Queue

“...using Single Linked List”

Prerequisite: Single Linked List

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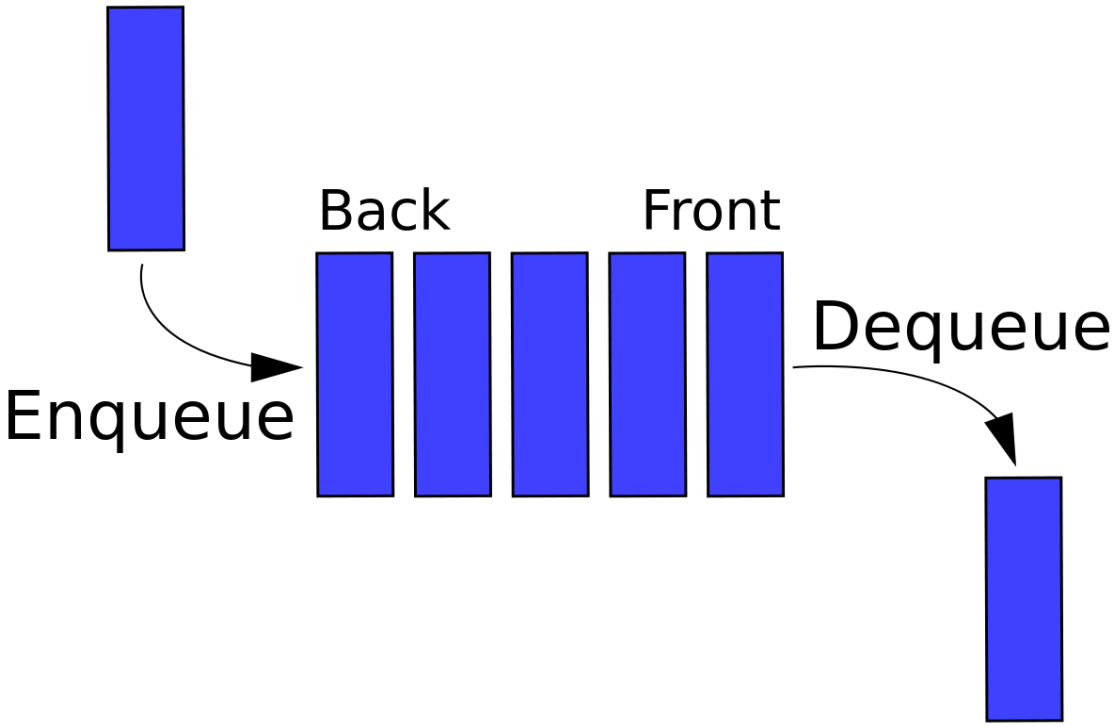
onix.hoque.mist@gmail.com

Properties of Queue



Application of Queue

1. Any kind of line in booth (Bank, shopping mall, hospital etc.)
2. Scheduling task
3. Printer Jobs
4. Keyboard buffer
5. One way Traffic

Properties of Queue

1. Non-primitive Linear (Sequential) Data Structure
2. Insert/Delete Behavior : FIFO
3. Supported operations are-
    i. Enqueue
    ii. Dequeue
    iii. isEmpty
    iv. isFull
    v. makeEmpty

Operations

Time complexity in big O notation

Algorithm	Average	Worst case
Space	O(*n*)	O(*n*)
Search	O(*n*)	O(*n*)
Enqueue	O(1)	O(1)
Dequeue	O(1)	O(1)

Variation of Queue

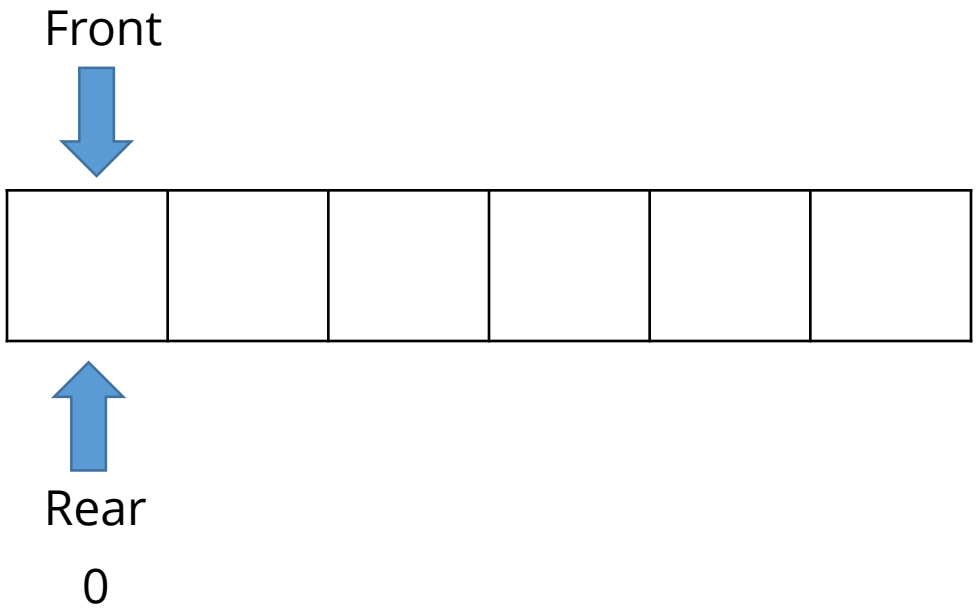
1. Linear Queue
2. Circular Queue (Also known as **Ring Buffer**)
3. Double Ended Queue
4. Priority Queue

