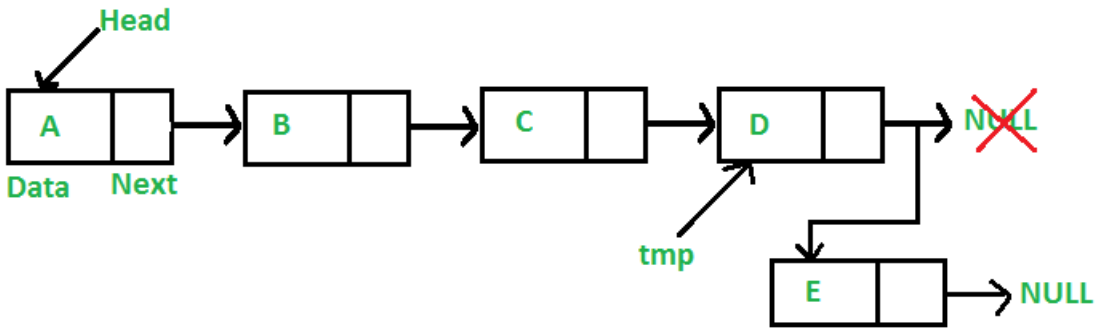
# Insert at the end of Singly Linked List

## Add a node at the end: (6 steps process)

- The new node is always added after the last node of the given Linked List. For example if the given Linked List is 5->10->15->20->25 and we add an item 30 at the end, then the Linked List becomes 5->10->15->20->25->30.
- Since a Linked List is typically represented by the head of it, we have to traverse the list till the end and then change the next to last node to a new node.




Following are the 6 steps to add a node at the end.

C++ | Java

```
 /* Appends a new node at the end. This method is
defined inside LinkedList class shown above */
public void append(int new_data)
{
    /* 1. Allocate the Node &
    2. Put in the data
    3. Set next as null */
    Node new_node = new Node(new_data);

    /* 4. If the Linked List is empty, then make the
        new node as head */
```

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```
        head = new Node(new_data);

    /* 4. This new node is going to be the last node, so
        make next of it as null */
    new_node.next = null;

    /* 5. Else traverse till the last node */
    Node last = head;
    while (last.next != null)
        last = last.next;

    /* 6. Change the next of last node */
    last.next = new_node;
    return;
}
```

**Complexity Analysis:**

- **Time complexity:** O(N), where N is the number of nodes in the linked list. Since there is a loop from head to end, the function does O(n) work.
  - This method can also be optimized to work in O(1) by keeping an extra pointer to the tail of the linked list/
- **Auxiliary Space:** O(1)