S.No: 9	Exp. Name: ***All operations on double linked list.***	Date: 2022-08-01

Aim:

Write a program that uses functions to perform the following **operations on double linked list**
i) Creation ii)insertion iii)deletion iv) Traversal

Sample Input and Output

```
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 10
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 11
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 12
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 13
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 14
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 15
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 16
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
```

```
Enter number: 17
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 1
Enter number: 18
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 3
10  11  12  13  14  15  16  17  18
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 2
Enter number to delete: 19
19 not found.
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 3
10  11  12  13  14  15  16  17  18
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 2
Enter number to delete: 13
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 3
10  11  12  14  15  16  17  18
Operations on doubly linked list
1. Insert
2.Remove
3. Display
0. Exit
Enter Choice 0-4? : 0
```

Source Code:

AllOperationsDLL.c

```
#include<stdio.h>
#include<stdlib.h>
typedef struct dlist
{
   int no;
   struct dlist *lptr, *rptr;
}node;
node *left = NULL, *right = NULL;
void insertion()
{
   node *p, *ptr;
   p=malloc(sizeof(node));
   printf("Enter number: ");
   scanf("%d",&p->no);
   if(left==NULL)
   {
      left=right=p;
      p->lptr=p->rptr=NULL;
      return;
   }
   if(p->no<=left->no)
   {
      p->lptr=NULL;
      p->rptr=left;
      left->lptr=p;
      left=p;
      return;
   }
   if(p->no>=right->no)
   {
      p->rptr=NULL;
      p->lptr=right;
      right->rptr=p;
      right=p;
      return;
   }
   ptr=left->rptr;
   while(ptr!=right&&ptr->no<p->no)
   ptr=ptr->rptr;
   p->rptr=ptr;
   p->lptr=ptr->lptr;
   ptr->lptr->rptr=p;
}
void deletion()
{
   int rno;
   node *ptr;
   if(left==NULL)
   {
      printf("Underflow");
      return;
   }
   printf("Enter number to delete: ");
   scanf("%d",&rno);
   if((rno<left->no) || (rno>right->no))
```

```
   {
      printf("%d not found.\n",rno);
      return;
   }
   if(rno==left->no)
   {
      ptr=left;
      if(left==right)
      left=right=NULL;
      else
      {
         left=left->rptr;
         left->lptr=NULL;
      }
      free(ptr);
      return;
   }
   if(rno==right->no)
   {
      ptr=right;
      right=right->lptr;
      right->rptr=NULL;
      free(ptr);
      return;
   }
   ptr=left->rptr;
   while(ptr!=right&&ptr->no<rno)
   {
      ptr=ptr->rptr;
   }
   if(ptr==right||ptr->no>rno)
   {
      printf("%d not found. \n",rno);
      return;
   }
   ptr->lptr->rptr=ptr->rptr;
   ptr->rptr->lptr=ptr->lptr;
   free(ptr);
}
void display()
{
   node *ptr;
   if(left==NULL)
   {
      printf("List is empty");
      return;
   }
   ptr=left;
   while(ptr!=NULL)
   {
      printf("%d\t",ptr->no);
      ptr=ptr->rptr;
   }
   printf("\n");
}
void main()
```

```
{
   int ch;
   do
   {
      printf("Operations on doubly linked list\n");
      printf("1. Insert \n2.Remove\n3. Display\n0. Exit\n");
      printf("Enter Choice 0-4? : ");
      scanf("%d",&ch);
      switch(ch)
      {
         case 1: insertion(); break;
         case 2: deletion(); break;
         case 3: display();break;
         case 0: exit(0);
      }
   }while(ch<4);
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? : 1
Enter number: 15
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? : 1
Enter number: 16
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? : 1
Enter number: 17
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? : 1
Enter number: 18
Operations on doubly linked list 3

Test Case - 1
1. Insert 3
2.Remove 3
3. Display 3
0. Exit 3
Enter Choice 0-4? : 3
15 16 17 18 2
Operations on doubly linked list 2
1. Insert 2
2.Remove 2
3. Display 2
0. Exit 2
Enter Choice 0-4? : 2
Enter number to delete: 19
19 not found. 3
Operations on doubly linked list 3
1. Insert 3
2.Remove 3
3. Display 3
0. Exit 3
Enter Choice 0-4? : 3
15 16 17 18 2
Operations on doubly linked list 2
1. Insert 2
2.Remove 2
3. Display 2
0. Exit 2
Enter Choice 0-4? : 2
Enter number to delete: 16
Operations on doubly linked list 0
1. Insert 0
2.Remove 0
3. Display 0
0. Exit 0
Enter Choice 0-4? : 0

Test Case - 2
User Output
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? : 1
Enter number: 10
Operations on doubly linked list 1
1. Insert 1
2.Remove 1
3. Display 1
0. Exit 1

Test Case - 2

```
Enter Choice 0-4? :  1
Enter number:  11
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  12
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  13
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  14
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  15
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  16
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
Enter number:  17
Operations on doubly linked list 1
1. Insert  1
2.Remove 1
3. Display 1
0. Exit 1
Enter Choice 0-4? :  1
```

Test Case - 2

```
Enter number:  18
Operations on doubly linked list 3
1. Insert  3
2.Remove 3
3. Display 3
0. Exit 3
Enter Choice 0-4? :  3
10      11      12      13      14      15      16      17      18      2
Operations on doubly linked list 2
1. Insert  2
2.Remove 2
3. Display 2
0. Exit 2
Enter Choice 0-4? :  2
Enter number to delete:  19
19 not found. 3
Operations on doubly linked list 3
1. Insert  3
2.Remove 3
3. Display 3
0. Exit 3
Enter Choice 0-4? :  3
10      11      12      13      14      15      16      17      18      2
Operations on doubly linked list 2
1. Insert  2
2.Remove 2
3. Display 2
0. Exit 2
Enter Choice 0-4? :  2
Enter number to delete:  13
Operations on doubly linked list 3
1. Insert  3
2.Remove 3
3. Display 3
0. Exit 3
Enter Choice 0-4? :  3
10      11      12      14      15      16      17      18       0
Operations on doubly linked list 0
1. Insert  0
2.Remove 0
3. Display 0
0. Exit 0
Enter Choice 0-4? :  0
```