Implementation of Queue

1. Using Array
2. Using Linked List

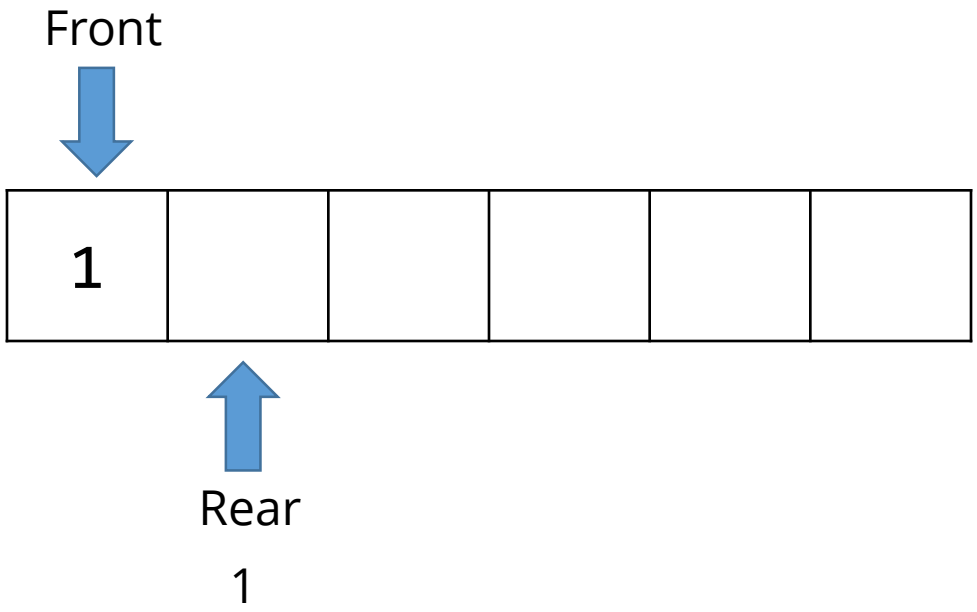
Implementation Using Array

Capacity = 6
Length = 0



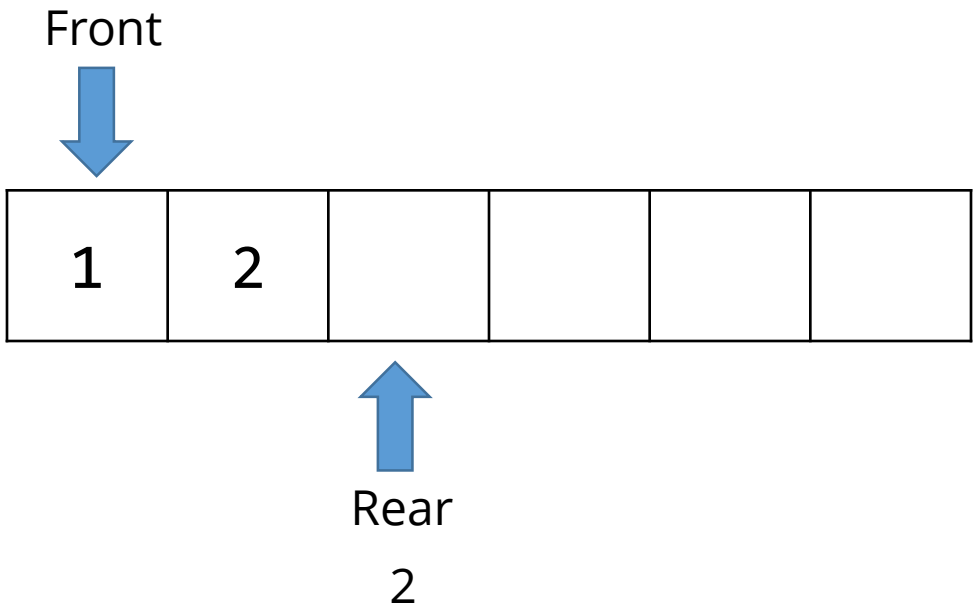
Implementation Using Array

Capacity = 6
Length = 1



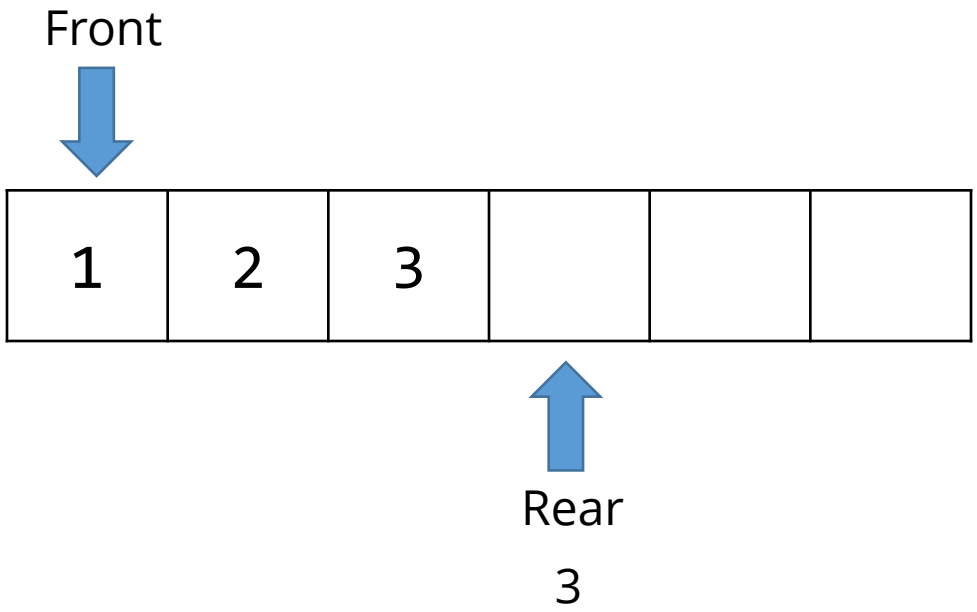
Implementation Using Array

Capacity = 6
Length = 2



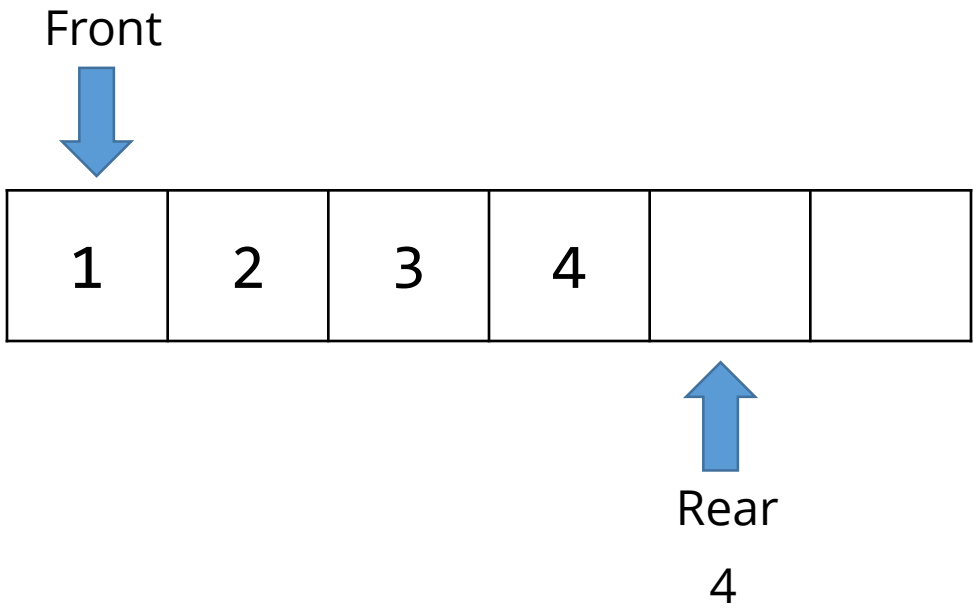
Implementation Using Array

