



Data Structure and Algorithm Stacks





Stacks





Stack Data Structure

A Data Structure where data are stacked upon each other, it follows the principle.

LI-FO (Last in – First Out)

FI-LO (First in – Last Out)





Stack Data Structure

Real Life Application





Stack Data Structure

Software Application

Today - Tuesday, December 5, 2023				
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<input type="checkbox"/>	9:03 AM		White Plates png - Yahoo Image Search Results	images.search.yahoo.com





Stack Data Structure

Empty Stack

	4
	3
	2
	1
	0

-1 ← Top





Stack Data Structure

Stack with Data

	4
	3
	2
	1
0	0

← Top

-1





Stack Data Structure

Stack with Data

	4
	3
	2
L	1
O	0

← Top

-1





Stack Data Structure

Stack with Data

	4
	3
R	2
L	1
O	0

← Top

-1





Stack Data Structure

Stack with Data

	4
A	3
R	2
L	1
O	0

← Top

-1





Stack Data Structure

Full Stack

C	4
A	3
R	2
L	1
O	0

← Top

-1





Stack Operations

push()

Inserts data on top of the stack.

pop()

Removes data on top of the stack





Stack Data Structure

Stack Operation Example

Operation

pop()
push("O")
pop()

	4
	3
	2
	1
	0

-1

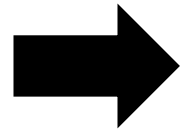
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Stack Data Structure

Stack Operation Example

Operation



pop()
push("O")
pop()

	4
	3
	2
	1
	0

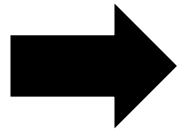
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Stack Data Structure

Stack Operation Example

Operation



pop()
push("O")
pop()

	4
	3
	2
	1
	0

Stack Underflow -1

← Top



Stack Data Structure

Stack Operation Example

Operation

→ pop()
push("O")
pop()

	4
	3
	2
	1
	0

-1

← Top



Stack Data Structure

Stack Operation Example

Operation

→ pop()
push("O")
pop()

	4
	3
	2
	1
0	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

pop()
push("O")
pop()

	4
	3
	2
	1
0	0

-1

← Top

Stack Data Structure

Stack Operation Example

Operation

pop()
push("O")
pop()

	4
	3
	2
	1
	0

-1

← Top

Stack Data Structure

Stack Operation Example

Operation

➔ push("O")
push("L")
push("R")
push("A")
push("C")

	4
	3
	2
	1
	0

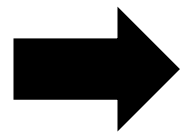
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Stack Data Structure

Stack Operation Example

Operation



push("O")

push("L")

push("R")

push("A")

push("C")

	4
	3
	2
	1
0	0

← Top

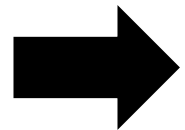
-1



Stack Data Structure

Stack Operation Example

Operation



push("O")

push("L")

push("R")

push("A")

push("C")

	4
	3
	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

→
push("O")
push("L")
push("R")
push("A")
push("C")

	4
	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

push("O")

push("L")

push("R")

→ push("A")

push("C")

	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

push("O")

push("L")

push("R")

push("A")

→ push("C")

C	4
A	3
R	2
L	1
O	0

← Top

-1



Stack Data Structure

Stack Operation Example

Operation

➔ push("O")

C	4
A	3
R	2
L	1
O	0

← Top

-1



Stack Data Structure

Stack Operation Example

Operation

Stack Overflow

➔ push("O")

C	4
A	3
R	2
L	1
O	0

← Top

-1



Stack Operations

IsEmpty()

Checks if stacks is empty.

isFull()

Checks if stack is full.





Stack Operations

peek()

Returns the data at the top of the stack.

size()

Returns the size of the stack.





Stack Data Structure

Stack Operation Example

Operation

Stack Overflow

➔ push("O")

C	4
A	3
R	2
L	1
O	0

← Top

-1



Stack Data Structure

Stack Operation Example Stack Overflow

➔ **push("O")**
isFull()
pop()
peek()
isFull()
isEmpty()

C	4
A	3
R	2
L	1
O	0

← **Top**

-1

Stack Data Structure

Stack Operation Example

Operation

→ push("O")
isFull()
pop()
peek()
isFull()
isEmpty()

C	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

TRUE

→ push("O")
isFull()
pop()
peek()
isFull()
isEmpty()

C	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

C	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

	4
A	3
R	2
L	1
O	0

← **Top**

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Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

	4
A	3
R	2
L	1
O	0

← **Top**

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Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

	4
A	3
R	2
L	1
O	0

'A'

← Top

-1



Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

	4
A	3
R	2
L	1
O	0

← **Top**

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Stack Data Structure

Stack Operation Example

FALSE

Operation

push("O")

isFull()

pop()

peek()

isFull()

isEmpty()

	4
A	3
R	2
L	1
O	0

← Top

-1



Stack Data Structure

Stack Operation Example

Operation

push("O")

isFull()

pop()

peek()

isFull()

→ isEmpty()

	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

FALSE

Operation

push("O")

isFull()

pop()

peek()

isFull()

→ isEmpty()

	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
A	3
R	2
L	1
O	0

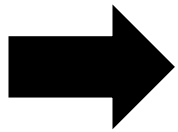
← **Top**

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Stack Data Structure

Stack Operation Example

Operation



size()

pop()

pop()

pop()

pop()

isEmpty()

	4
A	3
R	2
L	1
O	0

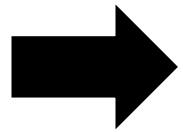
← **Top**

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Stack Data Structure

Stack Operation Example

Operation



size()

pop()

pop()

pop()

pop()

isEmpty()

4

	4
A	3
R	2
L	1
O	0

← **Top**

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Stack Data Structure

Stack Operation Example

Operation

→ size()
pop()
pop()
pop()
pop()
isEmpty()

	4
A	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

→ size()
pop()
pop()
pop()
pop()
isEmpty()

	4
	3
R	2
L	1
O	0

← Top

-1

Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
R	2
L	1
O	0

-1

← Top

Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
	2
L	1
O	0

← Top

-1



Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
	2
L	1
O	0

-1

← Top

Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
	2
	1
0	0

-1

← Top

Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
	2
	1
0	0

-1

← Top



Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

isEmpty()

	4
	3
	2
	1
	0

-1

← Top



Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

➔ isEmpty()

	4
	3
	2
	1
	0

-1

← Top





Stack Data Structure

Stack Operation Example

Operation

size()

pop()

pop()

pop()

pop()

→ isEmpty()

TRUE

	4
	3
	2
	1
	0

-1

← Top





The End

