

Write a program to combine two sorted lists in Python

In this article, TipsMake.com will learn how to write a program to combine two sorted lists using Python and C++.

Problem: Given two sorted lists of N and M nodes respectively. Your task is to combine two lists together and return the combined list in standard order.

For example:

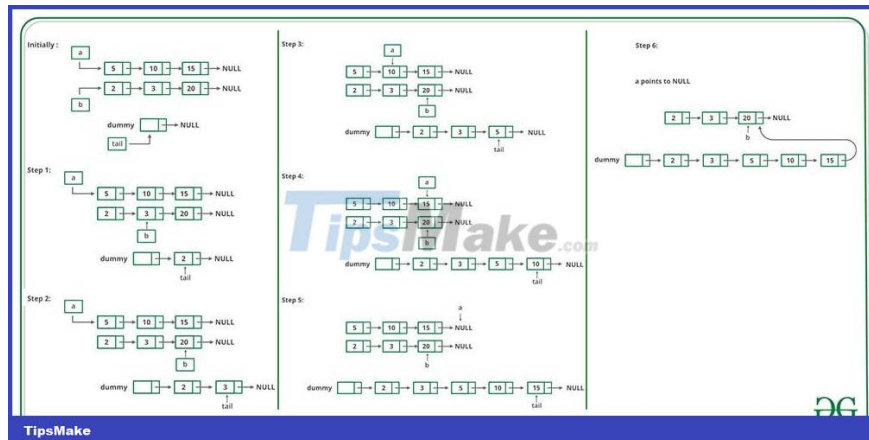
Input: a: 5->10->15, b: 2->3->20 Output: 2->3->5->10->15->20 Input: a: 1->1, b: 1->1

In this article, TipsMake.com will learn how to write a program to combine two sorted lists using Python and C++.

Method 1: Use fake buttons

The idea of this method is to use a temporary dummy node as the first node of the resulting list. The Tail pointer always points to the last node in the resulting list so adding new nodes becomes much easier.

You can see the diagram below to make it easier to visualize:



Follow these steps to resolve the issue:

1. First, create a dummy node for the merged results list.
2. Now, create two pointers, one will point to list 1 (list1) and the other pointer to list 2 (list2).
3. Now, traverse both lists until they run out of all nodes.

4. If the value of a node being pointed to in one list is smaller than the value being pointed to in the other list, add that node to the merged results list and increment that pointer.

Here is sample code in Python language for your reference:

```
""" Python program to merge two sorted linked lists """ # Linked List Node class
?t h?
p là:") listA.printList() """ This code is contributed by Debidutta Rath """
```

Sample code in C++:

```
/* C++ program to merge two sorted linked lists */ #include
using namespace std; /* Link list node */ class Node { public: int data
?t h?
p là: n"; printList(res); return 0; } // This code is contributed by rathbhupend
```

The returned result is:

Danh sách sau khi k?t h?p là: 2 3 5 10 15 20

Method 2: Use recursion

The idea of ??this approach is to move forward with a node in recursion having a smaller node value. When any node ends, append the rest of the already linked list.

Follow these steps to resolve the issue:

1. Create a function that takes two pointers to the list to be passed in.
2. Then check to see which of the two nodes passed in has the smaller value.
3. The node with the smaller value executes the instruction recursively by moving forward with the red pointer and concurrently concatenating the recursive instruction to the node.
4. Also set two base cases to check if one of the lists has reached the value of NULL and then concatenate the rest of the linked list.

Here is the sample code for your reference:

```
# Python3 program merge two sorted linked # in third linked list using recursive
?t h?p là:") list3.printList() # This code is contributed by 'Shriaknt13'.
```

Sample code in C++:

```
/* C++ program to merge two sorted linked lists */ #include
using namespace std; /* Link list node */ class Node { public: int data
?t h?
p là: n"; printList(res); return 0; } // This code is contributed by rathbhupend
```

The returned result is:

Danh sách sau khi kết hợp là: 2 3 5 10 15 20

Method 3: Using reverse list method with C++ language

The idea of this method is to first reverse both given lists and then traverse both lists from beginning to end and compare the nodes of the two lists. Next, insert the node with the greater value at the top of the resulting list. In this way we will get the list of results in ascending order.

Follow these steps to resolve the issue:

1. Initialize the resulting list to be empty: head = NULL.
2. Let "a" and "b" be the beginning of the first list and the second list respectively.
3. Reverse both lists.
4. When (a !=NULL and b!=NULL):
 1. Find the greater of both (current "a" and "b" values).
 2. Insert the larger value of the button in front of the result list.
 3. Continue with the larger buttons in the list.
5. If "b" becomes NULL before "a", insert all nodes of "a" into the resulting list from the beginning.
6. If "a" becomes NULL before "b", insert all nodes of "b" into the resulting list at the beginning.

Here is sample code in C++ for your reference:

```
/*Given two sorted linked lists consisting of N and M nodes respectively. The task is to merge these two sorted lists into one sorted list. The merged list should be returned.  
The nodes of the list are represented by struct Node.  
using namespace std; /* Link list Node */ struct Node { int key; struct Node *next; };  
?t h? p là: " endl; printList(res); return 0; } // This code is contributed by Aditya
```

The returned result is:

Danh sách sau khi kết hợp là: 2 3 5 10 15 20

TipsMake.com hope this article will be useful to you.

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