

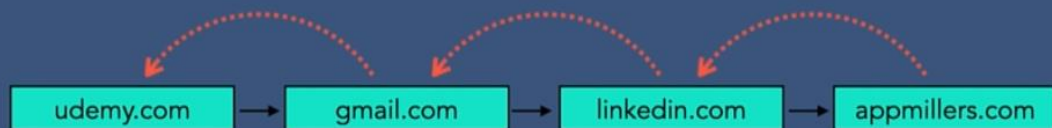
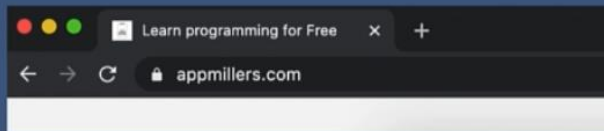
What is a Stack?

Stack is a data structure that stores items in a Last-In/First-Out manner.



Why do we need Stack?

appmillers.com



Stack Operations

- Create Stack
- Push
- Pop
- Peek
- isEmpty
- isFull
- deleteStack

Push Method

```
customStack = [1,2,3,4]
```

```
customStack.push(4)
```

				4					
				3					
				2					
				1					

Pop Method

```
customStack = []
```

```
customStack.pop()
```



The stack is Empty

Pop Method

```
customStack = [1,2,3]
```

```
customStack.pop() → 4
```

				3					
				2					
				1					

Peek Method

customStack = [1,2,3,4]

customStack.peek() → 4

				4					
				3					
				2					
				1					

isEmpty Method

customStack = [1,2,3,4]

customStack.isEmpty() → False

				4					
				3					
				2					
				1					

isFull Method

```
customStack = [1,2,3,4]
```

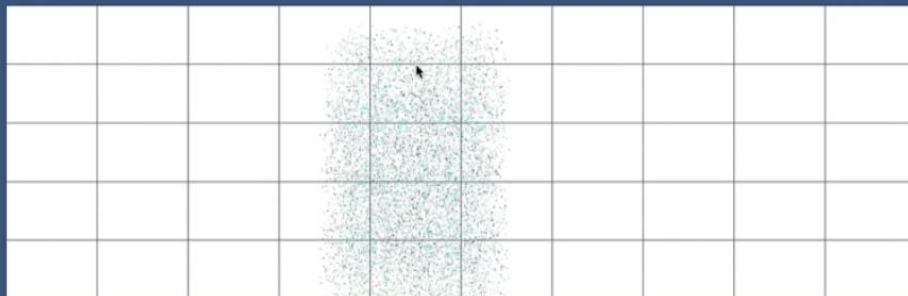
```
customStack.isFull() → False
```

				4					
				3					
				2					
				1					

Delete Method

```
customStack = [1,2,3,4]
```

```
customStack.delete()
```



Stack Creation - Array vs Linked List

Stack using Array

- Easy to implement
- Fixed size

Stack using Linked List

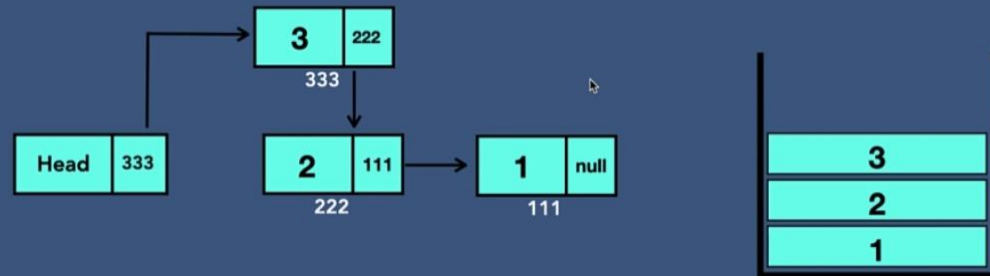
- Variable size
- Implementation is not easy

Time and Space Complexity of Stack using Array

Stack	Time complexity	Space complexity
Create Stack	$O(1)$	$O(n)$
Push	$O(1)$	$O(1)$
Pop	$O(1)$	$O(1)$
Peek	$O(1)$	$O(1)$
isEmpty	$O(1)$	$O(1)$
Delete Entire Stack	$O(1)$	$O(1)$

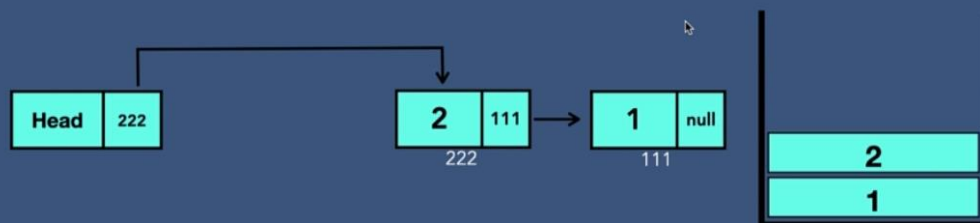
Stack using Linked List

Push() Method



Stack using Linked List

Pop() Method



Stack using Linked List

Pop() Method

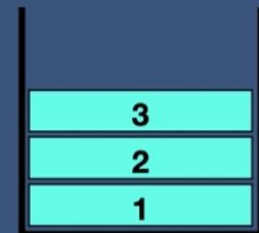


Stack using Linked List

Peek() Method



peek()
return head.value

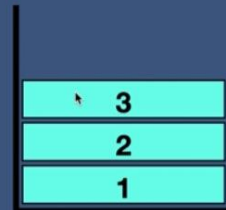


Stack using Linked List

isEmpty() Method



```
isEmpty()
If head==null {
    true
}
```

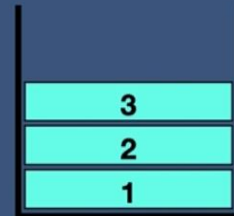


Stack using Linked List

delete() Method



```
delete()
head = null
```



Time and Space Complexity of Stack using Linked List

Stack	Time complexity	Space complexity
Create Stack	$O(1)$	$O(1)$
Push	$O(1)$	$O(1)$
Pop	$O(1)$	$O(1)$
Peek	$O(1)$	$O(1)$
isEmpty	$O(1)$	$O(1)$
Delete Entire Stack	$O(1)$	$O(1)$

When to Use/Avoid Stack

Use:

- LIFO functionality
- The chance of data corruption is minimum

Avoid:

- Random access is not possible

