1. Create function called swap ( ), which swaps the number values. Create a function pointer which points to a swap ( ) function and call function using pointer. Write a program which also checks whether the two number entered by user is palindrome or not after swaping.

```
#include<stdio.h>
void    swap(int *a,int *b)
{
    int tmp;
    tmp=*a;
    *a=*b;
    *b=tmp;
}
int reverse(int n)
{
    int rem,rnum=0;
    while(n > 0)
    {
        rem= n % 10;
        rnum=rnum * 10 + rem;
        n= n / 10;
    }
    return rnum;
}
int main()
{
    FILE *fp;
    fp=fopen("prog1.txt","r");
    int x,y;
    printf("\nEnter value of x:");
    scanf("%d",&x);
    fscanf(fp,"%d",&x);
    printf("\nEnter value of y:");
    scanf("%d",&y);
```

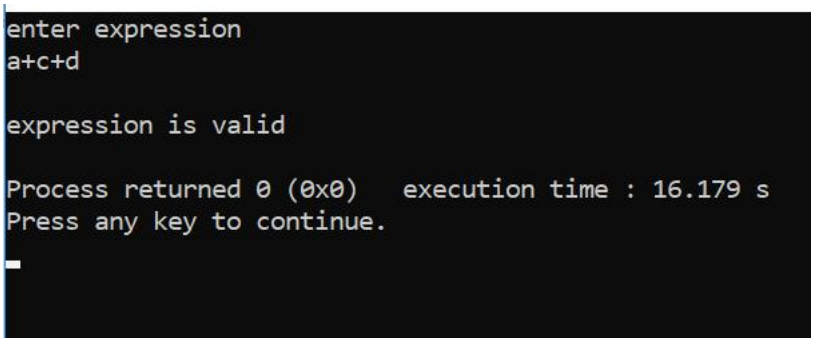
```
    fscanf(fp,"%d",&y);
    printf("Value before swap \nx= %d \ny= %d",x,y);


    void (*pfun) (int *,int *)=swap;
    pfun(&x,&y);
    printf("\nValue after swap \nx= %d \ny= %d",x,y);

    int (*rp) (int )=reverse;
    if(x == rp(x))
        printf("\n%d number is palindogram",x);
    else
        printf("\n%d number is not palindogram",x);

    if(y == rp(y))
        printf("\n%d number is palindogram",y);
    else
        printf("\n%d number is not palindogram",y);
    fclose(fp);

}
```

```
Enter value of x:4

Enter value of y:4
Value before swap
x= 4
y= 4
Value after swap
x= 4
y= 4
4 number is palindogram
4 number is palindogram
Process returned 0 (0x0)   execution time : 7.347 s
Press any key to continue.
```

3. Write a program to check the balance of parenthesis if an expression. Implement required data structure for the same.

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

int top = -1;
char stack[100];
void push(char);
void pop();
void find_top();

void main()
{
    int i;
    char a[100];
    printf("enter expression\n");
    scanf("%s", &a);
    for (i = 0; a[i] != '\0';i++)
    {
        if (a[i] == '(')
        {
            push(a[i]);
        }
        else if (a[i] == ')')
        {
            pop();
        }
    }
    find_top();
}
void push(char a)
{
    stack[top] = a;
    top++;
}
void pop()
```

```
{
    top--;
}
void find_top()
{
    FILE *ptr;
    ptr=fopen("expression.txt","w");
    if (top == -1)
    {
        printf("\nexpression is valid\n",top);
        fprintf(ptr,"expression is valid");
    }
    else
    {
        printf("\nexpression is invalid\n");
        fprintf(ptr,"expression is invalid");
    }
    fclose(ptr);
}
```



4. Implement a program to generate a linked list. For any unsorted linked list, write a method that will delete any duplicates from the linked list without using a temporary buffer.

-->

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