Capacity = 6
Length = 3



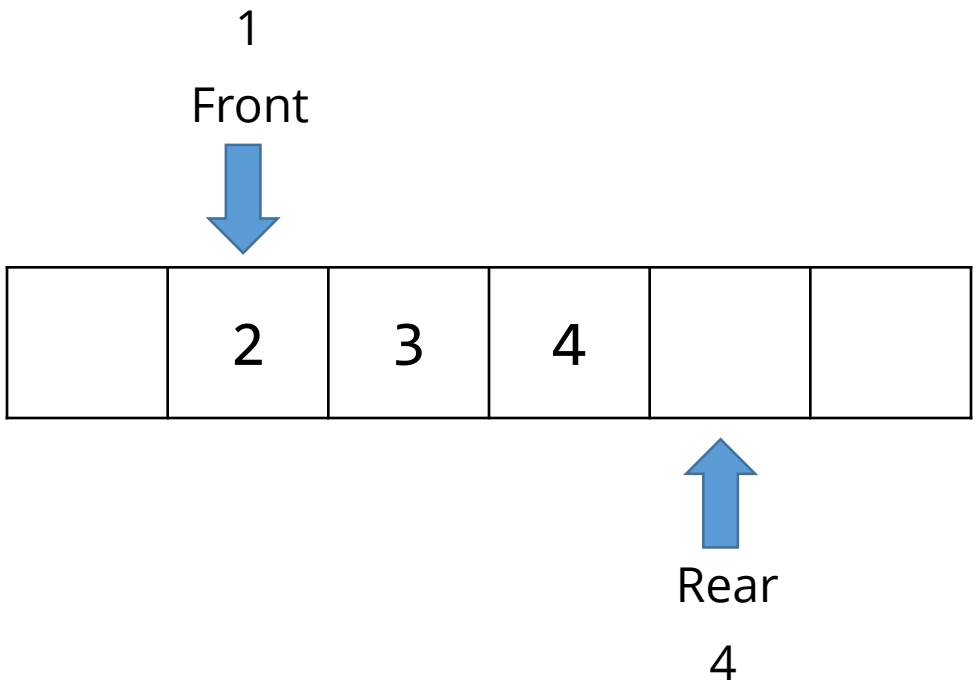
Implementation Using Array

Capacity = 6
Length = 4



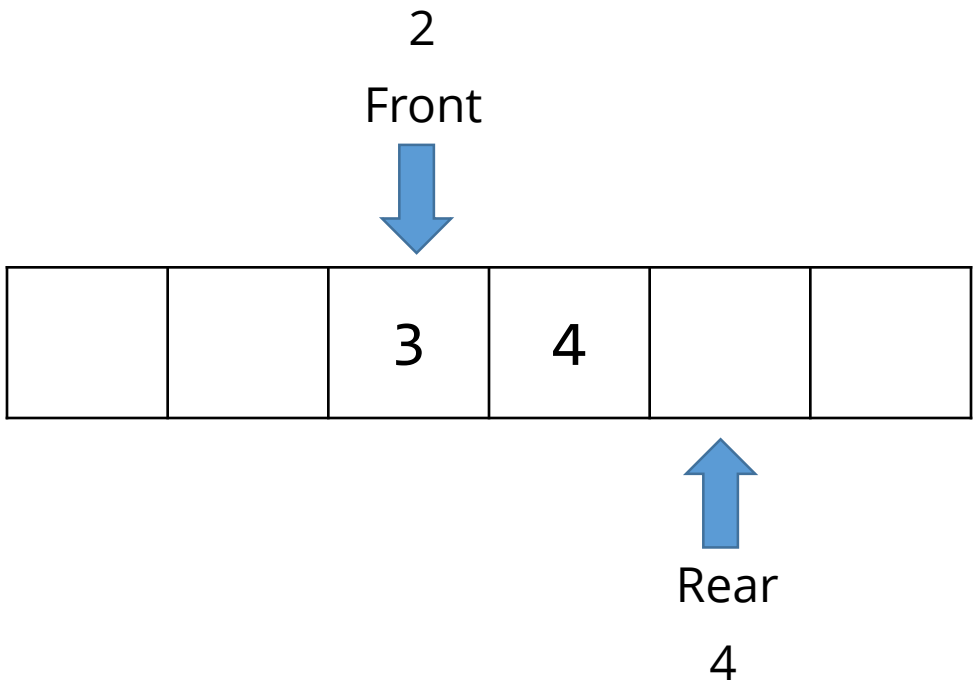
Implementation Using Array

Capacity = 6
Length = 3



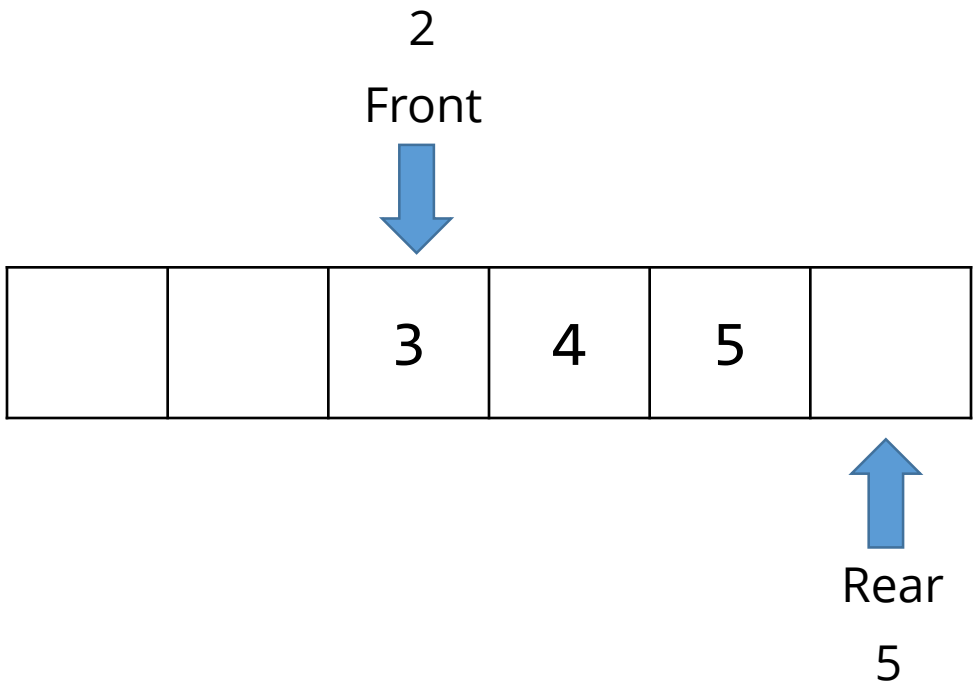
Implementation Using Array

Capacity = 6
Length = 2



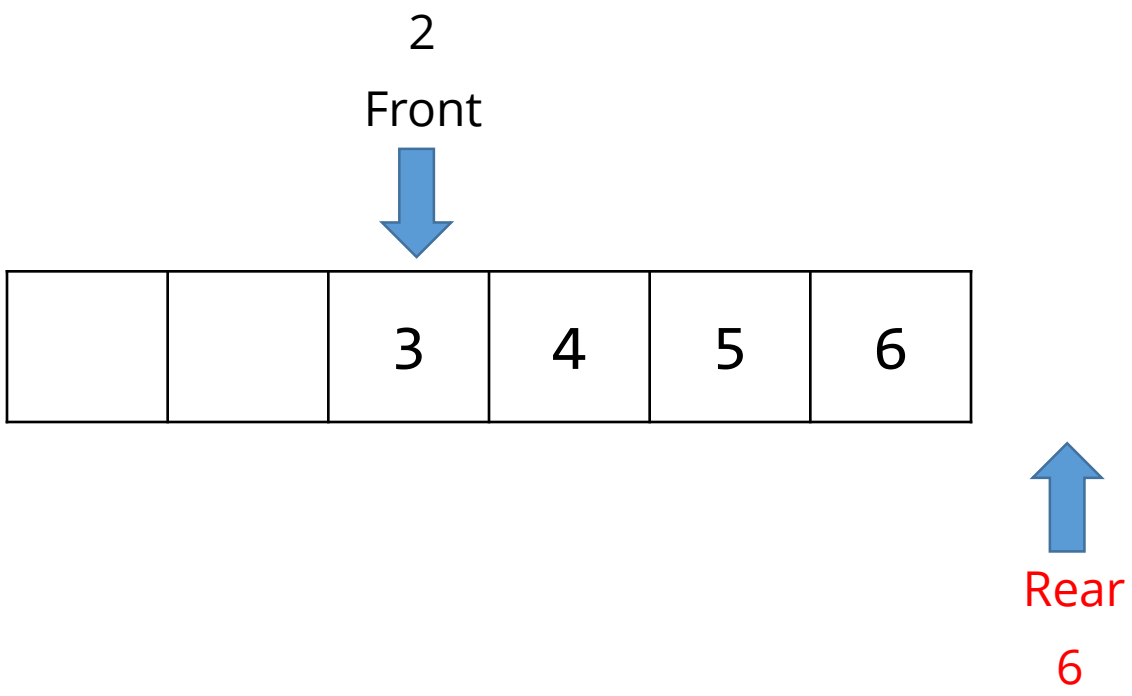
Implementation Using Array

Capacity = 6
Length = 3



