

EXPERIMENT NO 5

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

// Defining Structure
typedef struct node
{
    int data;
    struct node *next;
} node;
node *createList();
node *Insert_beg(node *head, int x);
node *Insert_end(node *head, int x);
node *Insert_mid(node *head, int x);
node *Delete_beg(node *head);
node *Delete_end(node *head);
node *Delete_mid(node *head);
void PrintList(node *head);

// Main Function
void main()
{
    int choice, insert_option, delete_option, x;
    node *head = NULL;
    printf("Implementation of the singly linked list ! \n");
    do
    {
        printf("Enter any choice of operation \n");
        printf(" 1. Create a List\n 2. Insert a node\n 3. Delete a node\n 4. Print the existing list\n\n");
        printf("5. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);
        printf("\n \n");
        switch (choice)
        {
            case 1:
                head = createList();
                break;
            case 2:
                do
                {
                    printf("Select a position where you to want to insert new node \n");
```

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        printf(" 1. Beginning of the List \n 2. At the end of the list \n 3. Insert in between \n
4. Exit the insert operation \n");
        printf("Enter your choice: ");
        scanf("%d", &insert_option);
        switch (insert_option)
        {
            case 1:
                printf("Enter the data to be inserted: ");
                scanf("%d", &x);
                head = Insert_beg(head, x);
                break;
            case 2:
                printf("Enter the data to be inserted: ");
                scanf("%d", &x);
                head = Insert_end(head, x);
                break;
            case 3:
                printf("Enter the data to be inserted: ");
                scanf("%d", &x);
                head = Insert_mid(head, x);
                break;
            case 4:
                printf("Insert operation Exit");
                break;
            default:
                printf("Please enter a valid choide: 1, 2, 3, 4");
        }
    } while (insert_option != 4);
    printf("\n \n");
    break;
case 3:
do
{
    printf("Select a position from where you to want to delete the element \n");
    printf(" 1. Beginning of the List \n 2. At the end of the list \n 3. Somewhere in
between \n 4. Exit the delete operation \n");
    printf("Enter your choice: ");
    scanf("%d", &delete_option);
    switch (delete_option)
    {
        case 1:
            head = Delete_beg(head);
            break;
        case 2:

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        head = Delete_end(head);
        break;
    case 3:
        head = Delete_mid(head);
        break;
    case 4:
        printf("Delete Operation Exit");
        break;
    default:
        printf("Please enter a valid choide: 1, 2, 3, 4");
    }
} while (delete_option != 4);
printf("\n \n");
break;
case 4:
    PrintList(head);
    break;
case 5:
    printf("Exit: Program Finished !!");
    break;
default:
    printf("Please enter a valid choide: 1, 2, 3, 4, 5");
}
} while (choice != 5);
}

```

// Function to create List

```

node *createList()
{
    node *head, *p;
    int i, n;
    head = NULL;
    printf("Enter the number of nodes: ");
    scanf("%d", &n);
    printf("Enter the data: ");
    for (i = 0; i <= n - 1; i++)
    {
        if (head == NULL)
        {
            p = head = (node *)malloc(sizeof(node));
        }
        else
        {
            p->next = (node *)malloc(sizeof(node));

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        p = p->next;
    }
    p->next = NULL;
    scanf("%d", &(p->data));
}
printf("\n \n");
return (head);
}

```

// Function to insert element

```
node *Insert_beg(node *head, int x)
```

```

{
    node *p;
    p = (node *)malloc(sizeof(node));
    p->data = x;
    p->next = head;
    head = p;
    return (head);
}

```

```
node *Insert_end(node *head, int x)
```

```

{
    node *p, *q;
    p = (node *)malloc(sizeof(node));
    p->data = x;
    p->next = NULL;
    if (head == NULL)
        return (p);
    for (q = head; q->next != NULL; q = q->next)
        ;
    q->next = p;
    return (head);
}

```

```
node *Insert_mid(node *head, int x)
```

```

{
    node *p, *q;
    int y;
    p = (node *)malloc(sizeof(node));
    p->data = x;
    p->next = NULL;
    printf("After which element you want to insert the new element ?");
    scanf("%d", &y);
    for (q = head; q != NULL && q->data != y; q = q->next)
        ;
    if (q != NULL)

