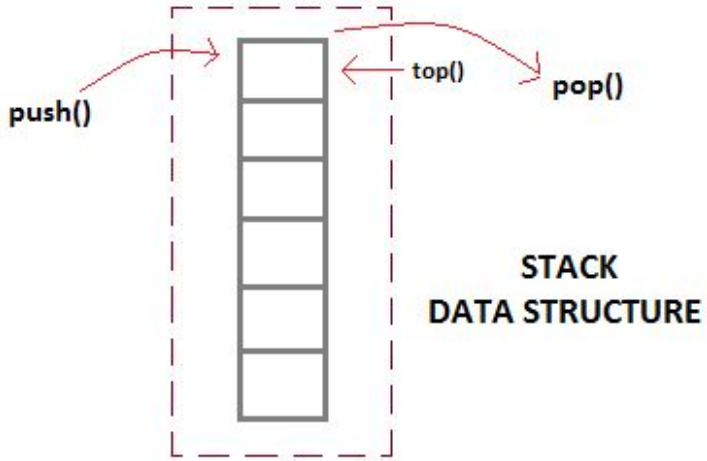
[...Knowledge]:
Stack & Queue!

Content

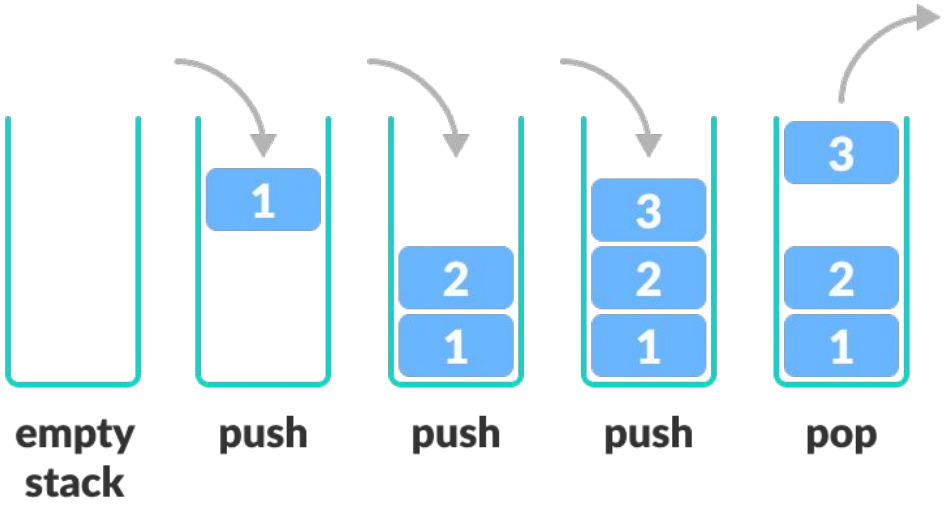
Stacks

Stacks?

- Stack is a linear data structure of similar data type.
- Stack is a LIFO(Last in First out) structure.
- Stack has a bounded(predefined) capacity.
- Very fast 0(1)