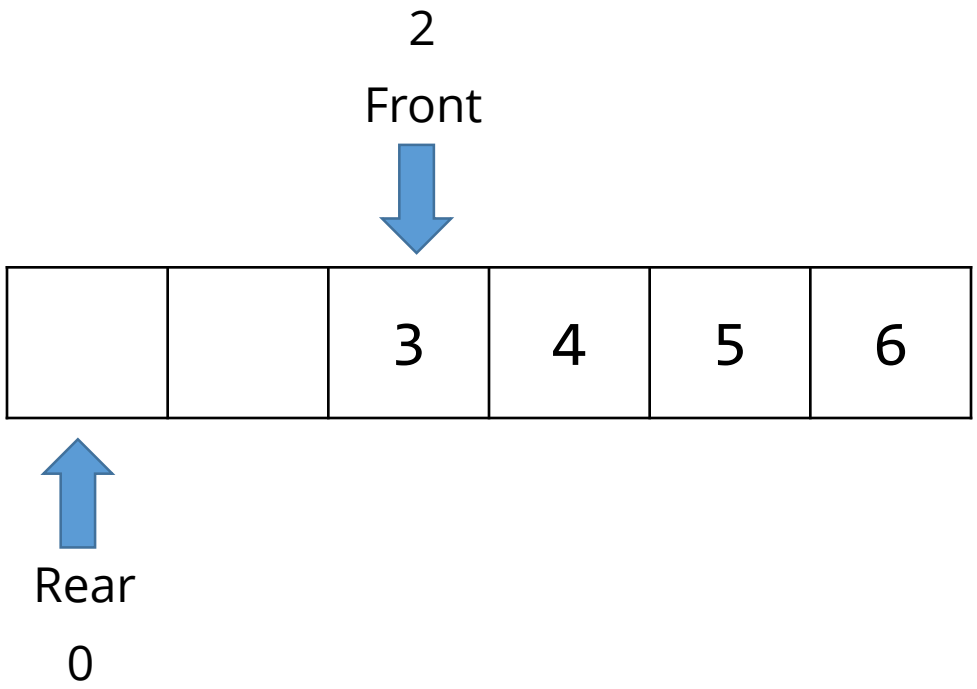
Implementation Using Array

Capacity = 6
Length = 4



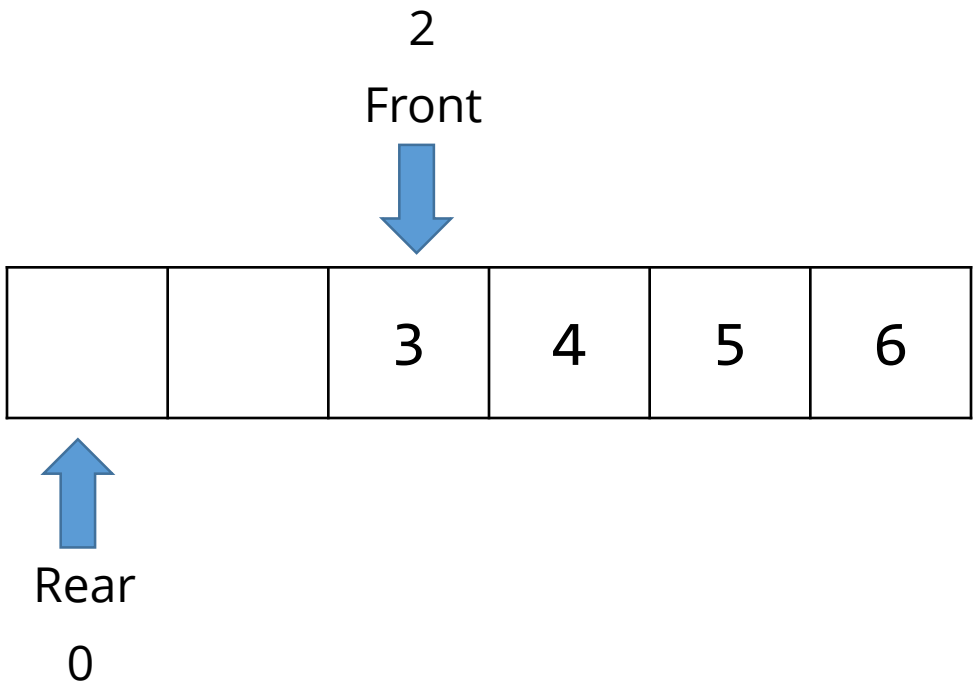
Circular Queue

Capacity = 6
Length = 4



Circular Queue

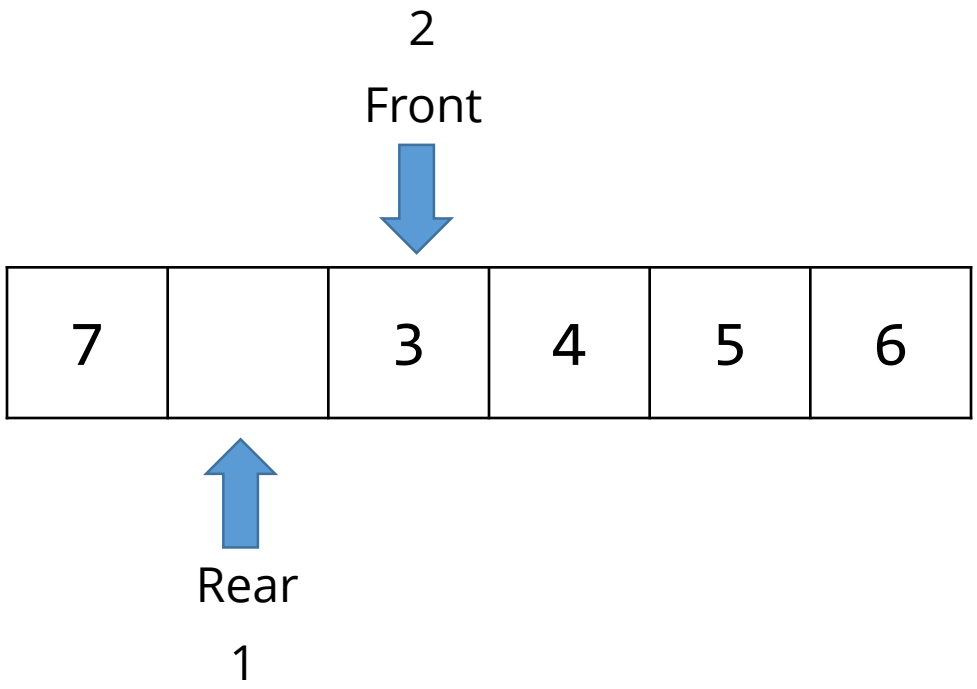
Capacity = 6
Length = 4



Rear = (Rear + 1) mod capacity

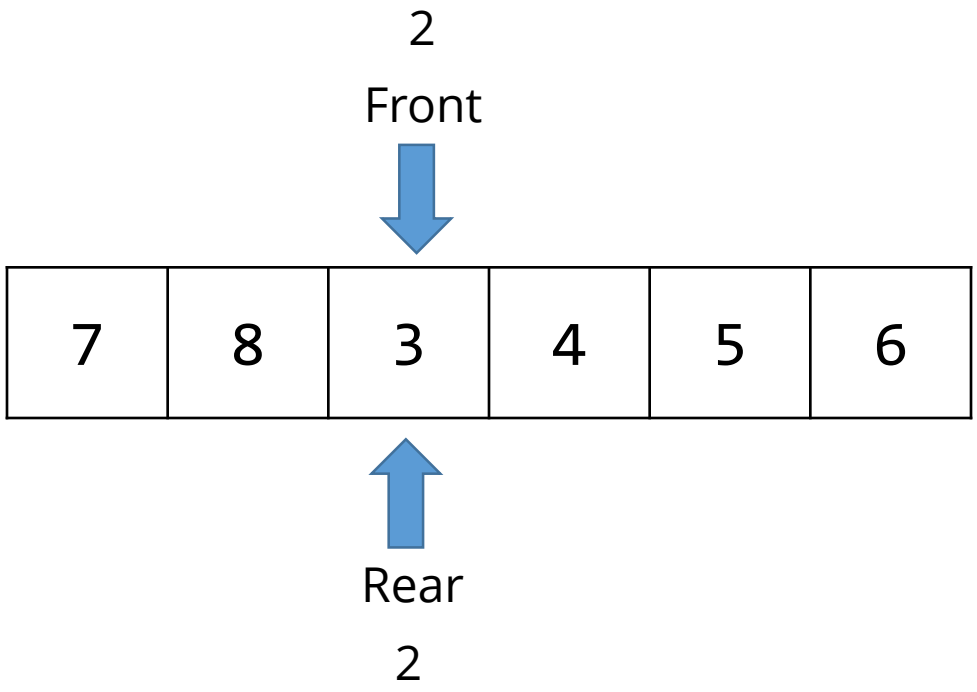
Circular Queue

Capacity = 6
Length = 5



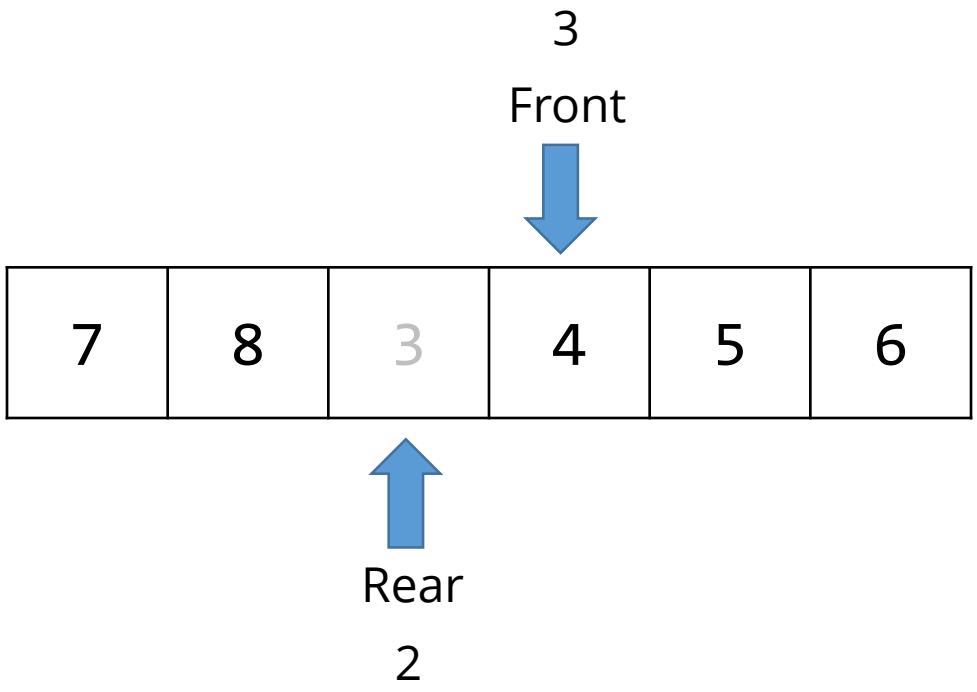