```

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    {
        p->next = q->next;
        q->next = p;
    }
    else
        printf("ERROR !! Data Not Found");
    return (head);
}

```

```

// Function to delete element
node *Delete_beg(node *head)

```

```

{
    node *p, *q;
    if (head == NULL)
    {
        printf("Empty Linked List");
        return (head);
    }
    p = head;
    head = head->next;
    free(p);
    return (head);
}

```

```

node *Delete_end(node *head)

```

```

{
    node *p, *q;
    if (head == NULL)
    {
        printf("Empty Linked List");
        return (head);
    }
    p = head;
    if (head->next == NULL)
    {
        head = NULL;
        free(p);
        return (head);
    }
    for (q = head; q->next->next != NULL; q = q->next)
        p = q->next;
    q->next = NULL;
    free(p);
    return (head);
}

```

```

node *Delete_mid(node *head)
{
    node *p, *q;
    int x, i;
    if (head == NULL)
    {
        printf("Empty Linked List");
        return (head);
    }
    printf("Enter the data to be deleted: ");
    scanf("%d", &x);
    if (head->data == x)
    {
        p = head;
        head = head->next;
        free(p);
        return (head);
    }
    for (q = head; q->next->data != x && q->next != NULL; q = q->next)
    if (q->next == NULL)
    {
        printf("ERROR !! Data Not Found");
        return (head);
    }
    p = q->next;
    q->next = q->next->next;
    free(p);
    return (head);
}

```

```

// Function to print the existing list
void PrintList(node *head)
{
    node *p;
    printf("[ ");
    for (p = head; p != NULL; p = p->next)
    {
        printf("%d \t", p->data);
    }
    printf(" ]");
    printf("\n \n");
}

```

```
itl4@22DL407: ~  
itl4@22DL407:~$ gcc rucs.c  
itl4@22DL407:~$ ./a.out rucs.c  
Implementation of the singly linked list !  
Enter any choice of operation  
1. Create a list  
2. Insert a node  
3. Delete a node  
4. Print the existing list  
5. Exit  
Enter your choice: 1  
  
Enter the number of nodes: 3  
Enter the data: 4 7 9  
  
Enter any choice of operation  
1. Create a list  
2. Insert a node  
3. Delete a node  
4. Print the existing list  
5. Exit  
Enter your choice: 2  
  
Select a position where you to want to insert new node  
1. Beginning of the List  
2. At the end of the list  
3. Insert in between  
4. Exit the insert operation  
Enter your choice: 1  
Enter the data to be inserted: 2  
Select a position where you to want to insert new node  
1. Beginning of the List  
2. At the end of the list  
3. Insert in between  
4. Exit the insert operation  
Enter your choice: 4  
Insert operation Exit  
  
Enter any choice of operation  
1. Create a list  
2. Insert a node  
3. Delete a node  
4. Print the existing list  
5. Exit  
Enter your choice: 3  
  
Select a position from where you to want to delete the element  
1. Beginning of the List  
2. At the end of the list  
3. Somewhere in between  
4. Exit the delete operation  
Enter your choice: 2  
Select a position from where you to want to delete the element  
1. Beginning of the List  
2. At the end of the list  
3. Somewhere in between  
4. Exit the delete operation  
Enter your choice: 2  
Select a position from where you to want to delete the element  
1. Beginning of the List  
2. At the end of the list  
3. Somewhere in between  
4. Exit the delete operation  
Enter your choice: 4  
Delete Operation Exit  
  
Enter any choice of operation  
1. Create a list  
2. Insert a node  
3. Delete a node  
4. Print the existing list  
5. Exit  
Enter your choice: 4  
[ 2 4 207784672 2 ]  
  
Enter any choice of operation  
1. Create a list  
2. Insert a node  
3. Delete a node  
4. Print the existing list  
5. Exit  
Enter your choice: 5  
Exit: Program Finished !!itl4@22DL407:~$
```