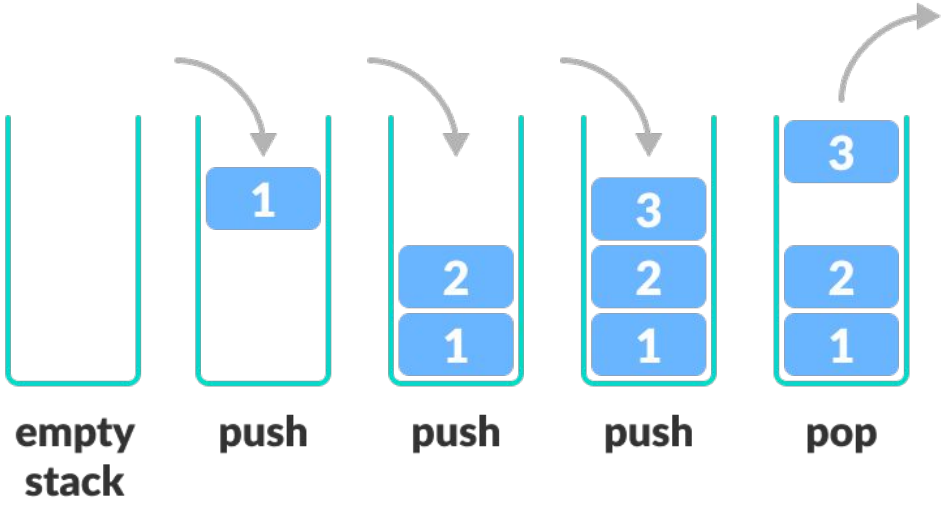


Stack: LIFO Principle

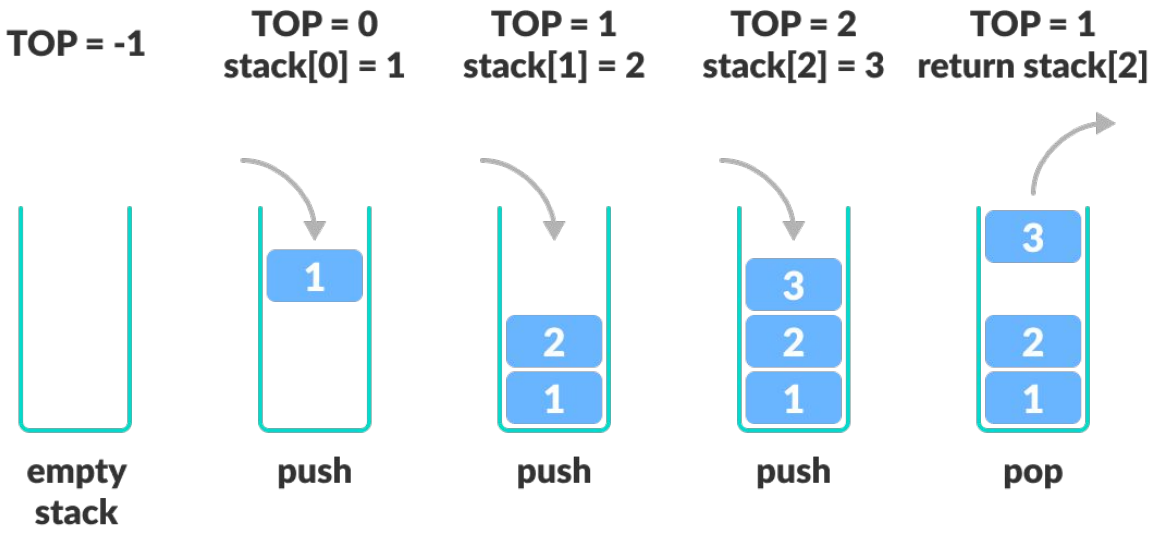


Stack

- Push
- Pop
- Peek



Stack


TOP = -1
TOP = 0
stack[0] = 1
TOP = 1
stack[1] = 2
TOP = 2
stack[2] = 3
TOP = 1
return stack[2]
1
2
1
3
2
1
3
2
1
empty
stack
push
push
push
pop

Stack:

Push

- Check if the stack is full or not.
    - If the stack is full, then print error of overflow. ❌
    - If the stack is not full, then increment the top and add the element. ✔️