Circular Queue

Capacity = 6
Length = 6



Circular Queue

Capacity = 6
Length = 5



Implementation Using Linked List

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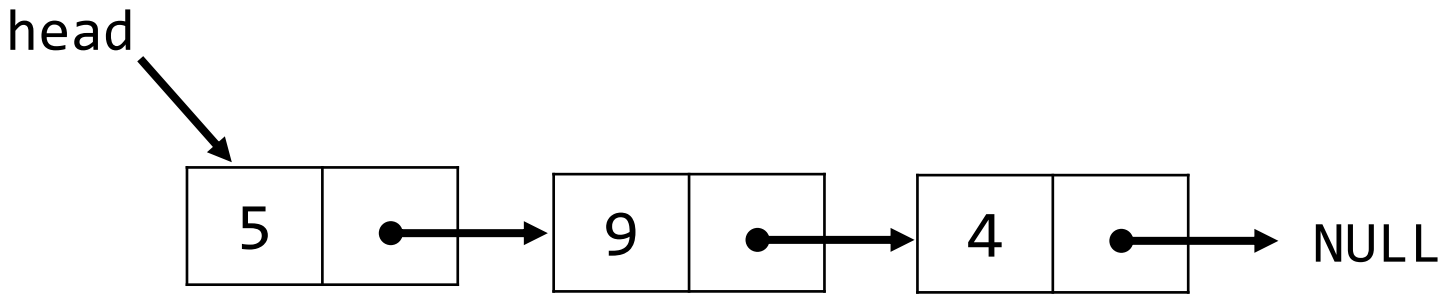
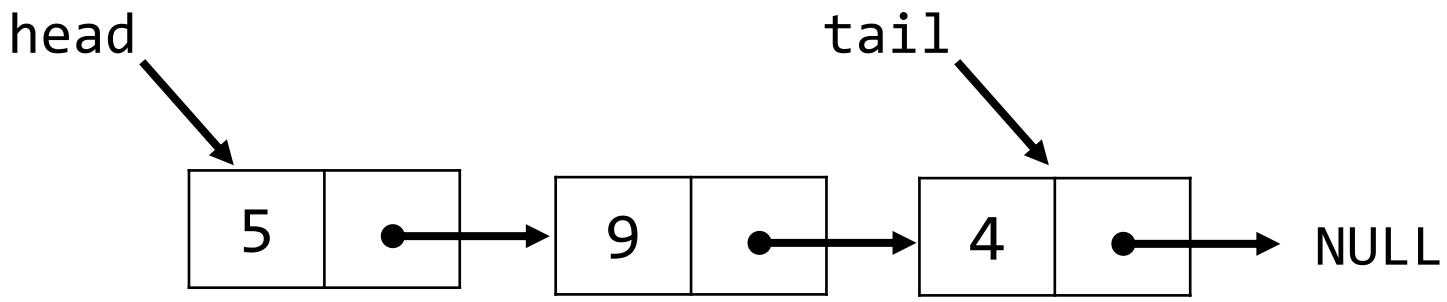


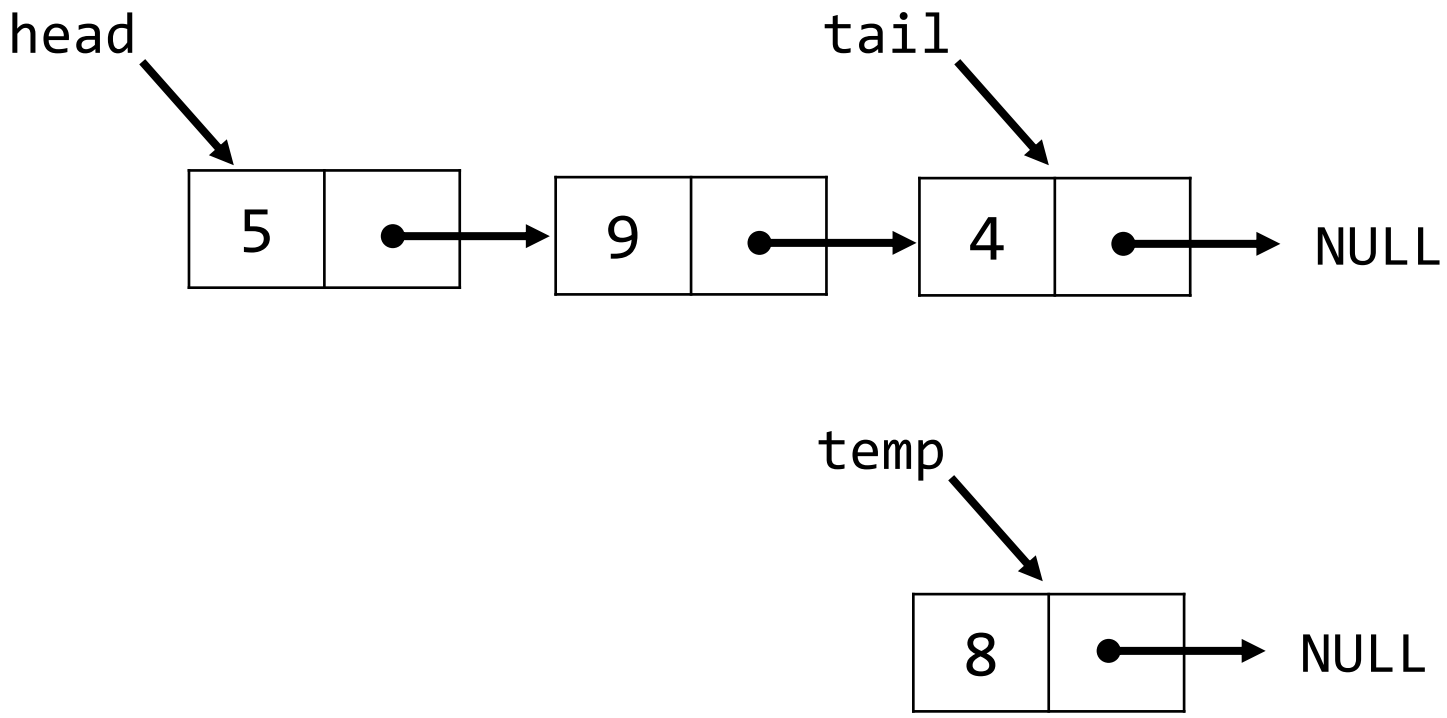
Implementation Using Linked List

Dequeue = LinkedList.pop_front()
Enqueue = LinkedList.push_back()



