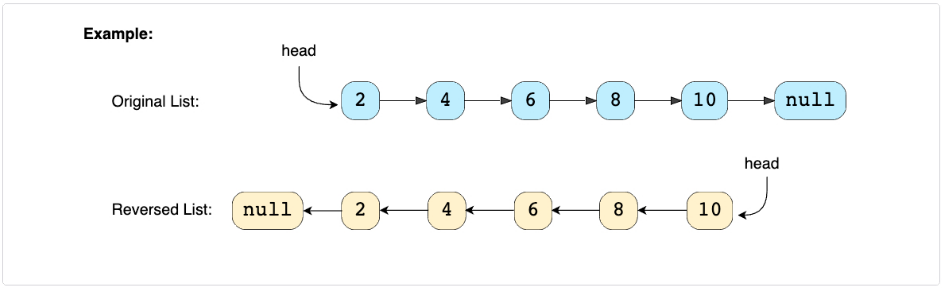
Reverse a LinkedList (easy)

We'll cover the following

Problem Statement

Given the head of a Singly LinkedList, reverse the LinkedList. Write a function to return the new head of the reversed LinkedList.



Try it yourself

Try solving this question here:

Java | Python3 | JS | C++

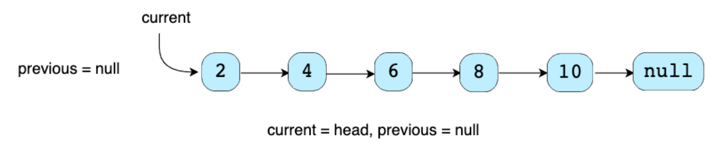
```java
class ListNode {
  int value = 0;
  ListNode next;

  ListNode(int value) {
    this.value = value;
  }
}

class ReverseLinkedList {

  public static ListNode reverse(ListNode head) {
    // TODO: Write your code here
    return head;
  }

  public static void main(String[] args) {
    ListNode head = new ListNode(2);
    head.next = new ListNode(4);
    head.next.next = new ListNode(6);
    head.next.next.next = new ListNode(8);
    head.next.next.next.next = new ListNode(10);

    ListNode result = ReverseLinkedList.reverse(head);
    System.out.print("Nodes of the reversed LinkedList are: ");
    while (result != null) {
      System.out.print(result.value + " ");
      result = result.next;
```

Run | Save | Reset

Solution

To reverse a LinkedList, we need to reverse one node at a time. We will start with a variable `current` which will initially point to the head of the LinkedList and a variable `previous` which will point to the previous node that we have processed; initially `previous` will point to `null`.

In a stepwise manner, we will reverse the `current` node by pointing it to the `previous` before moving on to the next node. Also, we will update the `previous` to always point to the previous node that we have processed. Here is the visual representation of our algorithm:



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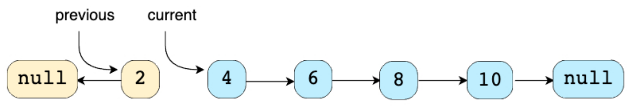

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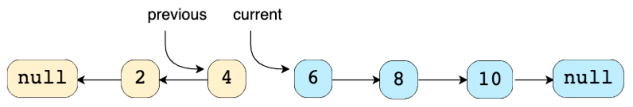

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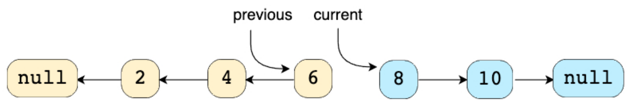

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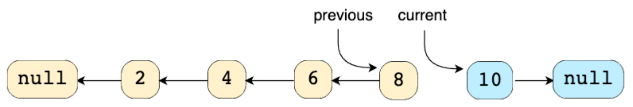

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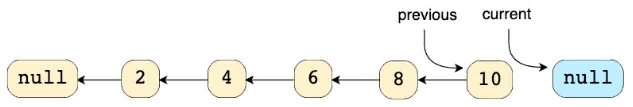

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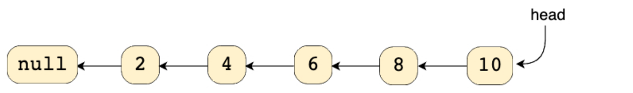

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Code

Here is what our algorithm will look like:

Java | Python3 | C++ | JS

```
class ListNode {
```

```java
  int value = 0;
  ListNode next;

  ListNode(int value) {
    this.value = value;
  }
}

class ReverseLinkedList {

  public static ListNode reverse(ListNode head) {
    ListNode current = head; // current node that we will be processing
    ListNode previous = null; // previous node that we have processed
    ListNode next = null; // will be used to temporarily store the next node

    while (current != null) {
      next = current.next; // temporarily store the next node
      current.next = previous; // reverse the current node
      previous = current; // before we move to the next node, point previous to the current node
      current = next; // move on the next node
    }
    // after the loop current will be pointing to 'null' and 'previous' will be the new head
    return previous;
  }

  public static void main(String[] args) {
    ListNode head = new ListNode(2);
```

Run Save Reset

Time complexity

The time complexity of our algorithm will be $O(N)$ where 'N' is the total number of nodes in the LinkedList.

Space complexity

We only used constant space, therefore, the space complexity of our algorithm is $O(1)$.

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