October 7

Stack - linear Data structure which follows a particular order in which operations are performed.

1) LIFO (Last In first out)

2) FILO (first in first out)

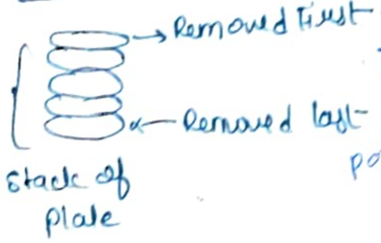
Operations in stack.

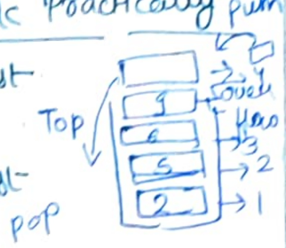
(a) push - add an item + If stack is full → overflow condn

(b) pop - removes an item (items are popped in reverse order in which they are pushed) + If stack is empty → under flow condition (d) Isempty / Is full

(c) Peek - Getting Top most item.

Understanding stack Practically





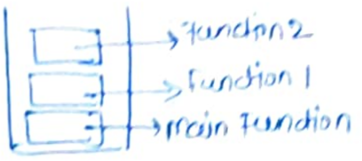
Implementation → using array
→ using linked list

structure to represent a stack

```
struct stack
  { int top;
    unsigned capacity;
    int * array;
  }
```

Applications of stack

- Used in function calls
- Infix to postfix conversion
- Parenthesis matching & more



main function will call each function.

Stack as abstract Data type

→ In order to create a stack we need a pointer to the topmost element along with other elements which are stored inside the stack.

Stack using Array Data structure

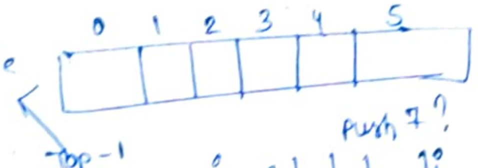
→ Fixed size array creation

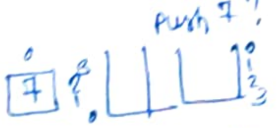
→ Top Element

```
Struct Stack {
        int size;
        int top;
      } int arr;
```

```
Struct stack s;
 s. size = 80;
 s. top  = -1;
 s. arr = (int *) malloc (s.size * sizeof int)
              malloc (s.size * size of
                      (int));
```

Example





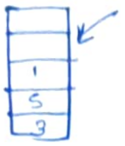
Now, Top = 0 ..
↓
Denoting Till when stack is filled.

Above we are performing push 6 pull operation on stack using array.

October 8

ALGORITHMS ON STACK

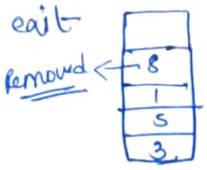
PUSH



```
Step1 - Start
Step2 - If Top = max
        print overflow & exit
Step3 - Read Data
Step4 - Top = Top+1
Step5 - Stack [Top] = Data
Step6 - Exit
```

POP ALGORITHM

```
Step1 - Start
Step2 - If Top = Null
        print underflow & exit
Step3 - stack [Top] = Null
Step4 - Top = Top-1
Step5 - Exit
```



STACK NOTIFICATION

1) INFIX - when operator comes between operands eg:- A+B-C*D

2) PREFIX - [+ AB] when operator Is putted before operand.

3) POSTFIX - AB+ when operator is putted after operand.

ALGORITHM FOR CONVERTING FROM INFIX TO POSTFIX :-

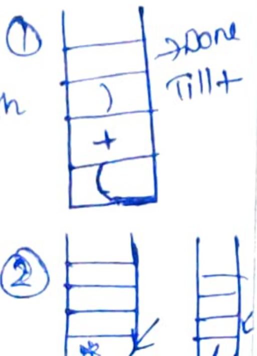
S = ((A+B)*C/D)

Final R = AB+C*D/

① Step 1 - start

Step 2 - Push "(" on to stack 2add ")" to end of stack

Step 3 - Scan 'S' Left to Right two repeat step 3 to 6, untill S is empty.



^ - Highest precedence ①

* / - high level precedence ②

+ - - lower than 1 and 2

Step4 - If an operator ⊕ is encountered

(a) Add operator on-to-the stack

(b) If another operator Exist 2 New operator has less or equal precedence then pop the stack 2 add to R push new operator onto top of stack

R = AB+C*D/

ALGORITHM FOR CONVERSION FROM INFIX TO POSTFIX

convert to post : A-B/(C*D^E)

```
Step1 - Start
Step2 - Push "(" onto Stack & add ")" to
        end of stack.
Step3 - Scan 'S' Left to Right two repeat
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Step4 - If operator is encountered
    (a) Add operator on to the stack
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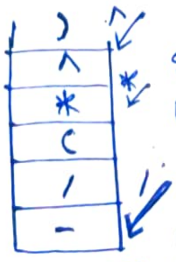

S = A-B/(C*D^E))

R = ABCDE^*/-

∴ / has high precedence than (-)

① →

② (parantheses & multiply

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October 8

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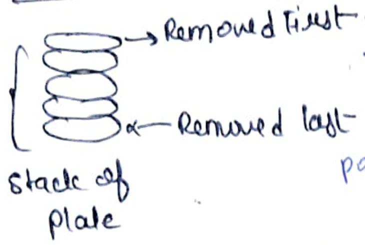

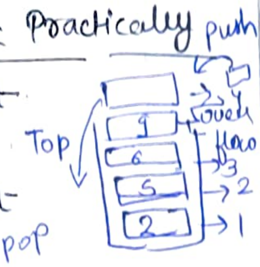

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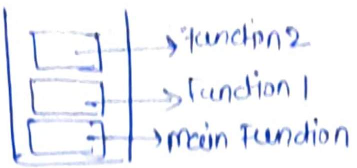

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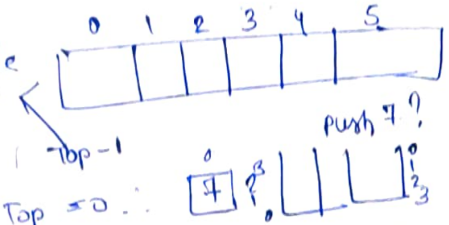

Now, Top = 0 .
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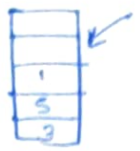
Denotify Till when stack is filled.

Above we are performing push & pull operation on stack using array.

October 8

ALGORITHMS ON STACK

PUSH



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Pop ALGORITHM

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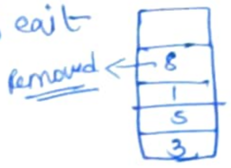
Step 4 - Top = Top - 1
Step 5 - Exit



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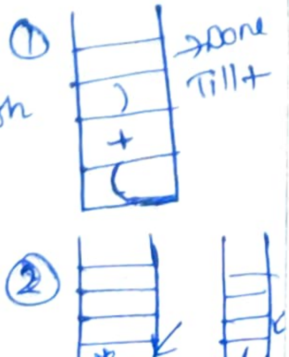

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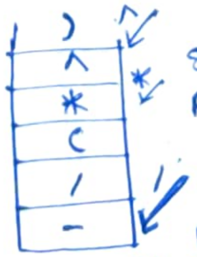
ⓐ Add operator on to the stack
ⓑ If another operator Exist 2 New operator has less or equal precedence pop the stack to add to R push new operator onto top



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