EXPERIMENT 5

Name: Siddhesh Vinay Rane
Class: SY-IT
Batch: S3
Roll no: 47

Program:

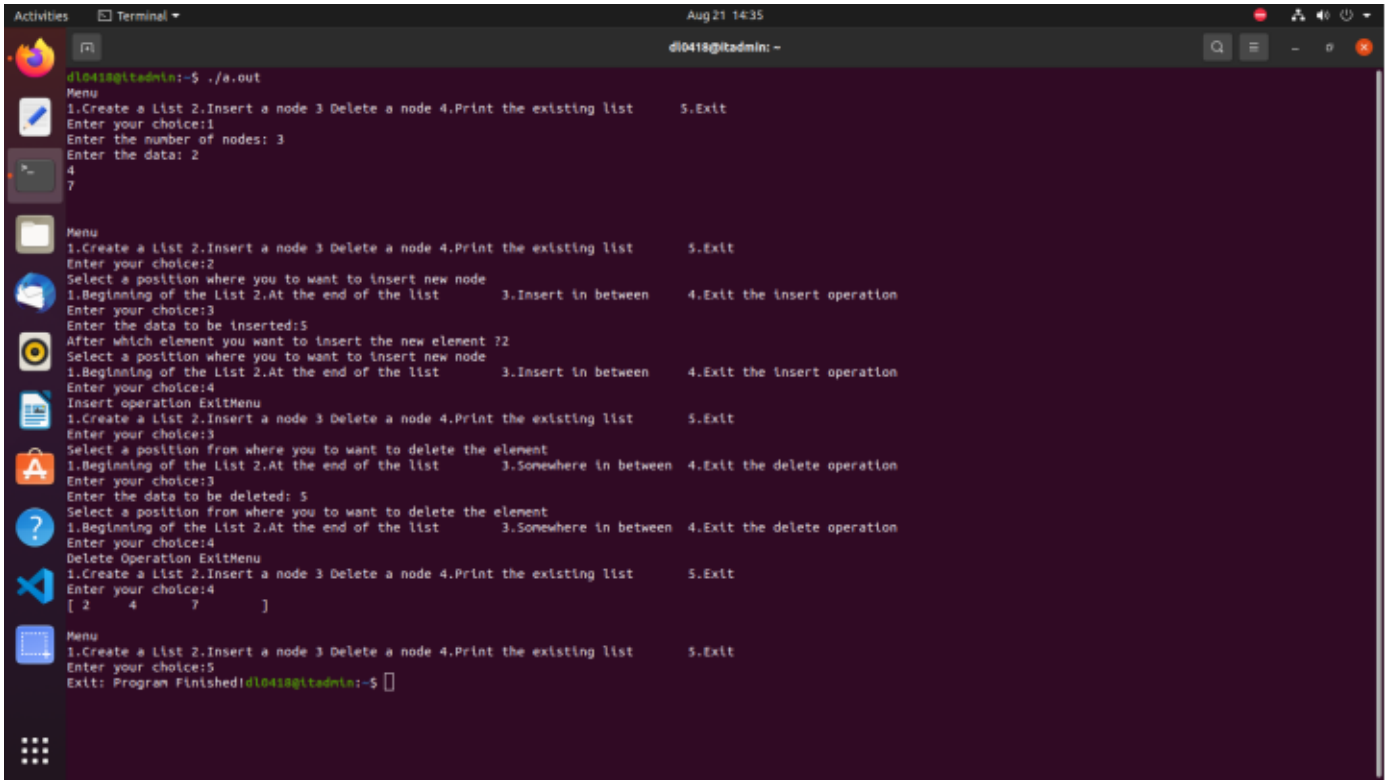
```
#include <stdio.h>
#include <stdlib.h>
#include <malloc.h>
typedef struct node
{ int data;
  struct node *next;
} node;
node *createList();
node *Insert_beg(node *head, int x);
node *Insert_end(node *head, int x);
node *Insert_mid(node *head, int x);
node *Delete_beg(node *head);
node *Delete_end(node *head);
node *Delete_mid(node *head);
void PrintList(node *head);
void main()
{ int choice, insert_option, delete_option, x;
  node *head = NULL;
  do { printf("Menu\n");
      printf("1.Create a List\t2.Insert a node\t3 Delete a node\t4.Print the existing list\t5.Exit\n");
      printf("Enter your choice:");
      scanf("%d",&choice);
      switch (choice)
       { case 1: head = createList();
                 break;
         case 2: do { printf("Select a position where you to want to insert new node\n");
                      printf("1.Beginning of the List\t2.At the end of the list\t3.Insert in between\t4.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("Enter a valid choice: 1, 2, 3, 4");
                       }
                    } while (insert_option != 4);
                 break;
        case 3: do { printf("Select a position from where you to want to delete the element\n");
```

```
                printf("1.Beginning of the List\t2.At the end of the list\t3.Somewhere in between\t4.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: 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 choice: 1, 2, 3, 4");
                  }
               } while (delete_option != 4);
            break;
        case 4: PrintList(head);
            break;
        case 5: printf("Exit: Program Finished!");
            break;
        default: printf("Please enter a valid choice: 1, 2, 3, 4, 5");
        }
    } while (choice != 5);
}
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));
            p = p->next;
          }
     p->next = NULL;
     scanf("%d", &(p->data));
   }
   printf("\n \n");
   return (head);
}
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)
   { p->next = q->next;
     q->next = p;
   }
  else
   printf("ERROR !! Data Not Found");
   return (head);
}
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);
}
void PrintList(node *head)
{ node *p;
  printf("[ ");
  for (p = head; p != NULL; p = p->next)
   { printf("%d \t", p->data);
   }
   printf(" ]");
   printf("\n \n");
}
```

Output:


Activities
Terminal
Aug 21 14:35
dl0418@itadmin: ~
dl0418@itadmin:~$ ./a.out
Menu
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: 2
4
7
Menu
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:3
Enter the data to be inserted:5
After which element you want to insert the new element ?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 ExitMenu
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:3
Enter the data to be deleted: 5
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 ExitMenu
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 7]
Menu
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!dl0418@itadmin:~$