

## Sort a linked list of 0s, 1s and 2s

Given a linked list of 0s, 1s and 2s, sort it.

Source: [Microsoft Interview | Set 1](#)

Following steps can be used to sort the given linked list.

- 1) Traverse the list and count the number of 0s, 1s and 2s. Let the counts be n1, n2 and n3 respectively.
- 2) Traverse the list again, fill the first n1 nodes with 0, then n2 nodes with 1 and finally n3 nodes with 2.

```
// Program to sort a linked list 0s, 1s or 2s
#include<stdio.h>
#include<stdlib.h>

/* Link list node */
struct node
{
    int data;
    struct node* next;
};

// Function to sort a linked list of 0s, 1s and 2s
void sortList(struct node *head)
{
    int count[3] = {0, 0, 0}; // Initialize count of '0', '1' and '2'
    struct node *ptr = head;

    /* count total number of '0', '1' and '2'
    * count[0] will store total number of '0's
    * count[1] will store total number of '1's
    * count[2] will store total number of '2's */
    while (ptr != NULL)
```

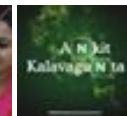
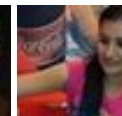
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```

{
    count[ptr->data] += 1;
    ptr = ptr->next;
}

int i = 0;
ptr = head;

/* Let say count[0] = n1, count[1] = n2 and count[2] = n3
 * now start traversing list from head node,
 * 1) fill the list with 0, till n1 > 0
 * 2) fill the list with 1, till n2 > 0
 * 3) fill the list with 2, till n3 > 0 */
while (ptr != NULL)
{
    if (count[i] == 0)
        ++i;
    else
    {
        ptr->data = i;
        --count[i];
        ptr = ptr->next;
    }
}
}

```

```

/* Function to push a node */
void push (struct node** head_ref, int new_data)
{
    /* allocate node */
    struct node* new_node =
        (struct node*) malloc(sizeof(struct node));

    /* put in the data */
    new_node->data = new_data;

    /* link the old list off the new node */
    new_node->next = (*head_ref);

    /* move the head to point to the new node */
    (*head_ref) = new_node;
}

/* Function to print linked list */
void printList(struct node *node)
{
    while (node != NULL)

```



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```

{
    printf("%d ", node->data);
    node = node->next;
}
printf("\n");
}

/* Driver program to test above function*/
int main(void)
{
    struct node *head = NULL;
    push(&head, 0);
    push(&head, 1);
    push(&head, 0);
    push(&head, 2);
    push(&head, 1);
    push(&head, 1);
    push(&head, 2);
    push(&head, 1);
    push(&head, 2);

    printf("Linked List Before Sorting\n");
    printList(head);

    sortList(head);

    printf("Linked List After Sorting\n");
    printList(head);

    return 0;
}

```

Output:

```

Linked List Before Sorting
2 1 2 1 1 2 0 1 0
Linked List After Sorting
0 0 1 1 1 1 2 2 2

```

Time Complexity:  $O(n)$

Auxiliary Space:  $O(1)$

This article is compiled by **Narendra Kangralkar**. Please write comments if you find anything

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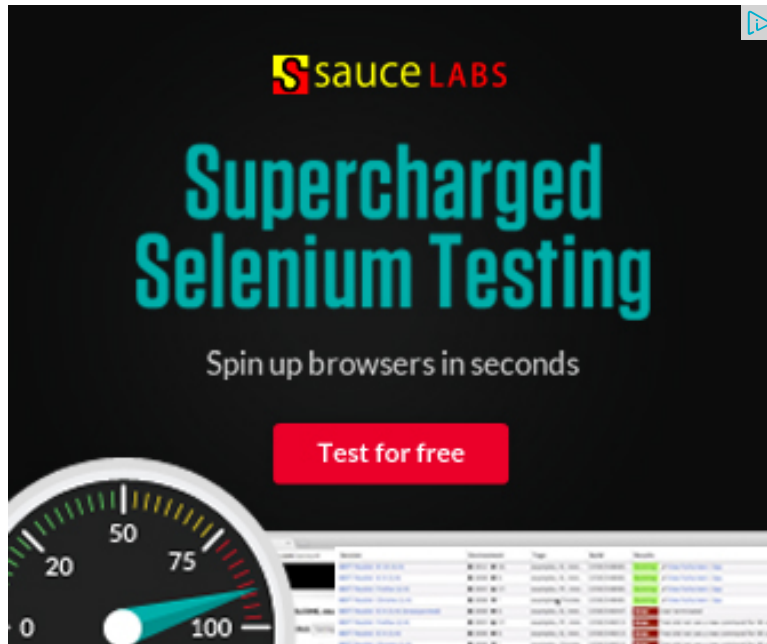
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