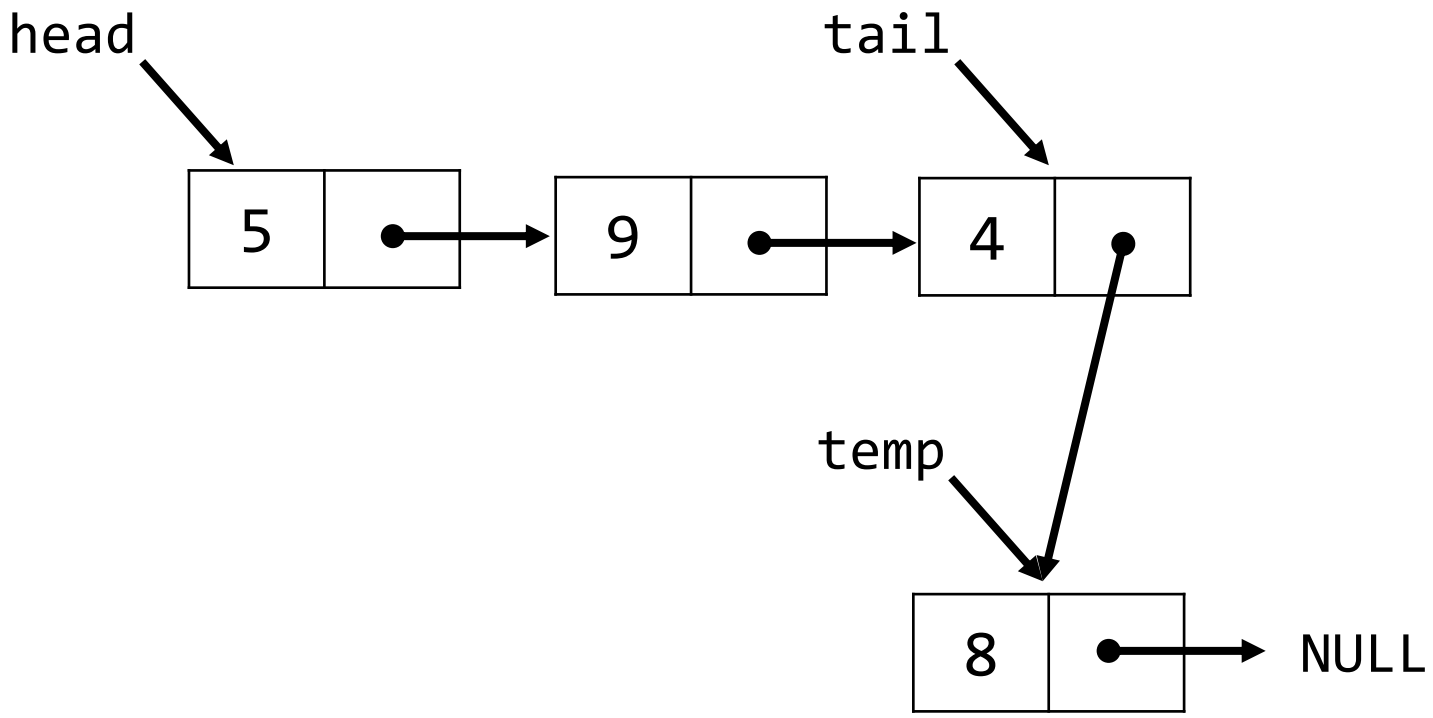
Implementation Using Linked List

Push_back Implementation



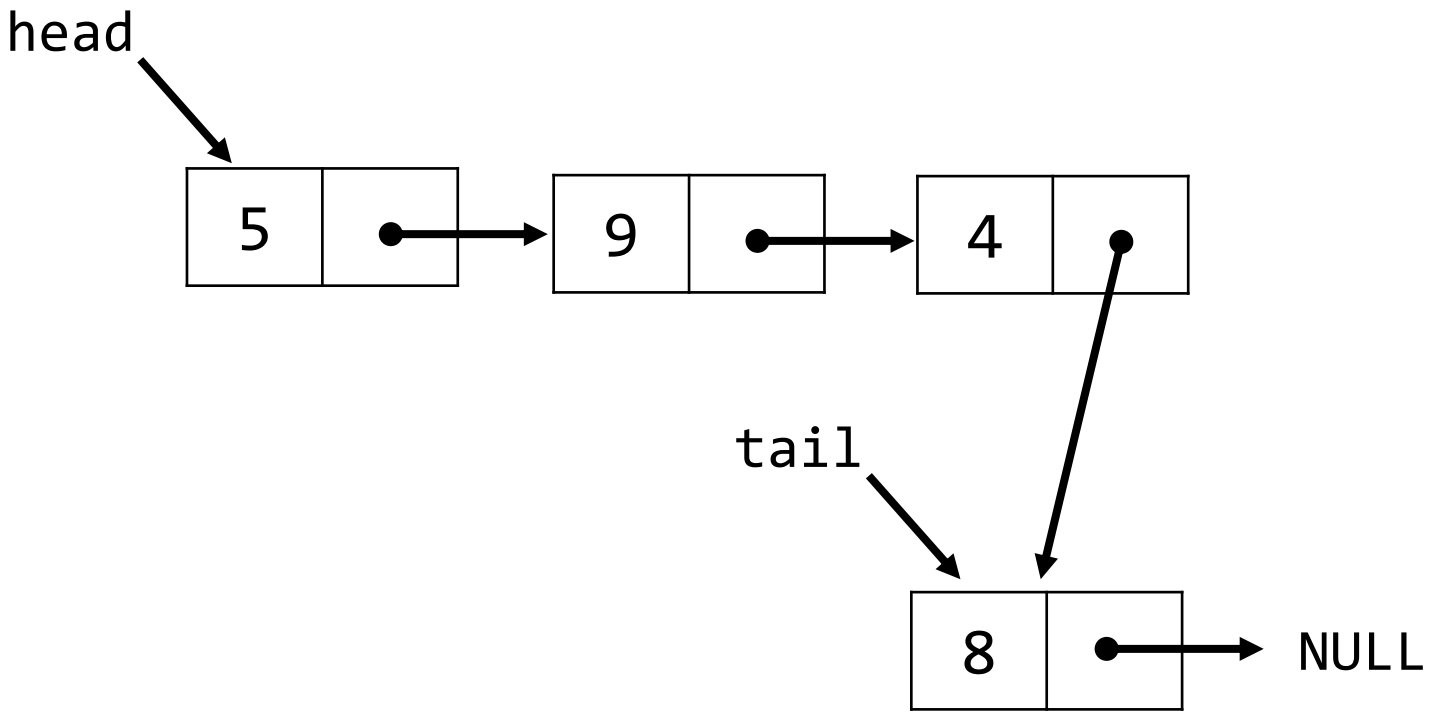
Implementation Using Linked List

Push_back Implementation



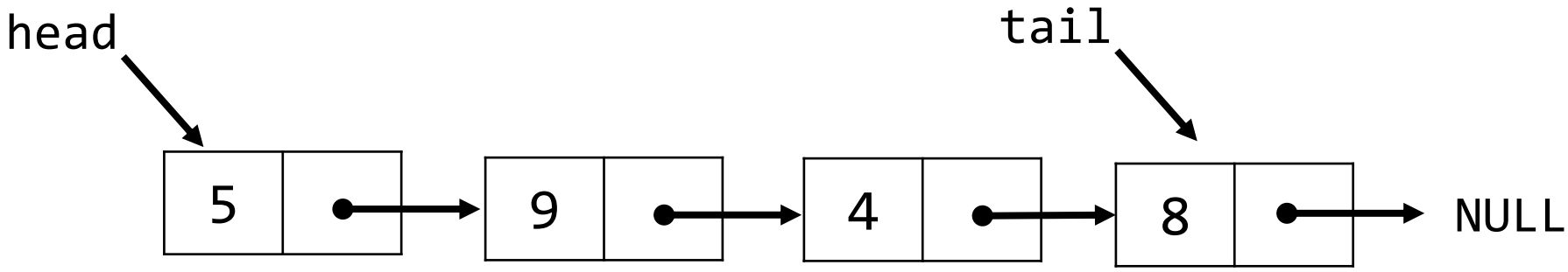
Implementation Using Linked List

Push_back Implementation



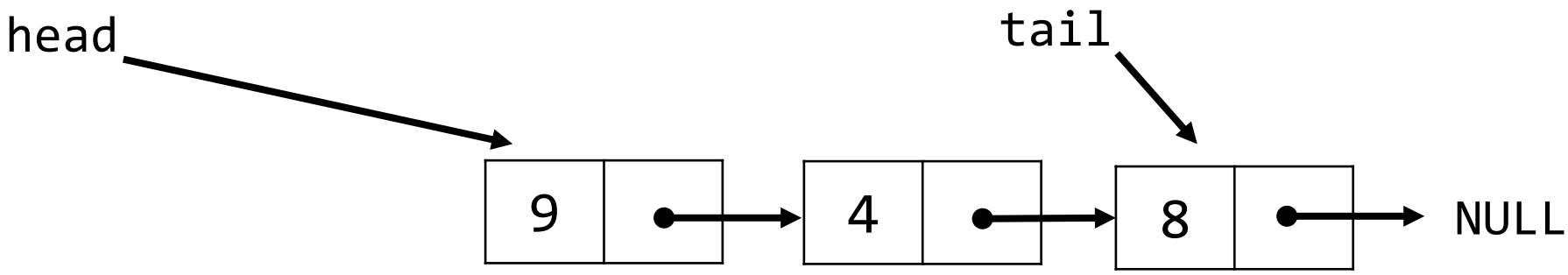
Implementation Using Linked List

How to implement tail?



