Implement stack with max and min function

Posted on September 10, 2019 | by Prashant Yadav

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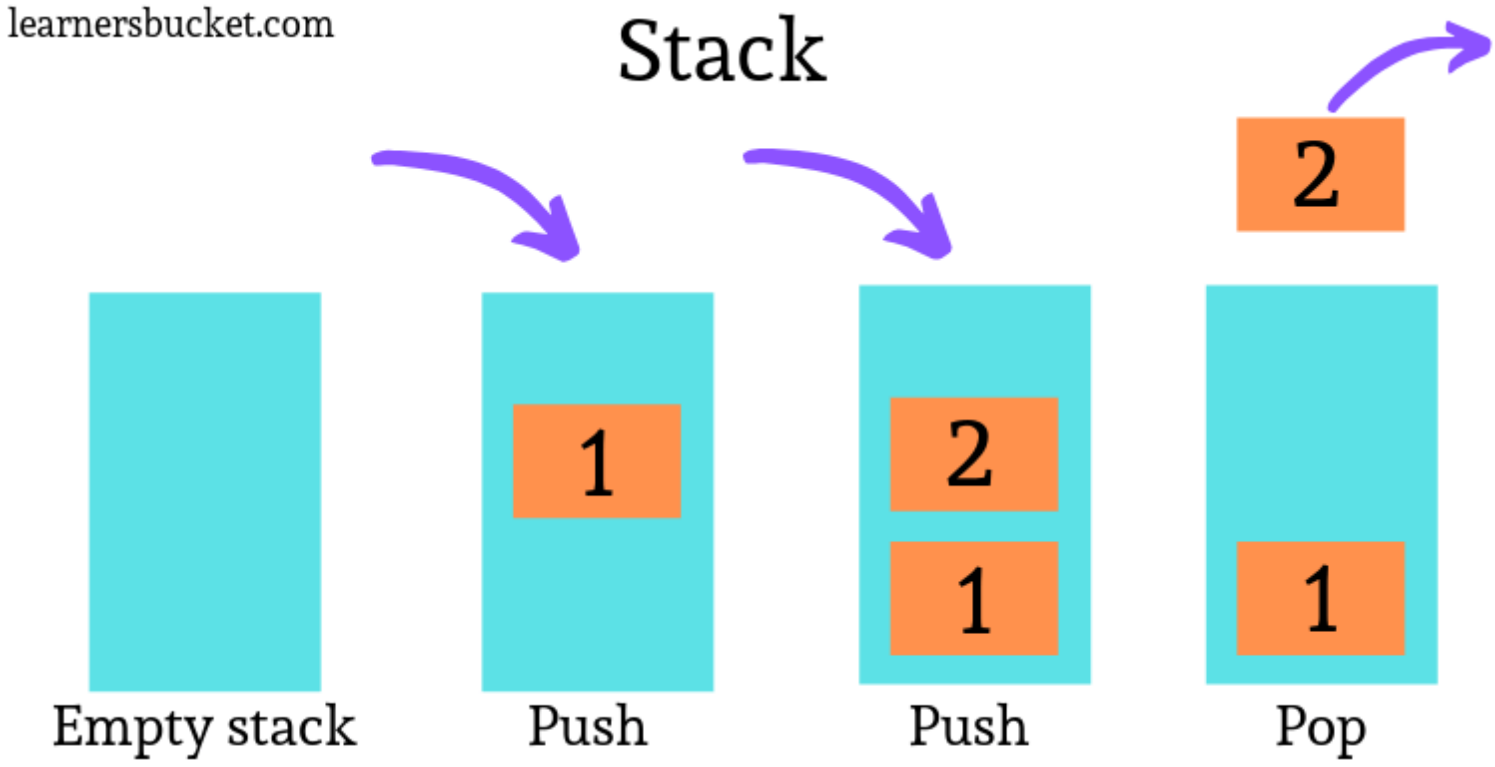
Learn how to implement the stack data structure in which we can get the max and min value through function in O(1) time.

Example

```
Input:
2 5 17 23 88 54 1 22

Output:
max: 88
min: 1
```



Implement stack with min and max function

- The idea is very simple, instead of storing a single value in the stack we will store an object with `current`, `max` and `min` values.
- While adding the new value in the stack we will check if stack is empty or not.
- If it is empty then add the current value as `current`, `max` and `min` values.

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- Else get the previous value and compare it with the current item, if it is greater than the existing then replace the `max`, If it is less than the existing the replace the `min`.

Adding a new item in the stack (Push operation)

```
this.push = (item) => {
   //Check if stack is empty
   //Then add the current value at all place
   if(length === 0){
     items[length++] = {value: item, max: item, min: item};
   }else{
     //Else get the top data from stack
     const data = this.peek();
     let {max, min} = data;

     //If it is greater than previous then update the max
     max = max < item ? item : max;

     //If it is lesser than previous then update the min
     min = min > item ? item : min;

     //Add the new data
     items[length++] = {value: item, max, min};
   }
 }
```

Complete code

Copy

```
function stackWithMax(){
    let items = [];
    let length = 0;

    this.push = (item) => {
      //Check if stack is empty
      //Then add the current value at all place
      if(length === 0){
        items[length++] = {value: item, max: item, min: item};
      }else{
        //Else get the top data from stack
        const data = this.peek();
        let {max, min} = data;

        //If it is greater than previous then update the max
        max = max < item ? item : max;

        //If it is lesser than previous then update the min
        min = min > item ? item : min;

        //Add the new data
        items[length++] = {value: item, max, min};
      }
    }

    //Remove the item from the stack
    this.pop = () => {
      return items[--length];
    }

    //Get the top data
    this.peek = () => {
      return items[length - 1];
    }

    //Get the max value
    this.max = () => {
      return items[length - 1].max;
    }

    //Get the min value
    this.min = () => {
      return items[length - 1].min;
    }

    //Get the size
    this.size = () => {
      return length;
    }

    //Check if its empty
    this.isEmpty = () => {
      return length === 0;
    }

    //Clear the stack
    this.clear = () => {
      length = 0;
      items = [];
```

```
    }
}
```

Copy

```
Input:
let SM = new stackWithMax();
SM.push(4);
SM.push(7);
SM.push(11);
SM.push(23);
SM.push(77);
SM.push(3);
SM.push(1);
SM.pop();
console.log(`max: ${SM.max()}`, `min: ${SM.min()}`);

Output:
"max: 77" "min: 3"
```

Time Complexity

#	Access	Search	Insert	Delete	Max	Min
Average	Θ(N)	Θ(N)	Θ(1)	Θ(1)	Θ(1)	Θ(1)
Worst	O(N)	O(N)	O(1)	O(1)	Θ(1)	Θ(1)

Space Complexity

#	space
Worst	O(N)

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