```
struct node
{
	int num;
	struct node *next;
};

void create(struct node **);
void dup_delete(struct node **);
void release(struct node **);
void display(struct node *);
void read(struct node *);
void write(struct node *);
int main()
{
	struct node *p = NULL;
	struct node_occur *head = NULL;
    read(&p);
	int n;
	printf("Enter data into the list\n");
	create(&p);
	write(&p);
	printf("Displaying the nodes in the list:\n");
	display(p);
	printf("Deleting duplicate elements in the list...\n");
	dup_delete(&p);
	printf("Displaying non-deleted nodes in the list:\n");
	display(p);
	release(&p);

	return 0;
}

void dup_delete(struct node **head)
{
```

```
        struct node *p, *q, *prev, *temp;

        p = q = prev = *head;
        q = q->next;
        while (p != NULL)
        {
                while (q != NULL && q->num != p->num)
                {
                        prev = q;
                        q = q->next;
                }
                if(q == NULL)
                {
                        p = p->next;
                        if (p != NULL)
                        {
                                q = p->next;
                        }
                }
                else if (q->num == p->num)
                {
                        prev->next = q->next;
                        temp = q;
                        q = q->next;
                        free(temp);
                }
        }
}

void create(struct node **head)
{
        int c, ch;
        struct node *temp, *rear;

        do
```

```
	{
		printf("Enter number: ");
		scanf("%d", &c);
		temp = (struct node *)malloc(sizeof(struct node));
		temp->num = c;
		temp->next = NULL;
		if (*head == NULL)
		{
			*head = temp;
		}
		else
		{
			rear->next = temp;
		}
		rear = temp;
		printf("Do you wish to continue [1/0]: ");
		scanf("%d", &ch);
	} while (ch != 0);
	printf("\n");
}

void display(struct node *p)
{
	while (p != NULL)
	{
		printf("%d\t", p->num);
		p = p->next;
	}
	printf("\n");
}
void write(struct node *p)
{
    int data,i;
    FILE *ptr;
    ptr=fopen("sortlink.txt","w");
```

```
    while (p != NULL)
      {
            fprintf(ptr,"%d\t", p->num);
            p = p->next;
      }
    fclose(ptr);
}
void read(struct node *p)
{
    int i;
    FILE *fptr;
    fptr=fopen("sortlink.txt","r");
    while (p != NULL)
      {
            fscanf(fptr,"%d\t", &p->num);
            p = p->next;
      }
    fclose(fptr);
    printf("\nRead successufully");
}
void release(struct node **head)
{
      struct node *temp = *head;
      *head = (*head)->next;
      while ((*head) != NULL)
      {
            free(temp);
            temp = *head;
            (*head) = (*head)->next;
      }
}
```

```
Read successufullyEnter data into the list
Enter number: 12
Do you wish to continue [1/0]: 1
Enter number: 13
Do you wish to continue [1/0]: 1
Enter number: 14
Do you wish to continue [1/0]: 0

Displaying the nodes in the list:
12      13      14
Deleting duplicate elements in the list...
Displaying non-deleted nodes in the list:
12      13      14

Process returned 0 (0x0)   execution time : 34.284 s
Press any key to continue.
```

5. Write a program to create a binary tree. Implement required method to generate a binary tree from user inputs and to display binary tree using level order and pre order traversals.

```
-->#include<stdio.h>
#include<stdlib.h>
struct tree
{
    int data;
    struct tree *left;
    struct tree *right;
};
struct tree *root=NULL;
struct tree *create_tree(struct tree *info,int no)
{
    if(info==NULL)
    {
        info=(struct tree *)malloc(sizeof(struct tree));
        info->data=no;
        info->left=NULL;
        info->right=NULL;
    }
    else
    {
        if(no<=info->data)
        {
```

```
                info->left=create_tree(info->left,no);
            }
            else
            {
                info->right=create_tree(info->right,no);
            }
        }
}
void pre_order(struct tree *info)
{
     if(info!=NULL)
     {
          printf(" %d ",info->data);
          pre_order(info->left);
          pre_order(info->right);
     }
}
void level_order(struct tree* info)
{
       int h = height(info);
       int i;
       for (i=1; i<=h; i++)
             printGivenLevel(info, i);
}
void printGivenLevel(struct tree* info, int level)
{
       if (info == NULL)
             return;
       if (level == 1)
             printf("%d ", info->data);
       else if (level > 1)
       {
             printGivenLevel(info->left, level-1);
             printGivenLevel(info->right, level-1);
       }
}
int height(struct tree* info)
{
       if (info==NULL)
             return 0;
```