Pop

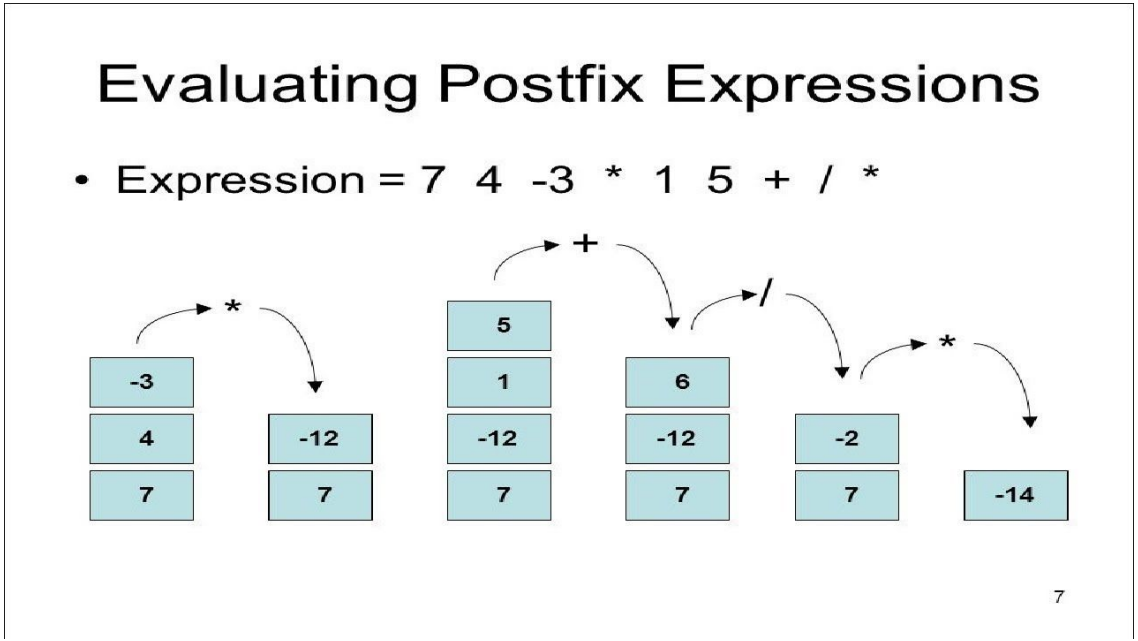
- Check if the stack is empty or not.
    - If the stack is empty, then print error of underflow. ❌
    - If the stack is not empty, then print the element at the top and decrement the top. ✔️

Demo

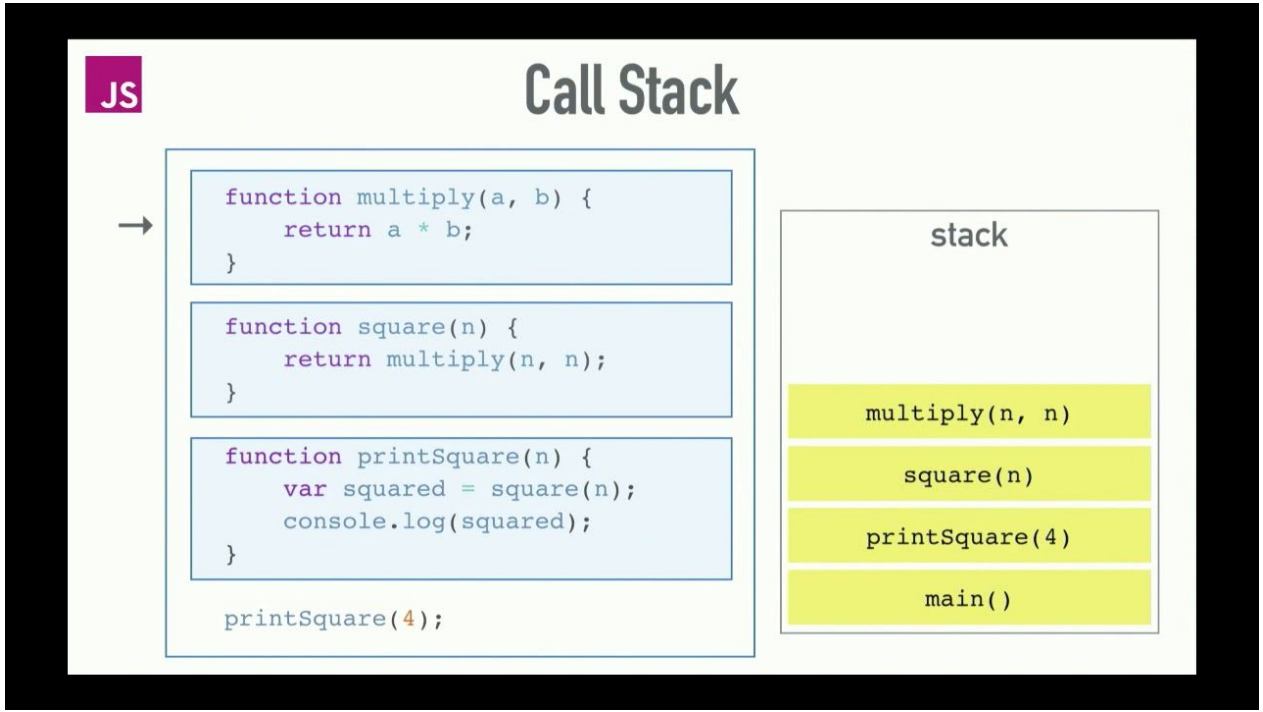
Stack: Real life implementations

- To reverse a word
- In compilers: Postfix notation
- In browsers: The back button in a browser
- JS: Call stack