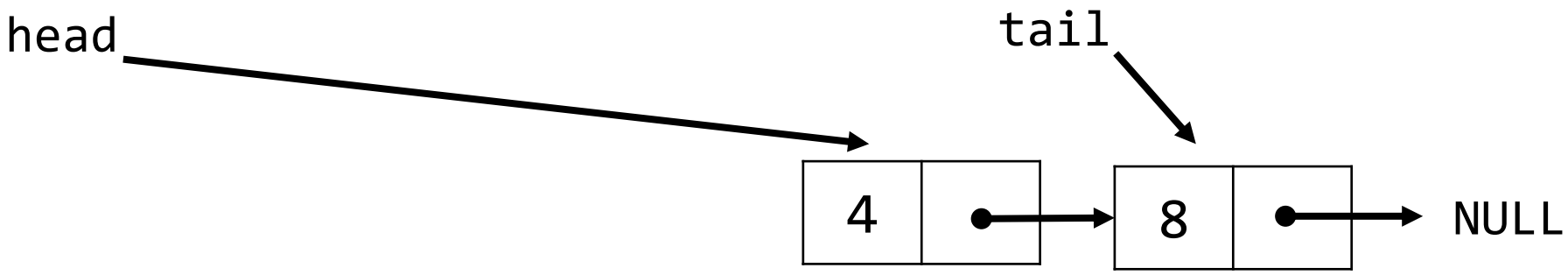
Implementation Using Linked List

Pop_front()



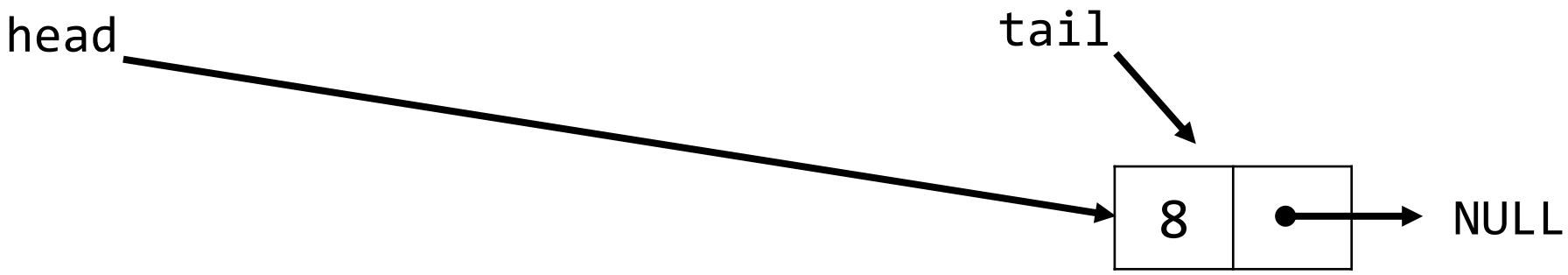
Implementation Using Linked List

Pop_front()



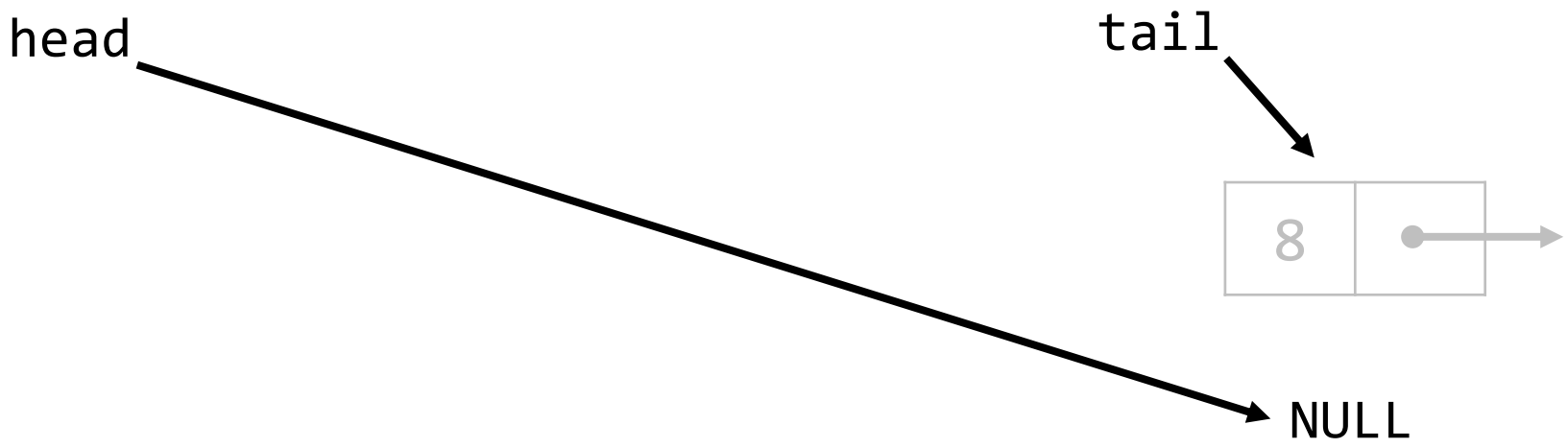
Implementation Using Linked List

Pop_front()



Implementation Using Linked List

Pop_front()
Tail should be updated



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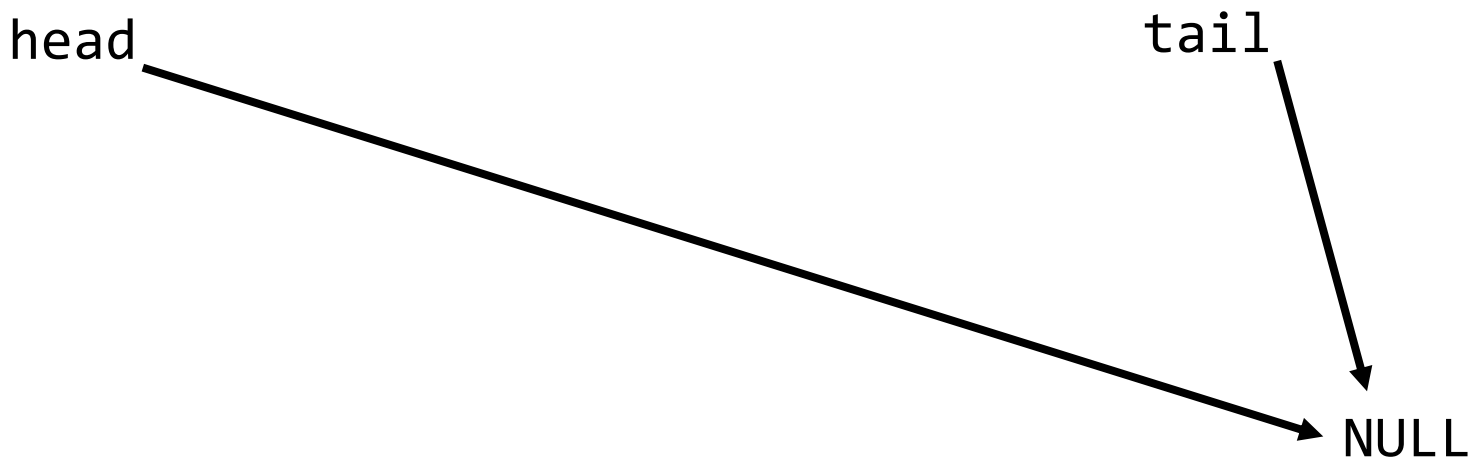
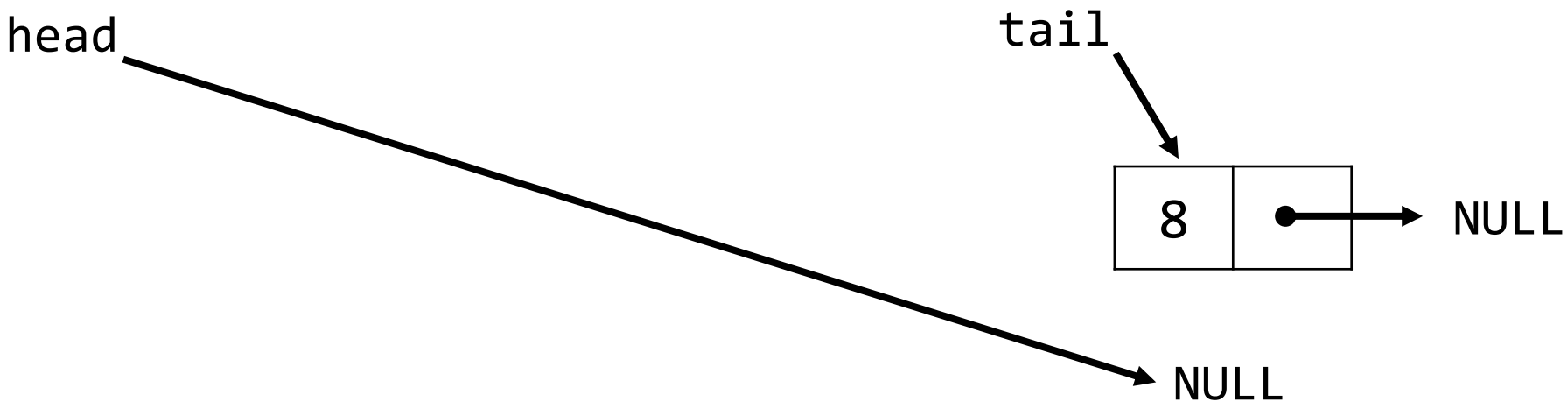