```
        else
        {
              int lheight = height(info->left);
              int rheight = height(info->right);
              if (lheight > rheight)
                    return(lheight+1);
              else
           return(rheight+1);
        }
}
int main()
{
     int ch,n;
     do
     {
          printf("\n1.Create_tree");
          printf("\n2.Preorder");
          printf("\n3.Levelorder");
          printf("\n0.Exit");
          printf("\nEnter Your Choce");
          scanf("%d",&ch);
          switch(ch)
          {
               case 1 :printf("\nEnter Value :");
                    scanf("%d",&n);
                    root=create_tree(root,n);
                    break;
               case 2 :pre_order(root);
                    break;
               case 3 :level_order(root);
                    break;
               case 0 :exit(0);
                    break;
               default:printf("\nInvalid Choice");
                    break;
          }
     }while(ch!=0);
     return 0;
}
```

```
1.Create_tree
2.Preorder
3.Levelorder
0.Exit
Enter Your Choce1

Enter Value :12

1.Create_tree
2.Preorder
3.Levelorder
0.Exit
Enter Your Choce1

Enter Value :11

1.Create_tree
2.Preorder
3.Levelorder
0.Exit
Enter Your Choce1

Enter Value :10

1.Create_tree
2.Preorder
3.Levelorder
0.Exit
Enter Your Choce2
 12  11  10
1.Create_tree
2.Preorder
3.Levelorder
0.Exit
Enter Your Choce
```

6.Given two values v1 and v2 (where v1 < v2) within a Binary Search Tree. Print all the keys of tree in range v1 to v2. i.e. print all x such that v1<=x<=v2 and x is a element of given BST. (Create a Binary Search Tree by any method).

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

struct NODE
{
    char Info;
    struct NODE *Left_Child;
    struct NODE *Right_Child;
};
```

```
int flag = 0;
struct NODE *Binary_Tree (char *, int, int);
int Search_Node(struct NODE *, char);
struct NODE *    Binary_Tree (char *List, int Lower, int Upper)
{
    struct NODE *Node;
    int Mid = (Lower + Upper)/2;
    Node = (struct NODE*) malloc(sizeof(struct NODE));

    Node->Info = List [Mid];
    if ( Lower>= Upper)
    {
        Node->Left_Child = NULL;
        Node->Right_Child = NULL;
        return (Node);
    }
    if (Lower <= Mid - 1)
        Node->Left_Child = Binary_Tree (List, Lower, Mid - 1);
    else
        Node->Left_Child = NULL;
    if (Mid + 1 <= Upper)
        Node->Right_Child = Binary_Tree (List, Mid + 1, Upper);
    else
        Node->Right_Child = NULL;
    return(Node);
}
int Search_Node(struct NODE *Node, char Info)
{
    while (Node != NULL)
    {
        if (Node->Info == Info)
        {
            flag = 1;
            return(flag);
        }
        else
            if(Info < Node->Info)
            {
                Node = Node->Left_Child;
            }
```

```
            else
            {
                Node = Node->Right_Child;
            }
        }
        return(flag);
}
void main()
{
        int flag;
        char List[100];
        int Number = 0;
        char Info ;
        char choice;
        struct NODE *T = (struct NODE *) malloc(sizeof(struct NODE));
        T = NULL;
        printf("\n Input choice 'b' to break:");
        choice = getchar();
        while(choice != 'b')
        {
            fflush(stdin);
            printf("\n Input information of the node: ");
            scanf("%c", &Info);
            List[Number++] = Info;
            fflush(stdin);
            printf("\n Input choice 'b' to break:");
            choice = getchar();
        }
        Number --;
        printf("\n Number of elements in the list is %d", Number+1);
        T = Binary_Tree(List, 0, Number);
//      Output(T, 1);
        fflush(stdin);
        printf("\n Input the information of the node to which want to search:
");
        scanf("%c", &Info);
        flag = Search_Node(T, Info);
        if (flag)
        {
            printf("\n Search is successful \n");
```

```
    }
    else
        printf("Search unsuccessful");
}
```

```
Input choice 'b' to break:1

Input information of the node: 1

Input choice 'b' to break:1

Input information of the node: 2

Input choice 'b' to break:1

Input information of the node: 3

Input choice 'b' to break:b

Number of elements in the list is 3
Input the information of the node to which want to search: 2

Search is successful

Process returned 0 (0x0)   execution time : 35.323 s
Press any key to continue.
```