Stack: Real life implementations



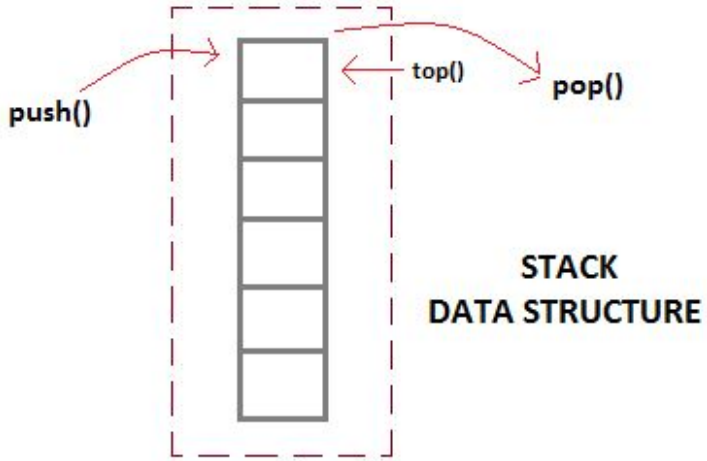
Stack: Real life implementations



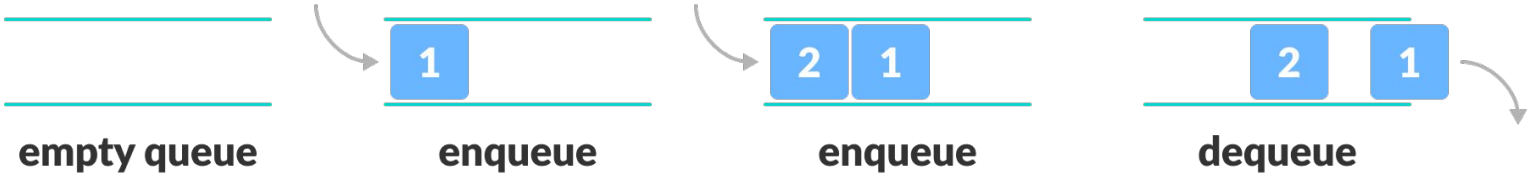
Queue

Queues?

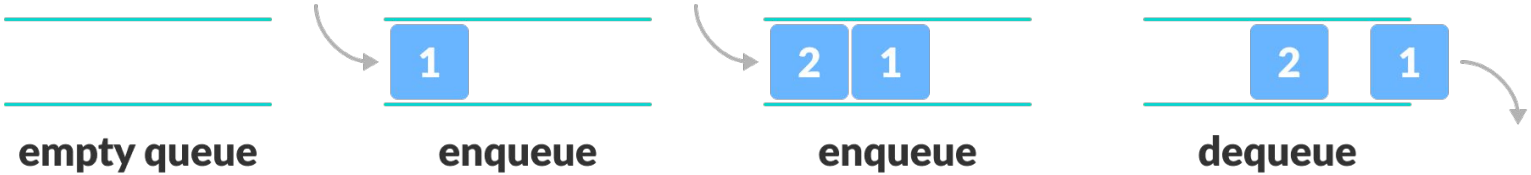
- Queue is a linear data structure of similar data type.
- Queue is a FIFO(First In First out) structure.
- Very fast 0(1)
- Types: Simple, Circular and Priority



