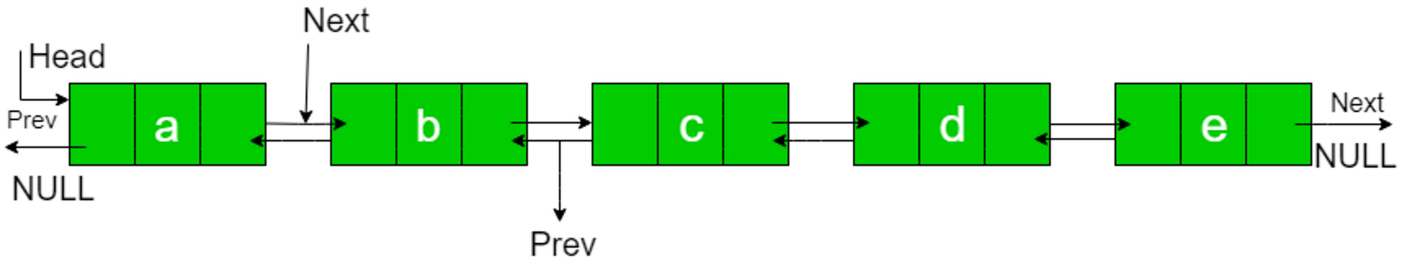
# Rotate Doubly linked list by N nodes

Monday, January 17, 2022 1:51 AM

# Rotate Doubly linked list by N nodes

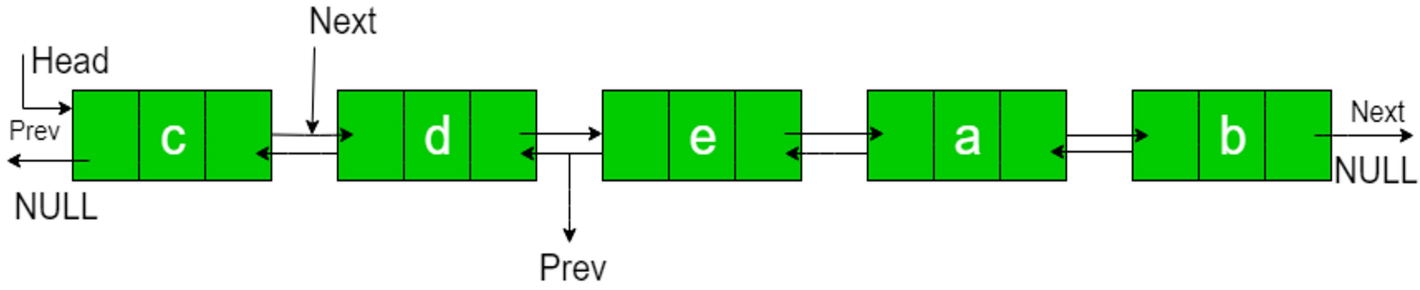
- Difficulty Level : Easy
- Last Updated : 06 Oct, 2021

Given a doubly-linked list, rotate the linked list counter-clockwise by N nodes. Here N is a given positive integer and is smaller than the count of nodes in linked list.




N = 2

Rotated List:




**Examples:**

```
Input : a  b  c  d  e   N = 2
Output : c  d  e  a  b
Input : a  b  c  d  e  f  g  h   N = 4
Output : e  f  g  h  a  b  c  d
```

**Asked in** Amazon

From <https://www.geeksforgeeks.org/rotate-doubly-linked-list-n-nodes/>

Rotate a Linked List

**Medium** Accuracy: 33.33% Submissions: 100k+ Points: 4

Given a singly linked list of size **N**. The task is to **left-shift** the linked list by **k** nodes, where **k** is a given positive integer smaller than or equal to length of the linked list.

**Example 1:**

**Input:**
N = 5
value[] = {2, 4, 7, 8, 9}
k = 3
**Output:** 8 9 2 4 7
**Explanation:Rotate 1:** 4 -> 7 -> 8 -> 9 -> 2**Rotate 2:** 7 -> 8 -> 9 -> 2 -> 4**Rotate 3:** 8 -> 9 -> 2 -> 4 -> 7
**Example 2:**

**Input:**

N = 8
value[] = {1, 2, 3, 4, 5, 6, 7, 8}
k = 4
**Output:** 5 6 7 8 1 2 3 4

**Your Task:**

You don't need to read input or print anything. Your task is to complete the function **rotate**() which takes a **head** reference as the **first argument** and **k** as the **second argument,** and returns the head of the rotated linked list.