7.Write a program to create a binary tree. Implement required method to generate a binary tree from user inputs and check whether the Binary Tree is a perfect binary tree.

```
-->#include<stdio.h>
#include<stdlib.h>
struct tree
{
    int data;
    struct tree *left;
    struct tree *right;
};
struct tree *root=NULL;
struct tree *create_tree(struct tree *info,int no)
{
    if(info==NULL)
    {
```

```
        info=(struct tree *)malloc(sizeof(struct tree));
        info->data=no;
        info->left=NULL;
        info->right=NULL;
    }
    else
    {
        if(no<=info->data)
        {
            info->left=create_tree(info->left,no);
        }
        else
        {
            info->right=create_tree(info->right,no);
        }
    }
}
void pre_order(struct tree *info)
{
    if(info!=NULL)
    {
        printf(" %d ",info->data);
        pre_order(info->left);
        pre_order(info->right);
    }
}
void post_order(struct tree *info)
{
    if(info!=NULL)
    {
        post_order(info->left);
        post_order(info->right);
        printf(" %d ",info->data);
    }
}
void in_order(struct tree *info)
{
    if(info!=NULL)
    {
        in_order(info->left);
```

```
        printf(" %d ",info->data);
        in_order(info->right);
    }
}
int isfulltree(struct tree *info)
{
    if(info==NULL)
        return 1;
    if(info->left == NULL && info->right == NULL)
        return 1;
    if((info->left) && (info->right))
        return (isfulltree(info->left)&&isfulltree(info->right));
}
int main()
{
    int ch,n,l;
    do
    {
        printf("\n1.Create_tree");
        printf("\n2.Inorder");
        printf("\n3.Preorder");
        printf("\n4.Postorder");
        printf("\n5.Prefect Tree or not");
        printf("\n6.Exit");
        printf("\nEnter Your Choce");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1 :printf("\nEnter Value :");
                scanf("%d",&n);
                root=create_tree(root,n);
                break;
            case 2 :in_order(root);
                break;
            case 3 :pre_order(root);
                break;
            case 4 :post_order(root);
                break;
            case 5:if (isfulltree(root))
                        printf("\nTree is perfect:");
```

```
                    else
                        printf("\nTree is not perfect");
                    break;
            case 6 :exit(0);
                break;
            default:printf("\nInvalid Choice");
                break;
        }
    }while(ch!=6);
    return 0;
}
```

```
1.Create_tree
2.Inorder
3.Preorder
4.Postorder
5.Prefect Tree or not
6.Exit
Enter Your Choce1

Enter Value :1

1.Create_tree
2.Inorder
3.Preorder
4.Postorder
5.Prefect Tree or not
6.Exit
Enter Your Choce1

Enter Value :2

1.Create_tree
2.Inorder
3.Preorder
4.Postorder
5.Prefect Tree or not
6.Exit
Enter Your Choce4
 2  1
1.Create_tree
2.Inorder
3.Preorder
4.Postorder
5.Prefect Tree or not
6.Exit
Enter Your Choce6
```

8. Write a program to implement stack with all basic operations using linked list.

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

struct node
{
    int data;
    struct node *next;
}*top=NULL;
void push(int);
void pop();
void disp();
void read();
void write();
int main()
{
    read();
    int ch,value;
    do
    {
        printf("\n1.push...");
        printf("\n2.pop...");
        printf("\n3.display...");
        printf("\n4.Exit...");
        printf("\nEnter your choice:");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1: printf("\nEnter value:");
                    scanf("%d",&value);
                    push(value);
                    write();
                    break;
            case 2: pop();
                    write();
                    break;
            case 3: disp();
                    break;
            case 4: exit(1);
                    break;
```

```
                default:printf("\nWrong Choice...");
                    break;
            }
        }while(ch!=4);

}
void push(int x)
{
    struct node *new_node;
    new_node=(struct node*)malloc(sizeof(struct node));
    new_node->data=x;
    if(top==NULL)
    {
        new_node->next=NULL;
    }
    else
    {
        new_node->next=top;
        //top=new_node;
    }
    top=new_node;
    printf("\nSuccessfully inserted");
}
void pop()
{
    if(top==NULL)
        printf("\nStacklist is not created");
    else
    {
        struct node *temp;
        temp=top;
        printf("\nDeleted emelemnt is %d",temp->data);
        top=temp->next;
        free(temp);
    }
}
void disp()
{
    if(top==NULL)
        printf("\nStack is empty");
```

