

Aim:

The `insertAtBegin(NODE first, int x)` function inserts a new node at the beginning of the singly linked list.

The algorithm for `insertAtBegin(NODE first, int x)` is as follows:

Step-1: Allocate memory to the node `temp`.
 Step-2: Store an integer value into `data` field of node `temp`.
 Step-3: Assign the address contained in the `first` node to the `next` field of `temp`.
 Step-4: Now treat the `temp` node as `first` node.
 Step-5: Finally return the `first` node.

The `count(NODE first)` function counts the number of nodes linked in a singly linked list.

The algorithm for `count(node first)` is as follows:

Step-1: Assign the address contained in `first` node to `temp` node.
 Step-2: Initialize a variable `sum` to 0 (zero).
 Step-3: Repeat **Step-4** and **Step-5** until `temp` reaches the `NULL`.
 Step-4: Increment the `sum` by 1.
 Step-5: Move to the next node by placing the address of the `next` node in `temp` node.
 Step-6: Finally return `sum`.

Source Code:SingleLL2.c

```
#include<stdio.h>
#include<stdlib.h>

#include "InsAtBeginAndCount.c"

void main() {
    NODE first = NULL;
    int x, op;
    while(1) {
        printf("1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit\n");
        printf("Enter your option : ");
        scanf("%d", &op);
        switch(op) {
            case 1: printf("Enter an element : ");
                    scanf("%d", &x);
                    first = insertAtBegin(first, x);
                    break;
            case 2: printf("The number of nodes in a SLL are : %d\n", count(first));
                    break;
            case 3: if (first == NULL) {
                        printf("Single Linked List is empty\n");
                    } else {
```

```

                printf("The elements in SLL are : ");
                traverseList(first);
            }
            break;
        case 4: exit(0);
    }
}
}

```

InsAtBeginAndCount.c

```

struct node {
    int data;
    struct node *next;
};
typedef struct node *NODE;

NODE createNode() {
    NODE temp;
    temp=(NODE)malloc(sizeof(struct node));
    temp->next=NULL;
    return temp;
}

NODE insertAtBegin(NODE first, int x) {
    NODE temp;
    temp=createNode();
    temp->data=x;
    temp->next=first;
    first=temp;
    return first;
}

int count(NODE first) {
    NODE temp=first;
    int sum=0;
    while(temp!=NULL)
    {
        sum++;
        temp=temp->next;
    }
    return sum;
}

void traverseList(NODE first) {
    NODE temp = first;
    while (temp != NULL) {
        printf("%d --> ",temp -> data);
        temp = temp -> next;
    }
    printf("NULL\n");
}

```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 10
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 20
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 30
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 2
Enter your option : 2
The number of nodes in a SLL are : 3 3
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 3
Enter your option : 3
The elements in SLL are : 30 --> 20 --> 10 --> NULL 1
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 40
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 2
Enter your option : 2
The number of nodes in a SLL are : 4 3
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 3
Enter your option : 3
The elements in SLL are : 40 --> 30 --> 20 --> 10 --> NULL 4
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 4
Enter your option : 4

Test Case - 2
User Output
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 99
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 1
Enter your option : 1
Enter an element : 89
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 3
Enter your option : 3
The elements in SLL are : 89 --> 99 --> NULL 2
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 2
Enter your option : 2
The number of nodes in a SLL are : 2 4
1.Insert At Begin 2.Count Number of Nodes 3.Traverse the List 4.Exit 4
Enter your option : 4