Deletion in Linked List | Linked List Operations

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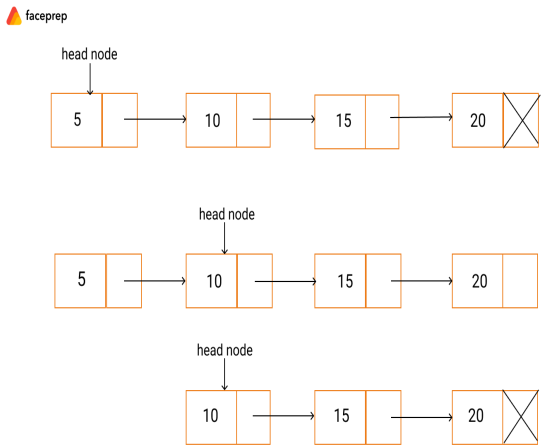
Deletion in a linked list (../linked-list-introduction/) can happen at various places in a list. A few cases are:

- At the beginning of the linked list.
- At the end of the linked list.
- At a given position in the linked list.

Now, let us look at a program for each of these cases.

Deletion at the beginning of the linked list



- To delete the first node (head node), copy the head node in a temporary node.
- Make the second node as the head node.
- Now, delete the temporary node.

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Program to delete a node at the beginning of the Linked List

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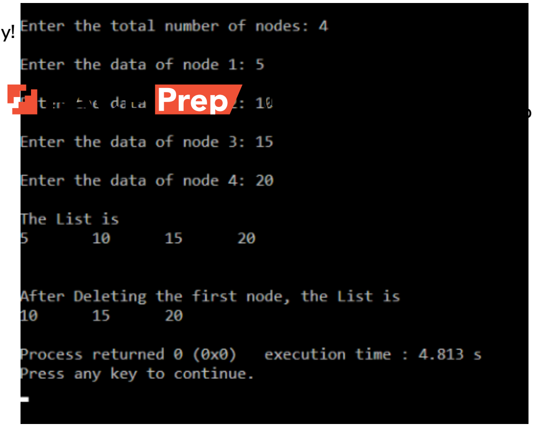
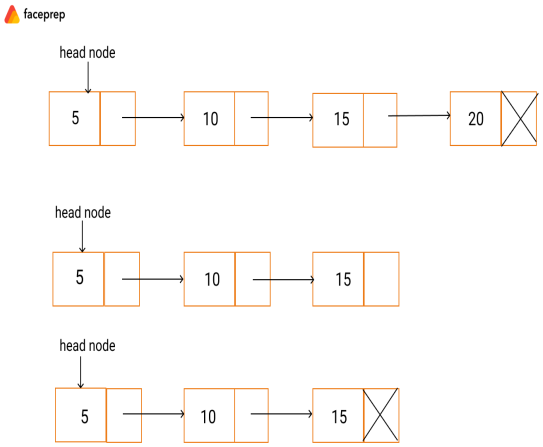
```
#include <stdio.h>
#include <stdlib.h>

// Creating node with data and a pointer
struct node {
 int data;
 struct node *next;
}*head;
void createList(int n);
void deletion_beginning();
void displayList();

int main()
{
 int n, data, pos;
 printf("\nEnter the total number of nodes: ");
 scanf("%d", &n);
 if(n == 0)
 {
 printf("Empty List\n");
 exit(0);
 }
 else
 {
 createList(n);
 }
printf("\nThe List is \n");
 displayList();
 deletion_beginning();
 printf("\n\nAfter Deleting the first node, the List is\n");
 displayList();
 return 0;
}

void createList(int n)
{
 struct node *newNode, *temp;
 int data, i;
head = (struct node *)malloc(sizeof(struct node));
 // When the list is empty
 if(head == NULL)
 {
 printf("Unable to allocate memory.");
 }
 else
 {
 printf("\nEnter the data of node 1: ");
 scanf("%d", &data);
 head->data = data;
 head->next = NULL;
 temp = head;
 for(i=2; i<=n; i++)
 {
 newNode = (struct node *)malloc(sizeof(struct node));
 if(newNode == NULL)
 {
 printf("Unable to allocate memory.");
 break;
 }
 else
 {
 printf("\nEnter the data of node %d: ", i);
 scanf("%d", &data);
 newNode->data = data;
 newNode->next = NULL;
 temp->next = newNode;
 temp = temp->next;
 }
 }
 }
}

/* Function to delete the first node */
void deletion_beginning()
{
 // Empty List
 if(head == NULL)
 printf("\n The list is Empty\n");
 struct node *temp;
 temp = head; //Make temp as head node
 head = head -> next; // Shift the head node
 free(temp); // Delete the temporary node
}
void displayList()
{
 struct node *temp;
 if(head == NULL)
 {
 printf("List is empty.");
 }
 else
 {
 temp = head;
// Print the list
 while(temp != NULL)
 {
 printf("%d\t", temp->data);
 temp = temp->next;
 }
 printf("\n");
 }
}
```