```
    else
    {
        struct node *temp;
        temp=top;
        while(temp!=NULL)
        {
            printf("\nData is %d",temp->data);
            temp=temp->next;
        }
        //printf("\nData is %d",temp->data);
    }
}
void write()
{
    int data,i;
    FILE *ptr;
    ptr=fopen("stacklink.txt","w");
    struct node *temp;
    temp=top;
    while(temp!=NULL)
    {
        fprintf(ptr,"%d",temp->data);
        temp=temp->next;
    }
    fclose(ptr);
}
void read()
{
    int i;
    FILE *fptr;
    fptr=fopen("stacklink.txt","r");
    struct node *temp;
    temp=top;
    while(temp!=NULL)
    {
        fscanf(fptr,"%d",&temp->data);
        temp=temp->next;
    }

    fclose(fptr);
```

}

```
1.push...
2.pop...
3.display...
4.Exit...
Enter your choice:1

Enter value:1

Successfully inserted
1.push...
2.pop...
3.display...
4.Exit...
Enter your choice:1

Enter value:2

Successfully inserted
1.push...
2.pop...
3.display...
4.Exit...
Enter your choice:3

Data is 2
Data is 1
```

9.Write a program to implement Queue with all basic operations using linked list.

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

struct node
{
    int data;
    struct node *next;
}*front=NULL,*rear=NULL;
void equeue(int);
void dqueue();
void disp();
void read();
void write();
int main()
```

```
{
    read();
    int ch,value;
    printf("\n1.Equeue");
    printf("\n2.Dqueue");
    printf("\n3.Display");
    printf("\n4.Exit");
    do
    {
        printf("\nEnter your choice:");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1:printf("\nEnter value:");
                   scanf("%d",&value);
                   equeue(value);
                   write();
                   break;
            case 2:dqueue();
                   write();
                   break;
            case 3:disp();
                   break;
            default:
                   break;
        }
    }while(ch!=4);
}
void equeue(int x)
{
    struct node *new_node;
    new_node=(struct node*)malloc(sizeof(struct node));
    new_node->data=x;
    new_node->next=NULL;
    if(rear==NULL)
        front=rear=new_node;
    else
    {
        rear->next=new_node;
        rear=new_node;
```

```
    }
    printf("\nSuccessfull inserted");
}
void dqueue()
{
    if(front==NULL)
        printf("\nQueue is empty");
    else
    {
        struct node *temp;
        temp=front;
        printf("\nDeleted element is %d",temp->data);
        front=temp->next;
        free(temp);
    }
}
void disp()
{
    if(front==NULL)
        printf("\nQueue is empty");
    else
    {
        struct node *temp;
        temp=front;
        while(temp!=NULL)
        {
            printf("\nElements is %d",temp->data);
            temp=temp->next;
        }
    }
}
void write()
{
    int data,i;
    FILE *ptr;
    ptr=fopen("queuelink.txt","w");
    struct node *temp;
    temp=front;
    while(temp!=NULL)
    {
```

```
        fprintf(ptr,"%d",temp->data);
        temp=temp->next;
    }
    fclose(ptr);
}
void read()
{
    int i;
    FILE *fptr;
    fptr=fopen("queuelink.txt","r");
    struct node *temp;
    temp=front;
    while(temp!=NULL)
    {
        fscanf(fptr,"%d",&temp->data);
        temp=temp->next;
    }
    fclose(fptr);
    printf("\nRead successufully");
}
```

```
Read successufully
1.Equeue
2.Dqueue
3.Display
4.Exit
Enter your choice:1

Enter value:1

Successfull inserted
Enter your choice:3

Elements is 1
Enter your choice:
```