**Expected Time Complexity:** O(N).

**Expected Auxiliary Space:** O(1).

**Constraints:**

1 <= N <= 10$_3$

1 <= k <= N

From <https://practice.g

**Constraints:**

$1 <= N <= 10^3$

$1 <= k <= N$

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# Rotate a Linked List

- Difficulty Level : Easy
- Last Updated : 25 Nov, 2021

Given a singly linked list, rotate the linked list counter-clockwise by k nodes. Where k is a given positive integer. For example, if the given linked list is 10->20->30->40->50->60 and k is 4, the list should be modified to 50->60->10->20->30->40. Assume that k is smaller than the count of nodes in a linked list.

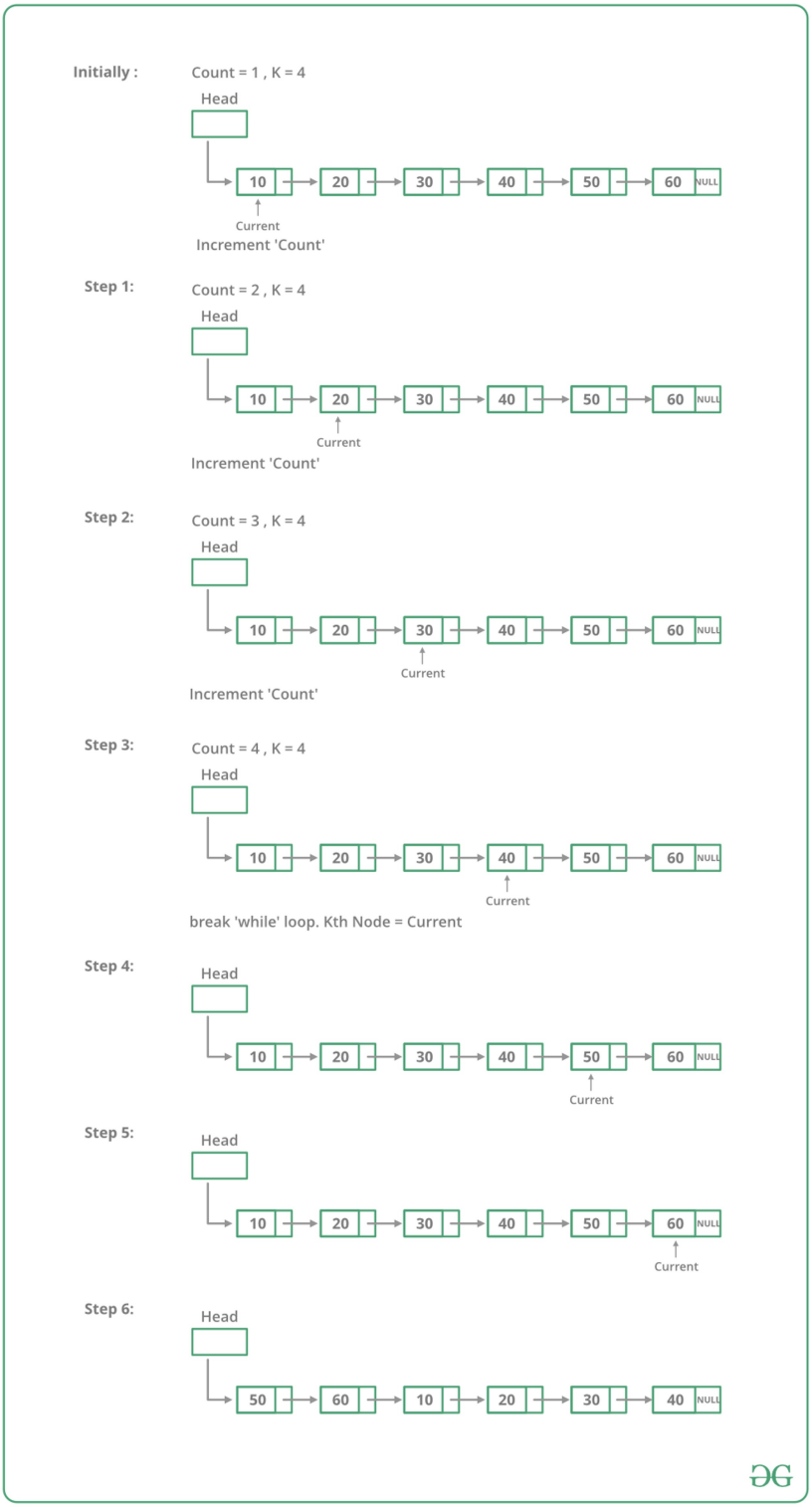
## Recommended: Please solve it on "***PRACTICE***" first, before moving on to the solution.

**Method-1:**

To rotate the linked list, we need to change the next of kth node to NULL, the next of the last node to the previous head node, and finally, change the head to (k+1)th node. So we need to get hold of three nodes: kth node, (k+1)th node, and last node.

Traverse the list from the beginning and stop at kth node. Store pointer to kth node. We can get (k+1)th node using kthNode->next. Keep traversing till the end and store a pointer to the last node also. Finally, change pointers as stated above.

