOP = MAX - 1, then
PRINT "OVERFLOW"
Go to step 5
Step 3: SET TOP = TOP + 1
Step 4: SET STACK [TOP] = VALUE
Step 5: Stop

Algorithm for POP operation:

Step 1: Start
Step 2: IF TOP = NULL, then
PRINT "UNDERFLOW"
GO TO Step 5
Step 3: SET VAL = STACK [TOP]
Step 4: SET TOP = TOP - 1
Step 5: Stop

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Algorithm for PEEK operation:

Step 1: start
Step 2: IF TOP = NULL, then
PRINT "STACK IS EMPTY"
Go to Step 4
Step 3: RETURN STACK[TOP]
Step 4: Stop