10. Write a program to implement stack with required operations using array.

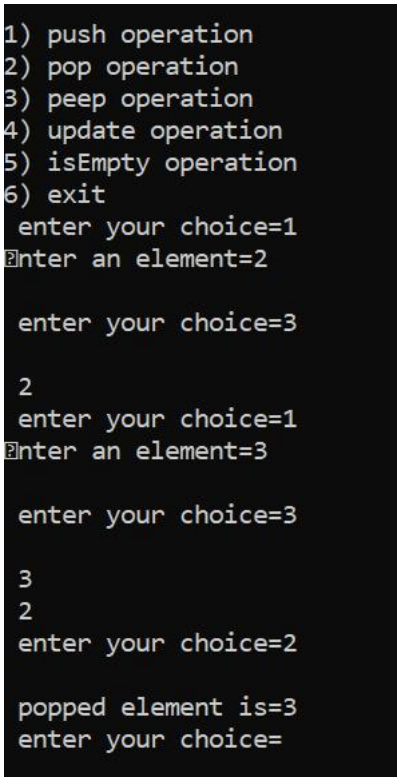
```
-->#include<stdio.h>
#include<conio.h>
#define size 5
int stack[size];
```

```
int top=-1;
void push();
void display();
void isEmpty();
void pop();

void update();
int main()
{
     read();
       int ch;
       printf("\n1) push operation");
       printf("\n2) pop operation");
       printf("\n3) peep operation");
       printf("\n4) update operation");
       printf("\n5) isEmpty operation");
       printf("\n6) exit");
       do
       {


       printf("\n enter your choice=");
       scanf("%d",&ch);
       switch(ch)
       {
              case 1:
                     push();
                     write();
                     break;
              case 2:
                     pop();
                     write();
                     break;
              case 3:
                     peep();
                     break;
              case 4:
                     update();
                     write();
                     break;
```

```
            case 5:
                  isEmpty();
                  break;
            default:
                  return 0;
                  break;

       }
       }while(ch!=5);
}
void write()
{
     int data,i;
     FILE *ptr;
     ptr=fopen("stack.txt","w");
     for(i=top;i>=0;i--)
          fprintf(ptr,"%d\t",stack[i]);
     fclose(ptr);
}
void read()
{
     int i;
     FILE *fptr;
     fptr=fopen("stack.txt","r");
     for(i=top;i>=0;i--)
          fscanf(fptr,"%d\t",&stack[i]);
     fclose(fptr);

}
void push()
{
       int data;
       if(top>=size-1)
       {
             printf("\n stack is overflow");
       }
       else
       {
              printf("\Enter an element=");
          scanf("%d",&data);
```

```
            top++;
            stack[top]=data;

        }
}


void peep()
{
        int i;
        if(top==-1)
        {
            printf("\n stack is underflow");
        }
        else
        {
            for(i=top;i>=0;i--)
            {
                printf("\n %d",stack[i]);

            }
        }
}

void pop()
{
        if(top==-1)
        {
            printf("\n stack is underflow");

        }
        else
        {
            printf("\n popped element is=%d",stack[top]);
            stack[top--];
        }
}


void update()
```

```
{
	int u,n;
	if(top==-1)
	{
		printf("\n stack is underflow");
	}
	else
	{
		printf("\n enter position    at you want to change=");
		scanf("%d",&u);
		printf("\n enter new element= ");
		scanf("%d",&n);
		stack[u]=n;

	}
}

void isEmpty()
{
	if(top==-1)
	{
		printf("\n stack is empty");
	}
	else
	{
		printf("\n stack is not empty");
	}
}
```