Below image shows how to rotate function works in the code :




- C++
- C
- Java
- Python
- C#
- Javascript

```
// Java program to rotate a linked list
class LinkedList {
    Node head; // head of list

/* Linked list Node*/
    class Node {
        int data;
```

```
        Node next;
        Node(int d)
        {
            data = d;
            next = null;
        }
    }

// This function rotates a linked list counter-clockwise
    // and updates the head. The function assumes that k is
    // smaller than size of linked list. It doesn't modify
    // the list if k is greater than or equal to size
    void rotate(int k)
    {
        if (k == 0)
            return;

// Let us understand the below code for example k = 4
        // and list = 10->20->30->40->50->60.
        Node current = head;

// current will either point to kth or NULL after this
        // loop. current will point to node 40 in the above example
        int count = 1;
        while (count < k && current != null) {
            current = current.next;
            count++;
        }

// If current is NULL, k is greater than or equal to count
        // of nodes in linked list. Don't change the list in this case
        if (current == null)
            return;

// current points to kth node. Store it in a variable.
        // kthNode points to node 40 in the above example
        Node kthNode = current;

// current will point to last node after this loop
        // current will point to node 60 in the above example
        while (current.next != null)
            current = current.next;

// Change next of last node to previous head
        // Next of 60 is now changed to node 10

current.next = head;

// Change head to (k+1)th node
        // head is now changed to node 50
        head = kthNode.next;

// change next of kth node to null
        kthNode.next = null;
    }

/*  Given a reference (pointer to pointer) to the head
        of a list and an int, push a new node on the front
        of the list. */
    void push(int new_data)
    {
        /* 1 & 2: Allocate the Node &
                  Put in the data*/
        Node new_node = new Node(new_data);

/* 3. Make next of new Node as head */
        new_node.next = head;

/* 4. Move the head to point to new Node */
        head = new_node;
    }

void printList()
    {
        Node temp = head;
        while (temp != null) {
```

```
            System.out.print(temp.data + " ");
            temp = temp.next;
        }
        System.out.println();
    }

/* Driver program to test above functions */
    public static void main(String args[])
    {
        LinkedList llist = new LinkedList();

// create a list 10->20->30->40->50->60
        for (int i = 60; i >= 10; i -= 10)
            llist.push(i);

System.out.println("Given list");
        llist.printList();

llist.rotate(4);

System.out.println("Rotated Linked List");
        llist.printList();
    }
} /* This code is contributed by Rajat Mishra */
```

**Output:**

```
Given linked list
10  20  30  40  50  60
Rotated Linked list
50  60  10  20  30  40
```

Time Complexity: O(n) where n is the number of nodes in Linked List. The code traverses the linked list only once.

Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above.

**Method-2:**

To rotate a linked list by k, we can first make the linked list circular and then moving k-1 steps forward from head node, making (k-1)th node's next to null and make kth node as head.

- C++
- Java
- Python3
- C#
- Javascript

```
// Java program to rotate
// a linked list counter clock wise
import java.util.*;
class GFG{

/* Link list node */
static class Node {

int data;
    Node next;
};
static  Node head = null;

// This function rotates a linked list
// counter-clockwise and updates the
// head. The function assumes that k is
// smaller than size of linked list.
static void rotate( int k)
{
    if (k == 0)
        return;

// Let us understand the below
    // code for example k = 4 and
```

```
    // list = 10.20.30.40.50.60.
    Node current = head;

// Traverse till the end.
    while (current.next != null)
        current = current.next;

current.next = head;
    current = head;

// traverse the linked list to k-1 position which
    // will be last element for rotated array.
    for (int i = 0; i < k - 1; i++)
        current = current.next;

// update the head_ref and last element pointer to null
    head = current.next;
    current.next = null;
}

/* UTILITY FUNCTIONS */
/* Function to push a node */
static void push(int new_data)
{

    /* allocate node */
    Node new_node = new Node();

/* put in the data */
    new_node.data = new_data;

/* link the old list off the new node */
    new_node.next = head;

/* move the head to point to the new node */
    head = new_node;
}

/* Function to print linked list */
static void printList(Node node)
{
    while (node != null)
    {
        System.out.print(node.data + " ");
        node = node.next;
    }
}

/* Driver code*/
public static void  main(String[] args)
{
    /* Start with the empty list */


// create a list 10.20.30.40.50.60
    for (int i = 60; i > 0; i -= 10)
        push( i);

System.out.print("Given linked list \n");
    printList(head);
    rotate( 4);

System.out.print("\nRotated Linked list \n");
    printList(head);
}
}

// This code IS contributed by gauravrajput1
```

**Output:**

```
Given linked list
10 20 30 40 50 60
Rotated Linked list
50 60 10 20 30 40
```

From <https://www.geeksforgeeks.org/rotate-a-linked-list/>