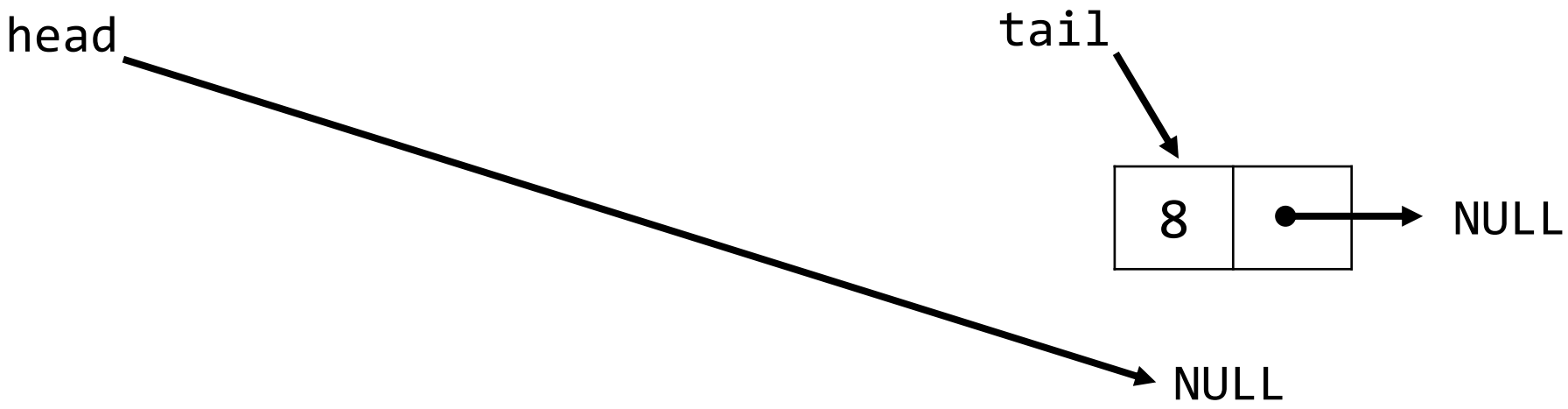
Implementation Using Linked List

Push_back()



Implementation Using Linked List

Push_back()
Head should be updated



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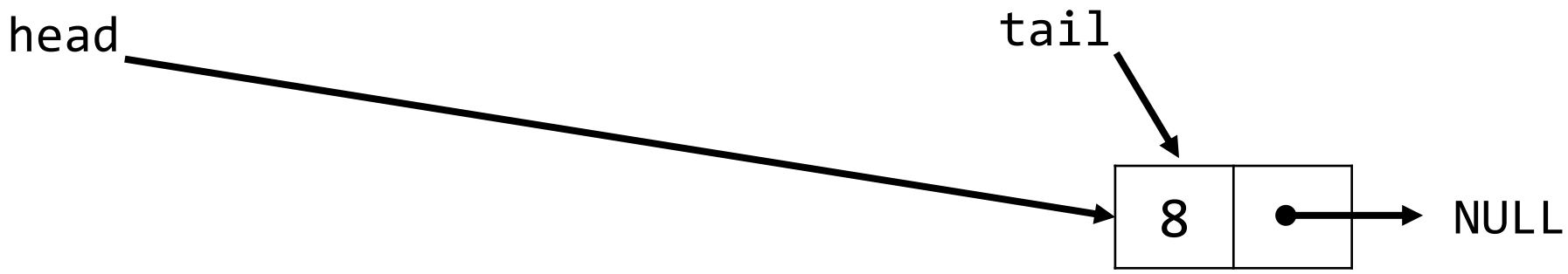
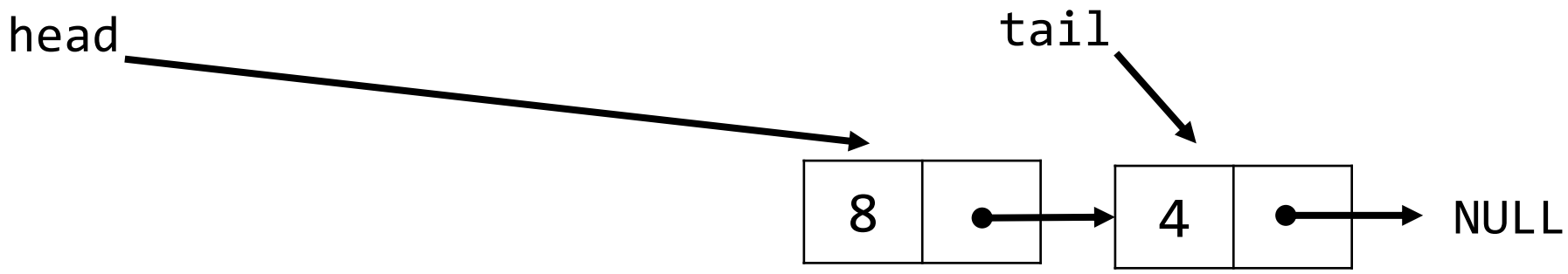


Implementation Using Linked List

Push_back()
Head will not be update after the first insert



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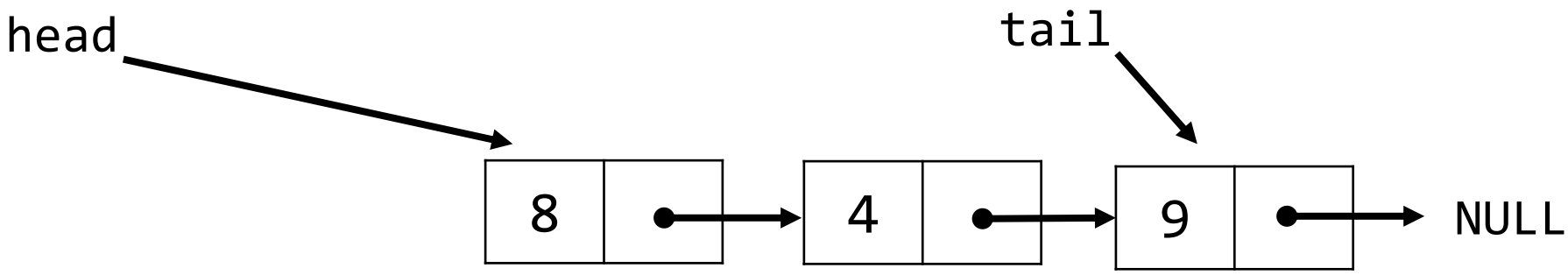
Head will not be update after the first insert



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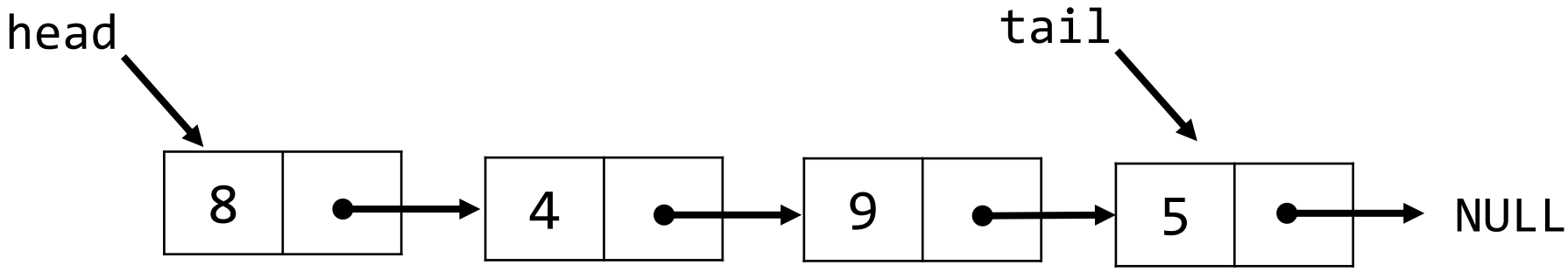

Array vs Linked List

Which one is preferable in actual performance?

Array vs Linked List

Which one is preferable in **actual performance**?

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Locality of reference

From Wikipedia, the free encyclopedia

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In computer science, **locality of reference**, also known as the **principle of locality**,[1] is the tendency of a processor to access the same set of memory locations repetitively over a short period of time.[2] There are two basic types of reference locality – temporal and spatial locality. Temporal locality refers to the reuse of specific data, and/or resources, within a relatively small time duration. Spatial locality refers to the use of data elements within relatively close storage locations. Sequential locality, a special case of spatial locality, occurs when data elements are arranged and accessed linearly, such as, traversing the elements in a one-dimensional array.