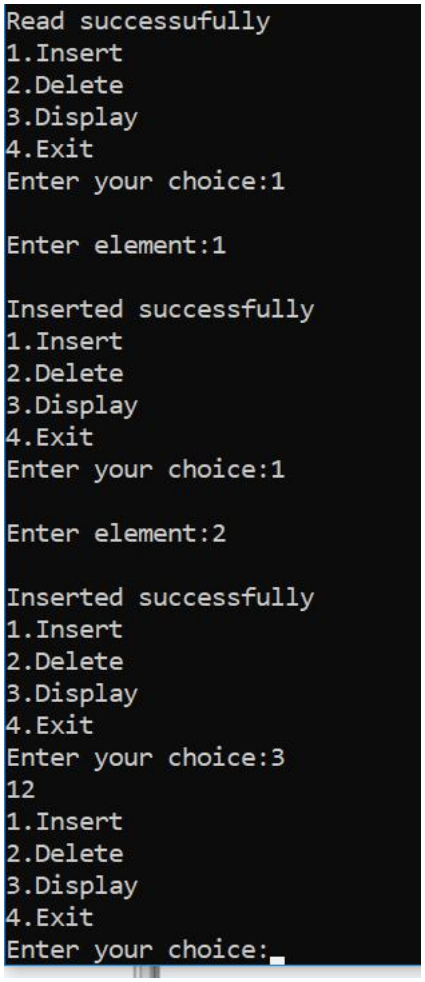


11. Write a program to implement Queue with required operations using array.

```
-->#include<stdio.h>
#include<conio.h>
#include<ctype.h>
#include<string.h>
#include<stdlib.h>
#define size 10
int ch;
int q[size];
int rear=-1;
int front=-1;
void insert_queue();
void delete_queue();
void disp_queue();
void insert_queue()
{
    if(rear>=size)
        printf("\nQueue is overflow");
    else
```

```
    {
        if(front==-1)
            front=0;
        printf("\nEnter element:");
    scanf("%d",&ch);
        rear=rear+1;
        q[rear]=ch;
        printf("\nInserted successfully");
    }

}
void delete_queue()
{
    if(front==-1 || front>=rear)
        printf("\nQueue underflow");
    else
    {
        ch=q[front];
        printf("\nDelete Element is %d",ch);
        front=front+1;
    }
}
void disp_queue()
{
    int i;
    if(front==-1)
        return;
    for(i=front;i<=rear;i++)
        printf("%d",q[i]);
}
void write()
{
    int data,i;
    FILE *ptr;
    ptr=fopen("queue.txt","w");
    for(i=front;i<=rear;i++)
        fprintf(ptr,"%d\t",q[i]);
    fclose(ptr);
}
void read()
```

```
{
    int i;
    FILE *fptr;
    fptr=fopen("queue.txt","r");
    for(i=front;i<=rear;i++)
        fscanf(fptr,"%d\t",&q[i]);
    fclose(fptr);
    printf("\nRead successufully");
}
void main()
{
    read();
    int ch;
    do
    {
        printf("\n1.Insert");
        printf("\n2.Delete");
        printf("\n3.Display");
        printf("\n4.Exit");
        printf("\nEnter your choice:");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1:insert_queue();
                   write();
                   break;
            case 2:delete_queue();
                   write();
                   break;
            case 3:disp_queue();
                   break;
            case 4:exit(1);
                   break;
            default:
                   break;
        }
    }while(ch!=5);
}
```



12. Write a program to check whether the string is palindrome or not. Use Stack Data Structure for the same.

```
-->#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define MAX 50

int top = -1, front = 0;
int stack[MAX];
void push(char);
void pop();

void main()
{
//   read();
     FILE *ptr;
      int i, ch;
```

```
char s[MAX], b;
do
{
        printf("\n1-Enter string....");
        printf("\n2-Exit....");
        printf("\nEnter your choice\n");
        scanf("%d",&ch);
        switch (ch)
        {
          case 1:
               ptr=fopen("palindrome.txt","w");
                    printf("Enter the String\n");
                    scanf("%s", s);
                    for (i = 0;s[i] != '\0';i++)
                    {
                         b = s[i];
                         push(b);
                    }
                    for (i = 0;i < (strlen(s) / 2);i++)
                    {
                         if (stack[top] == stack[front])
                         {
                              pop();
                              front++;
                         }
                         else
                         {
                              printf("%s is not a palindrome\n", s);
                              fprintf(ptr,"%s is not palindrome",s);
                              break;
                         }
                    }

                    if ((strlen(s) / 2)    ==    front)
                    {
                         printf("%s is palindrome\n",    s);
                         fprintf(ptr,"%s is palindrome",s);
                    }
                    front    =    0;
                    top    =    -1;
```

```
                fclose(ptr);
                //write();
                break;
        case 2:
                exit(0);
        default:
                printf("enter correct choice\n");
       }
    }while(ch!=3);
}

void push(char a)
{
    top++;
    stack[top]  =  a;
}
void pop()
{
    top--;
}
```

```
1-Enter string....
2-Exit....
Enter your choice
1
Enter the String
piyu
piyu is not a palindrome

1-Enter string....
2-Exit....
Enter your choice
```

