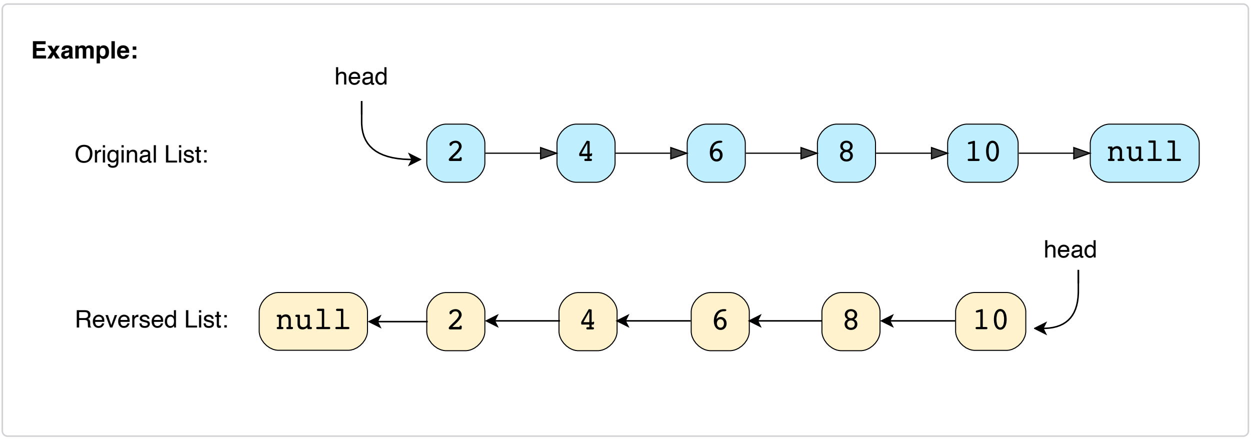
Reverse a LinkedList (easy)

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++

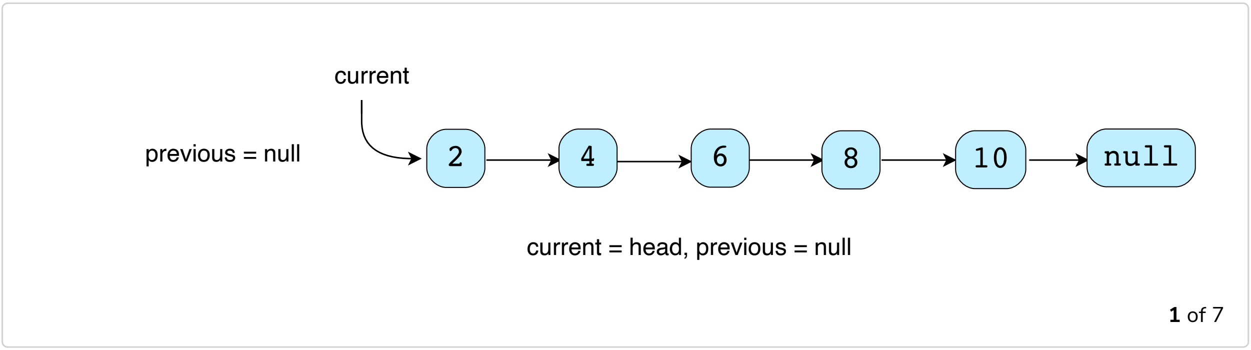
```
from __future__ import print_function


class Node:
  def __init__(self, value, next=None):
    self.value = value
    self.next = next

  def print_list(self):
    temp = self
    while temp is not None:
      print(temp.value, end=" ")
      temp = temp.next
    print()

```

```python

def reverse(head):
  # TODO: Write your code here
  return head


def main():
  head = Node(2)
  head.next = Node(4)
  head.next.next = Node(6)
  head.next.next.next = Node(8)
  head.next.next.next.next = Node(10)