Queue: FIFO Principle

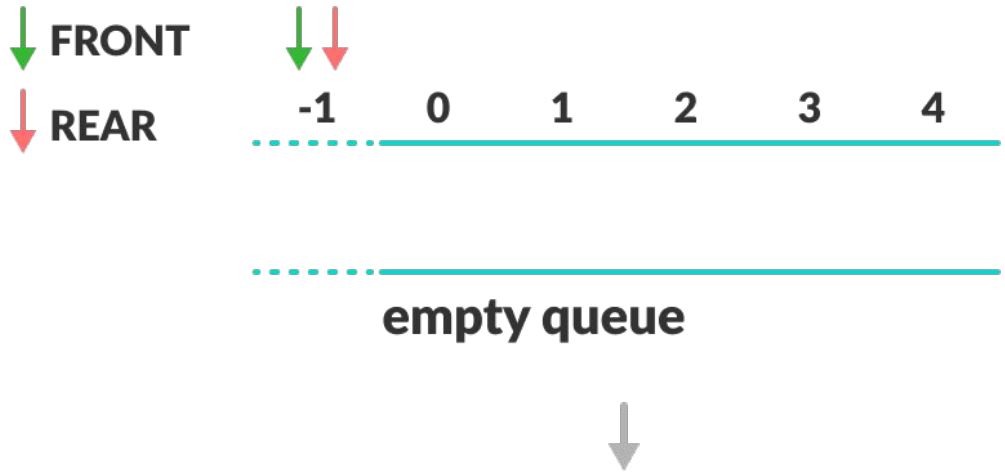


Queue

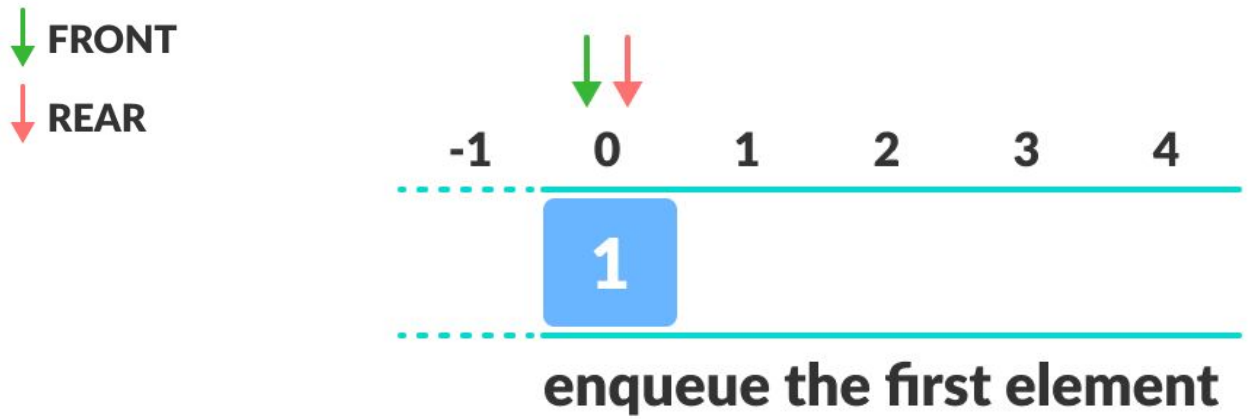


- Enqueue
- Dequeue
- Peek

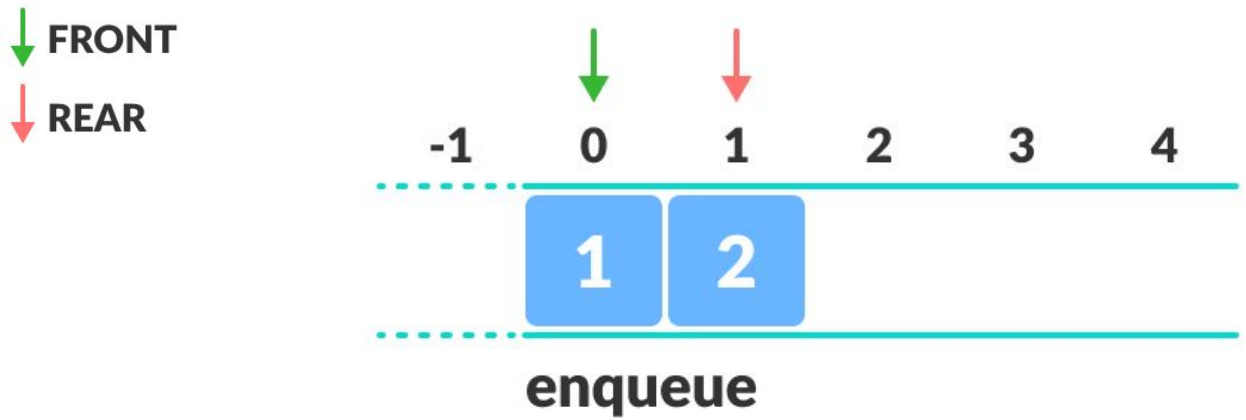
Queue: Implementation



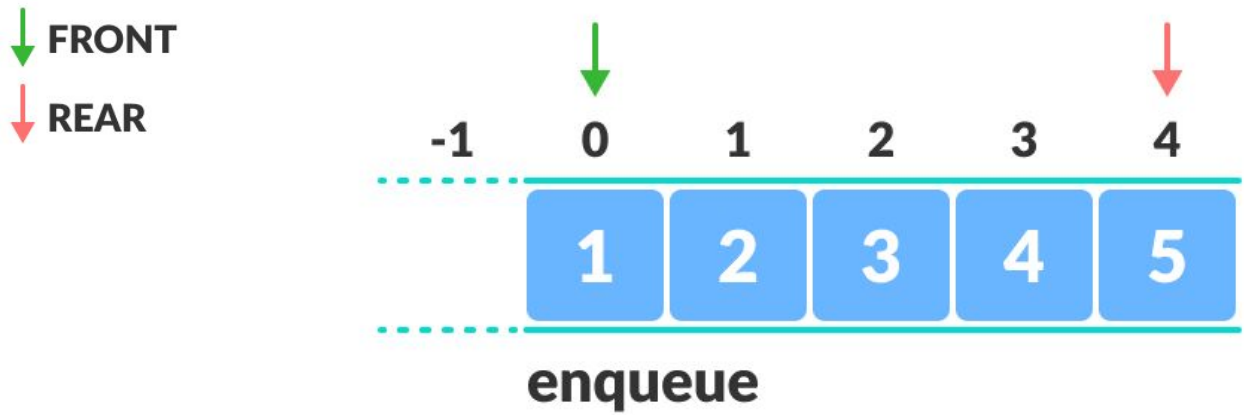
Queue: Implementation



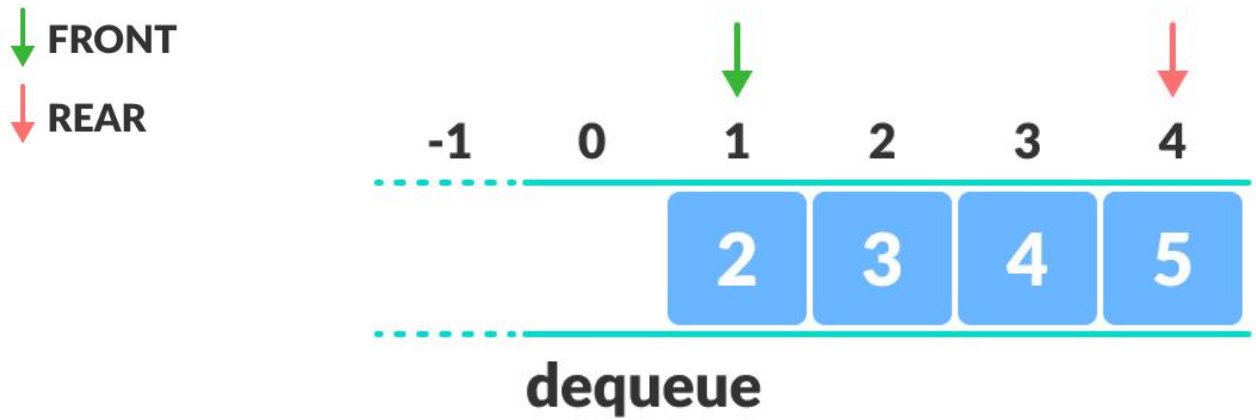