OUTPUT:



```
Enter the total number of nodes: 4

Enter the data of node 1: 5

Enter the data of node 2: 10

Enter the data of node 3: 15

Enter the data of node 4: 20

The List is
5       10      15      20


After Deleting the first node, the List is
10      15      20

Process returned 0 (0x0)   execution time : 4.813 s
Press any key to continue.
```

Deletion at the end of the linked list

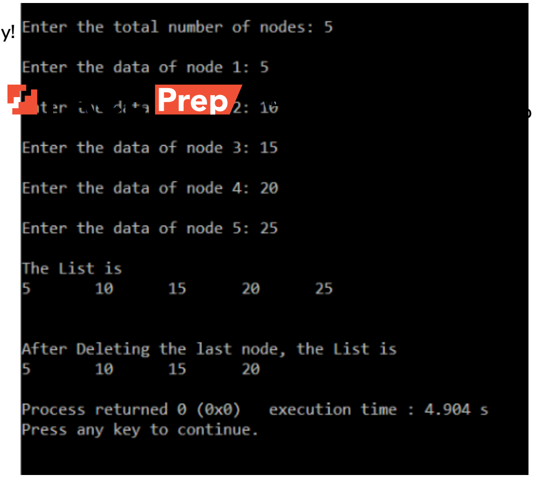


- To delete the last node, start traversing the list from the head node and continue traversing until the address part of the node is **NULL**.
- Keep track of the **second last node** in some temporary variable say **prev_node**.
- Once the address part of the node is NULL, set the **address part** of the **prev_node** as **NULL** and then delete the last node.

Program to delete a node at the end of the Linked List

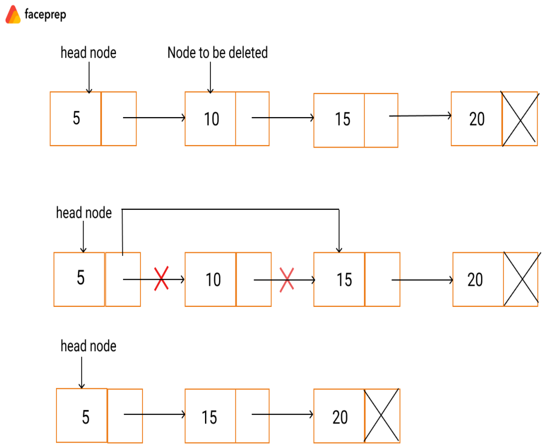
```
#include <stdio.h>
#include <stdlib.h>

// Creating node with data and a pointer
struct node {
int data;
struct node *next;
}*head;
void createList(int n);
void deletion_end();
void displayList();

int main()
{
int n, data, pos;
printf("\nEnter the total number of nodes: ");
scanf("%d", &n);
createList(n);
printf("\nThe List is \n");
displayList();
deletion_end();
printf("\n\nAfter Deleting the last node, the List is\n");
displayList();
return 0;
}

void createList(int n)
{
struct node *newNode, *temp;
int data, i;
head = (struct node *)malloc(sizeof(struct node));
// When the list is empty
if(head == NULL)
{
printf("Unable to allocate memory.");
}
else
{
printf("\nEnter the data of node 1: ");
scanf("%d", &data);
head->data = data;
head->next = NULL;
temp = head;
for(i=2; i<=n; i++)
{
newNode = (struct node *)malloc(sizeof(struct node));
if(newNode == NULL)
{
printf("Unable to allocate memory.");
break;
}
else
{
printf("\nEnter the data of node %d: ", i);
scanf("%d", &data);
newNode->data = data;
newNode->next = NULL;
temp->next = newNode;
temp = temp->next;
}
}
}
}

/* Function to delete the last node */
void deletion_end()
{
// Empty List
if(head -> next == NULL)
{
free(head); //Delete head
head = NULL; // make the reference to NULL
}
struct node *temp = head,*prev_node;
while(temp -> next != NULL)
{
prev_node = temp;
temp = temp -> next; //Traverse to to the last node
}
free(temp); //Delete the last node
prev_node -> next = NULL;
}

void displayList()
{
struct node *temp;
if(head == NULL)
{
printf("List is empty.");
}
else
{
temp = head;
// Print the list
while(temp != NULL)
{
printf("%d\t", temp->data);
temp = temp->next;
}
printf("\n");
}
}
```