```

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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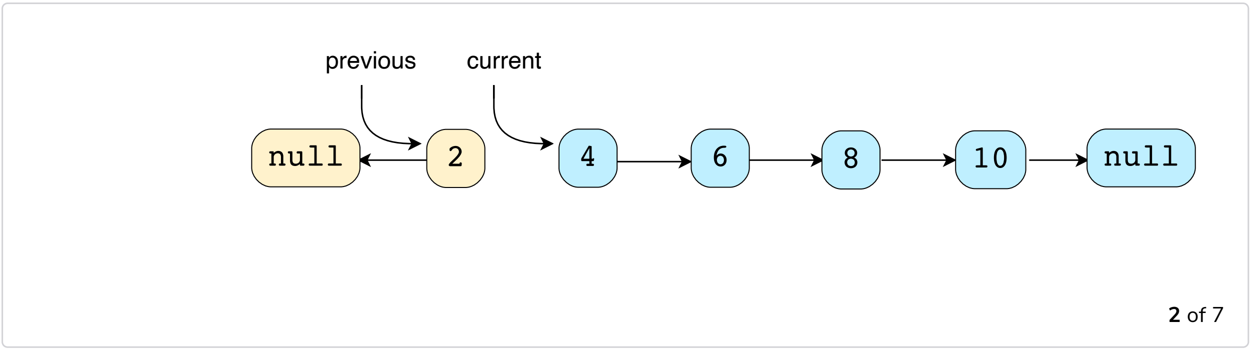

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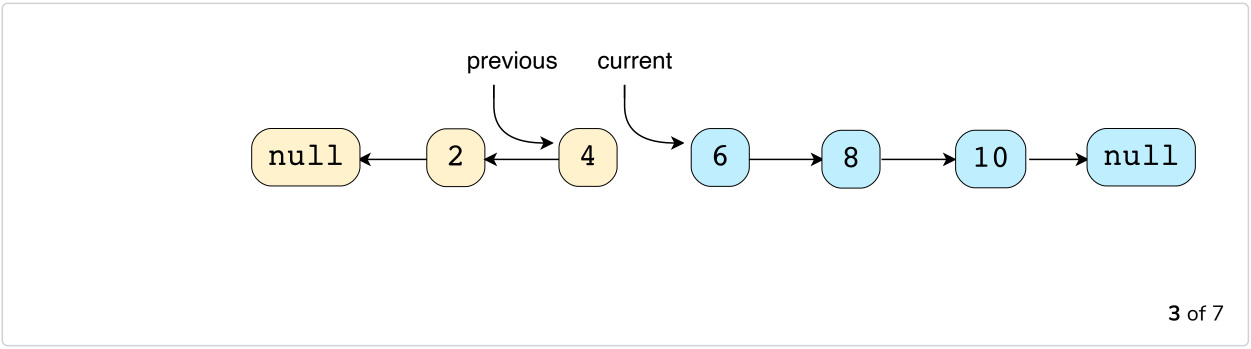

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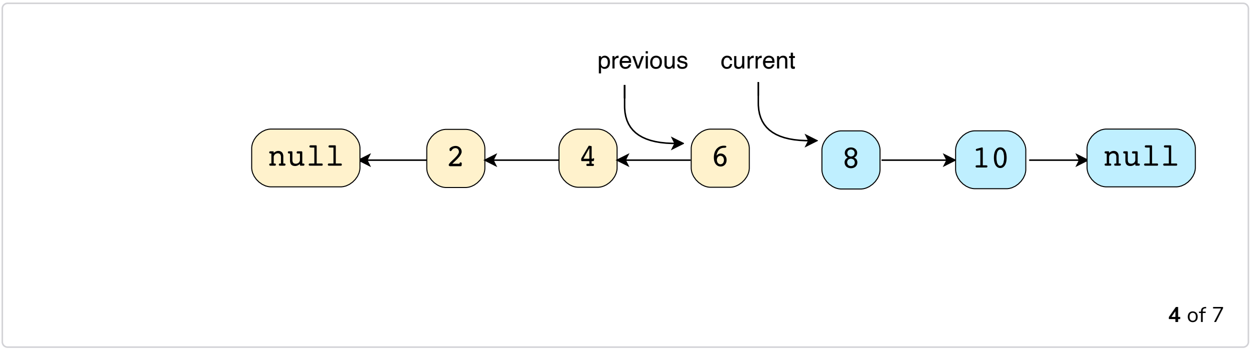