Queue: Implementation



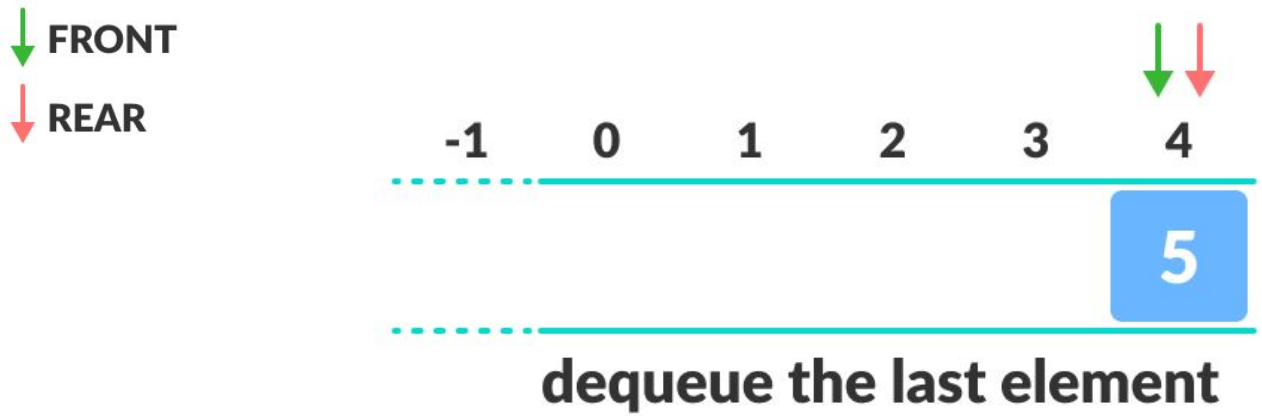
Queue: Implementation



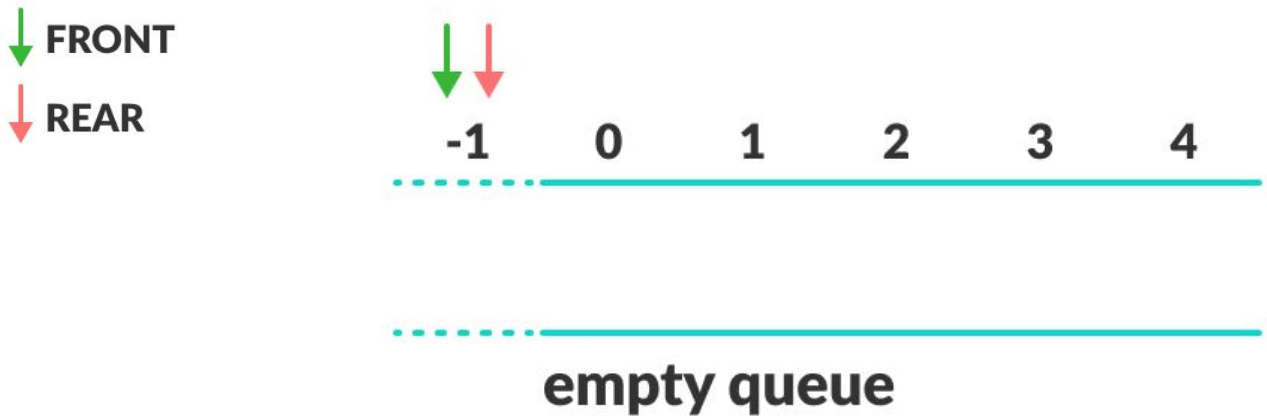
Queue: Implementation



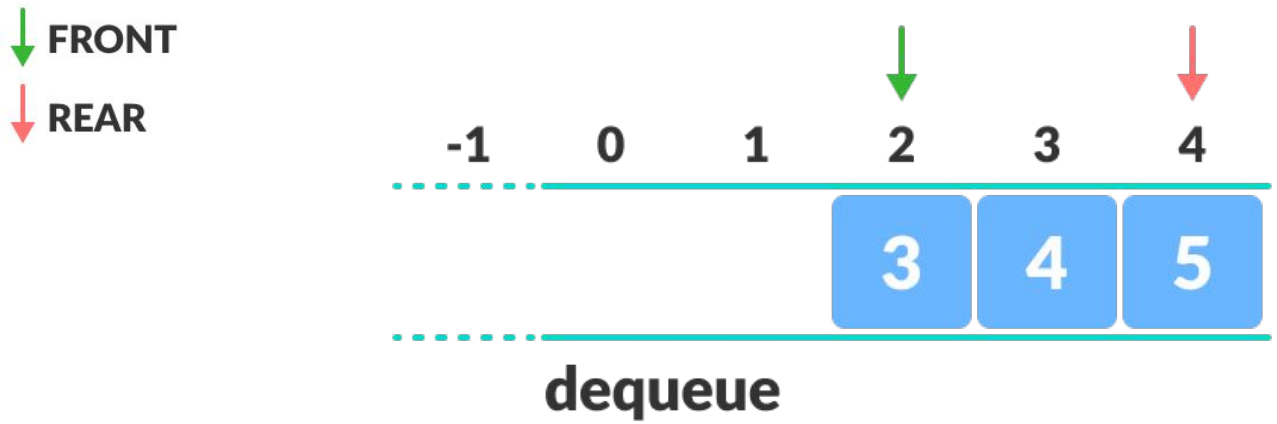
Queue: Implementation



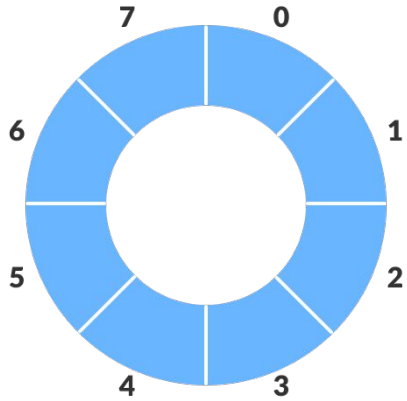
Queue: Implementation

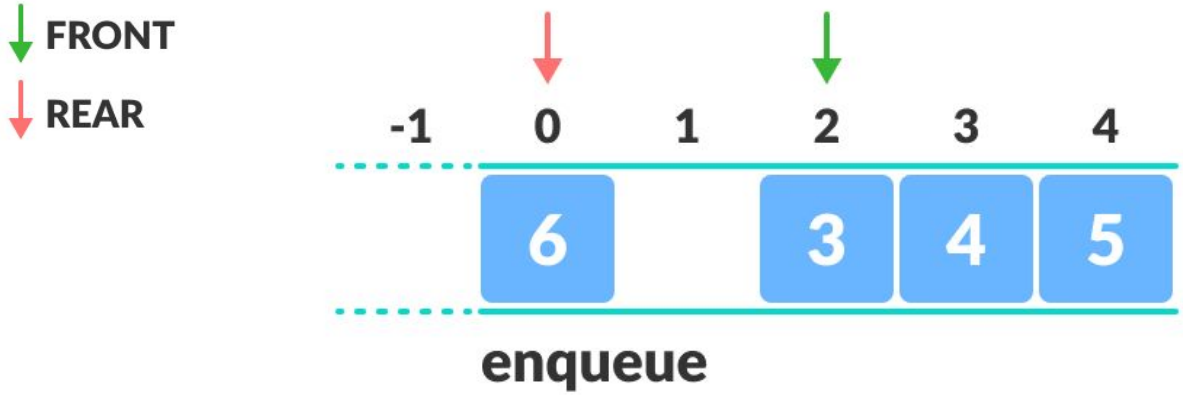


Queue: Limitation



Circular Queue





Queue:

Enqueue

- Check if the queue is full or not.
    - If the queue is full, then print error of overflow. ❌
    - For the first element set value HEAD to zero. ✔️
    - Increment the tail and add the element. ✔️

Dequeue

- Check if the queue is empty or not.
    - If the queue is empty, then print error of underflow. ❌
    - for the last element, reset the values of HEAD and TAIL to -1. ✔️
    - Print the element at the head and increment the head. ✔️

Demo

Queue: Real life implementations

- CPU scheduling, Disk Scheduling
- Call Center phone systems
- Traffic system

Thanks!