OUTPUT:



```
Enter the total number of nodes: 5

Enter the data of node 1: 5

Enter the data of node 2: 10

Enter the data of node 3: 15

Enter the data of node 4: 20

Enter the data of node 5: 25

The List is
5       10      15      20      25


After Deleting the last node, the List is
5       10      15      20

Process returned 0 (0x0)   execution time : 4.904 s
Press any key to continue.
```

Deletion at a given position in the linked list



- Now let us assume that the node at position 2 has to be deleted.
- Start traversing the list from the head node and move up to that **position.**
- While traversing, keep track of the previous node to the node to be deleted.
- In this case, since we want to delete the second node, you need to traverse till node 2, storing node 1 in some temporary variable.

- Now, the address part of node 2 is assigned to the address part of node 1 and then node 2 is deleted.

Program to delete a node at a given position in the Linked List

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

// Creating node with data and a pointer
struct node {
int data;
struct node *next;
}*head;
void createList(int n);
void deletion_given_pos(int pos);
void displayList();

int main()
{
int n, data, pos;
printf("\nEnter the total number of nodes: ");
scanf("%d", &n);
createList(n);
printf("\nThe List is \n");
displayList();
printf("\nEnter the position : "); //position of the node to b
scanf("%d",&pos);
deletion_given_pos(pos);
printf("\n\nAfter Deleting the node at given position, the Lis
displayList();
return 0;
}

void createList(int n)
{
struct node *newNode, *temp;
int data, i;
head = (struct node *)malloc(sizeof(struct node));
// When the list is empty
if(head == NULL)
{
printf("Unable to allocate memory.");
}
else
{
printf("\nEnter the data of node 1: ");
scanf("%d", &data);
head->data = data;
head->next = NULL;
temp = head;
for(i=2; i<=n; i++)
{
newNode = (struct node *)malloc(sizeof(struct node));
if(newNode == NULL)
{
printf("Unable to allocate memory.");
break;
}
else
{
printf("\nEnter the data of node %d: ", i);
scanf("%d", &data);
newNode->data = data;
newNode->next = NULL;
```

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```
temp->next = newNode;
temp = temp->next;
}
}
}
}


/* Function to delete the node at given position */
void deletion_given_pos(int pos)
{
// Empty List
if(head == NULL)
{
free(head); //Delete head
head = NULL; // make the reference to NULL
}
struct node *temp = head,*prev_node;
int count = 0;
while(temp -> next != NULL && pos != count)
{
prev_node = temp;  // Tracking the (position - 1 )node
temp = temp -> next;
count = count + 1;
}
if(pos == count)
{
prev_node -> next = temp -> next;  // Assigning the address of
free(temp); // Delete the node
}
}

void displayList()
{
struct node *temp;
if(head == NULL)
{
printf("List is empty.");
}
else
{
temp = head;
// Print the list
while(temp != NULL)
{
printf("%d\t", temp->data);
temp = temp->next;
}
printf("\n");
}
}
```

OUTPUT:

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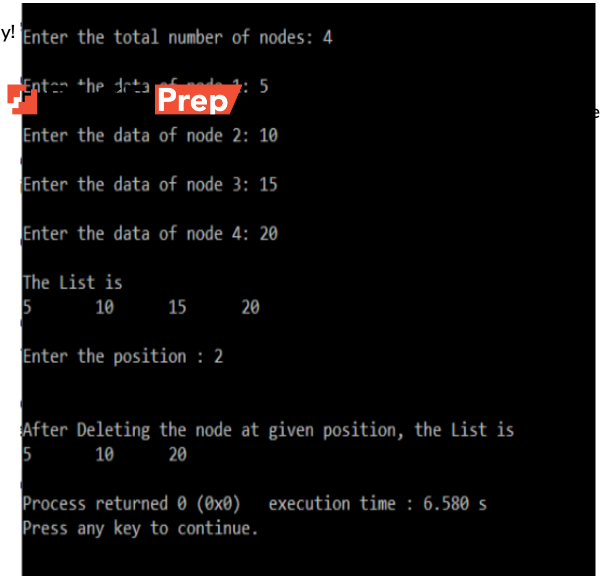

```
Enter the total number of nodes: 4

Enter the data of node 1: 5

Enter the data of node 2: 10

Enter the data of node 3: 15

Enter the data of node 4: 20

The List is
5       10      15      20

Enter the position : 2


After Deleting the node at given position, the List is
5       10      20

Process returned 0 (0x0)   execution time : 6.580 s
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```

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