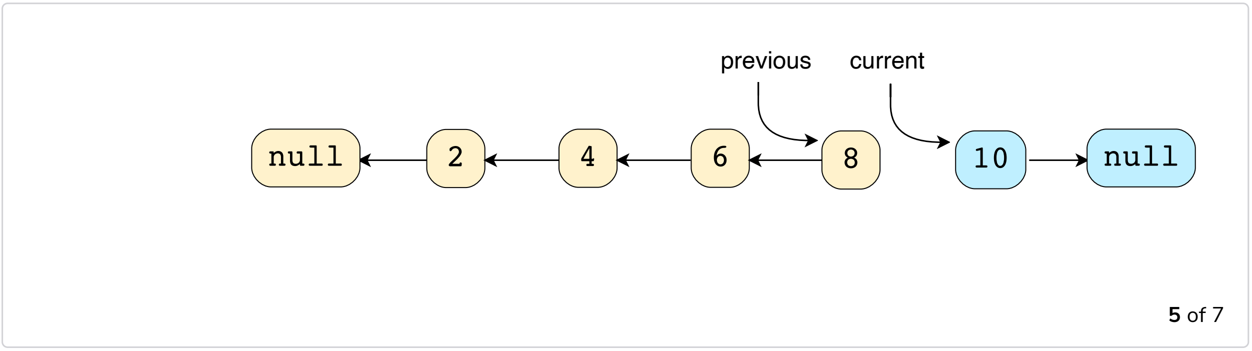

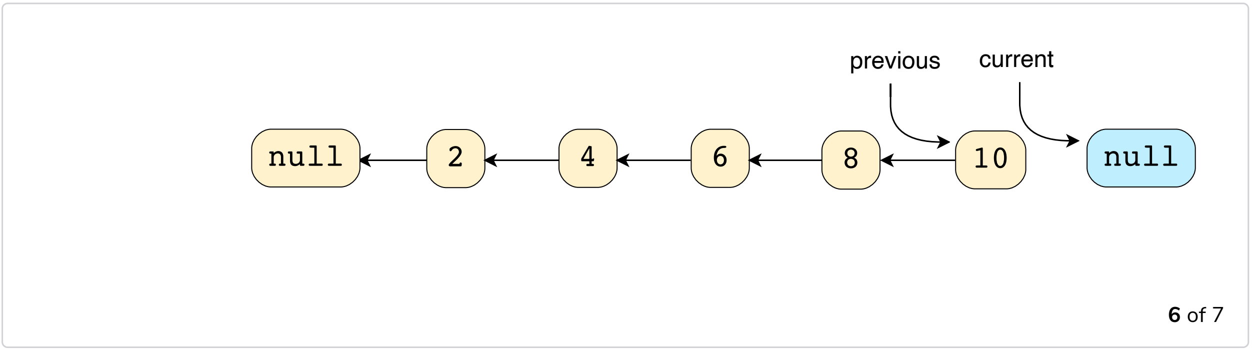

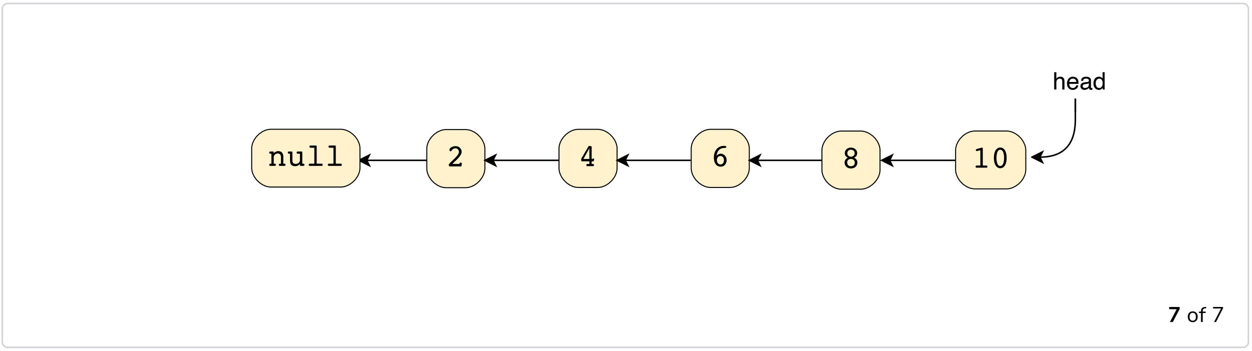

Code

Here is what our algorithm will look like:

Java | Python3 | C++ | JS

```
from __future__ import print_function


class Node:
  def __init__(self, value, next=None):
    self.value = value
    self.next = next
  def print_list(self):
    temp = self
    while temp is not None:
      print(temp.value, end=" ")
      temp = temp.next
    print()


def reverse(head):
  previous, current, next = None, head, None
  while current is not None:
    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 n
    current = next  # move on the next node
  return previous


def main():
  head = Node(2)
```

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 $O(1)$.