

Reverse Nodes in k-Group

This problem is an extension of reversing a linked list, but done in chunks of size k ; the approach is iterative group reversal.

Key Idea:

- Traverse the list in chunks of k .
- For each chunk:
 - Check if there are at least k nodes left; if not, leave them as is.
 - Reverse the k nodes.
 - Connect the reversed chunk to the previous part of the list.
- Use a dummy node to simplify edge cases (like reversing the first group).

Steps:

1. Count nodes in the list to know when to stop.
2. Create a dummy node pointing to head.
3. Use prev pointer to mark the node before the current group.
4. While there are at least k nodes left:
 - Mark $start = prev \rightarrow next$ (first node of group) and $end = start \rightarrow next$.
 - Reverse nodes between start and end for $k-1$ iterations:
 - Move end after prev (standard in-place reversal trick).
5. Return dummy \rightarrow next.

Time Complexity:

- $O(n)$ - each node is visited and reversed once
- $O(1)$ extra space.