13. Write a program to implement Doubly Linked List.

```
-->#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct node
{
```

```
    int data;
    struct node *next;
    struct node *prev;
};
struct node *head=NULL;

void insert_first()
{
    int n;
    struct node *new_node;
    new_node=(struct node*)malloc(sizeof(struct node));
    printf("\nEnter number:");
    scanf("%d",&n);
    new_node->data=n;
    new_node->next=NULL;
    new_node->prev=NULL;
    if(head!=NULL)
    {
        new_node->next=head;
        head->prev=new_node;
        head=new_node;
    }
    else
        head=new_node;
}
void insert_last()
{
    int n;
    struct node *new_node;
    struct node *temp;
    new_node=(struct node*)malloc(sizeof(struct node));
    printf("\nEnter number:");
    scanf("%d",&n);
    new_node->data=n;
    new_node->next=NULL;
    new_node->prev=NULL;
    temp=head;
    if(head==NULL)
        printf("\nList is emtpty");
    else
```

```
    {
        while(temp->next!=NULL)
            temp=temp->next;
        temp->next=new_node;
        new_node->prev=temp;
    }
}
void insert_specific()
{
    int n;
    struct node *new_node;
    struct node *temp;
    int p,cnt=1;
    new_node=(struct node*)malloc(sizeof(struct node));
    printf("\nEnter number:");
    scanf("%d",&n);
    new_node->data=n;
    new_node->next=NULL;
    new_node->prev=NULL;
    printf("\nEnter position:");
    scanf("%d",&p);
    temp=head;
    if(head==NULL)
    {
        printf("\nList is empty");
    }
    else
    {
        while(cnt!=p)
        {
            temp=temp->next;

            cnt++;
        }
        new_node->next=temp->next;
        temp->next=new_node;
        new_node->prev=temp;
    }
}
void insert()
```

```
{
    int ch,inch;
    printf("\n1.Insert First....");
    printf("\n2.Insert Last.....");
    printf("\n3.Insert Specific..");
    printf("\nEnter your choice...");
    scanf("%d",&ch);
    if(ch==1)
        insert_first();
    else if(ch==2)
        insert_last();
    else
        insert_specific();
}
void delete_first()
{
    struct node *temp;
    if(head==NULL)
        printf("\nList is empty");
    else
    {
        temp=head;
        head=head->next;
        head->next->prev=head;
        printf("\nDeleted element is %d",temp->data);
        free(temp);
    }

}
void delete_last()
{
    struct node *temp;
    struct node *prev;
    temp=head;
    if(head==NULL)
        printf("\nList is empty");
    else
    {
        while(temp->next!=NULL)
        {
```

```
            prev=temp;
            temp=temp->next;
        }
        printf("\nDeleted element is %d",temp->data);
        prev->next=NULL;
        free(temp);
    }
}
void delete()
{
    int ch,inch;
    printf("\n1.Delete First....");
    printf("\n2.Delete Last.....");
    printf("\n3.Delete Specific..");
    printf("\nEnter your choice...");
    scanf("%d",&ch);
    if(ch==1)
        delete_first();
    else if(ch==2)
        delete_last();
    //else
    //   delete_specific();
}
void disp()
{
    struct node *new_node;
    struct node *temp;
    temp=head;
    while(temp)
    {
        printf("\ndata is %d",temp->data);
        temp=temp->next;
    }
}
void write()
{
    int data,i;
    FILE *ptr;
    ptr=fopen("doublylink.txt","w");
    struct node *temp;
```

```
    temp=head;
    while(temp)
    {
        fprintf(ptr,"%d",temp->data);
        temp=temp->next;
    }
    fclose(ptr);
}
void read()
{
    int i;
    FILE *fptr;
    fptr=fopen("doublylink.txt","r");
    struct node *temp;
    temp=head;
    while(temp)
    {
        fscanf(fptr,"%d",&temp->data);
        temp=temp->next;
    }
    fclose(fptr);
    printf("\nRead successufully");
}
int main()
{
    read();
    int ch,n;
    do
    {
        printf("\n1.Insert..");
        printf("\n2.Delete..");
        printf("\n3:Display");
        printf("\n4:Exit");
        printf("\nEnter your choice:");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1:insert();
                   write();
                   break;
```

```
            case 2:delete();
                   write();
                   break;
            case 3:disp();
                   break;
            case 4:exit(1);
                   break;
            default:
                   break;
        }
    }while(ch!=4);
    return 0;
}
```