

143. Reorder List

🕒 Created	@October 17, 2022 3:50 PM
📌 Difficulty	Medium
📄 LC Url	https://leetcode.com/problems/reorder-list/
📌 Importance	
🏷️ Tag	LinkedList NEET
📺 Video	

You are given the head of a singly linked-list. The list can be represented as:

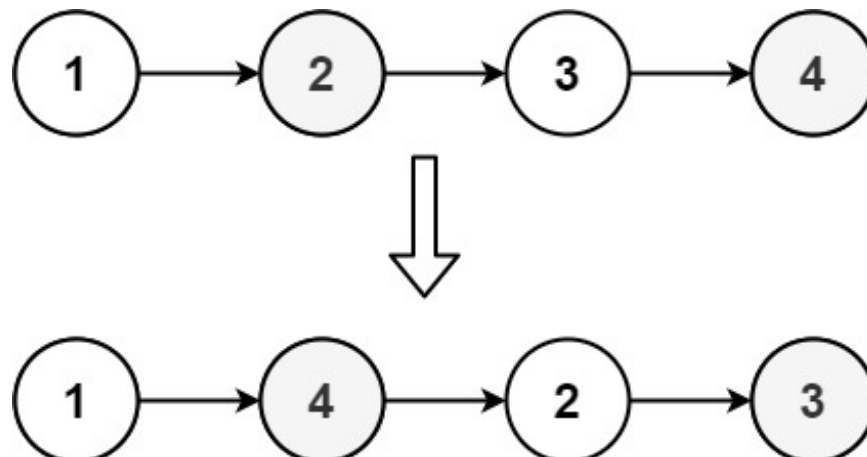
$L_0 \rightarrow L_1 \rightarrow \dots \rightarrow L_{n-1} \rightarrow L_n$

Reorder the list to be on the following form:

$L_0 \rightarrow L_n \rightarrow L_1 \rightarrow L_{n-1} \rightarrow L_2 \rightarrow L_{n-2} \rightarrow \dots$

You may not modify the values in the list's nodes. Only nodes themselves may be changed.

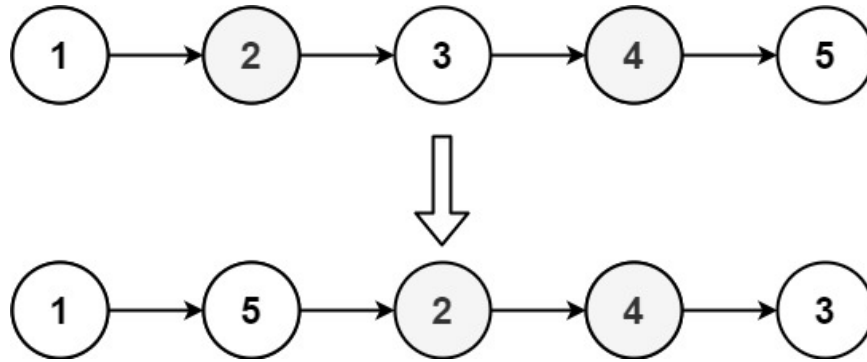
Example 1:



Input: head = [1,2,3,4]

Output: [1,4,2,3]

Example 2:



Input: head = [1,2,3,4,5]

Output: [1,5,2,4,3]

Constraints:

- The number of nodes in the list is in the range `[1, 5 * 104]`.
- `1 <= Node.val <= 1000`

Solution

```
class Solution:
    def reorderList(self, head: ListNode) -> None:
        # find middle
        slow, fast = head, head.next
        while fast and fast.next:
            slow = slow.next
            fast = fast.next.next

        # reverse second half
        second = slow.next
        prev = slow.next = None
        while second:
            tmp = second.next
            second.next = prev
            prev = second
            second = tmp
```

```
        second = tmp

# merge two halves
first, second = head, prev
while second:
    tmp1, tmp2 = first.next, second.next
    first.next = second
    second.next = tmp1
    first, second = tmp1, tmp2
```