ASSIGNMENT 1

AIM: TO CREATE ADT TO PERFORM THE FOLLOWING SET OPERATIONS:

1. ADD (NEW ELEMENT) PLACE A VALUE IN A SET.
2. REMOVE(ELEMENT).
3. RETURNS TRUE IF ELEMENT IS IN COLLECTION.
4. SIZE() RETURNS NUMBER OF VALUES IN A COLLECTION.
5. INTERSECTION OF TWO SETS.
6. UNION OF TWO SETS.
7. DIFFERENCE BETWEEN TWO SETS
8. SUBSET.

OBJECTIVE: TO IMPLEMENT THE "SET" CONCEPT.

THEORY: A **set** is an abstract data type that can store unique values, without any particular order. It is a computer implementation of the mathematical concept of a finite set. Unlike most other collection types, rather than retrieving a specific element from a set, one typically tests a value for membership in a set. One may define the operations of the algebra of sets:

- union(*S*, *T*): returns the union of sets *S* and *T*.
- intersection(*S*, *T*): returns the intersection of sets *S* and *T*.
- difference(*S*, *T*): returns the difference of sets *S* and *T*.
- subset(*S*, *T*): a predicate that tests whether the set *S* is a subset of set *T*.

ALGORITHM:

Union: *j*

1) Initialize union U as empty.
2) Copy all elements of first array to U.
3) Do following for every element x of second array:
……a) If x is not present in first array, then copy x to U.
4) Return U.

Intersection:

1) Initialize intersection I as empty.
2) Do following for every element x of first array
……a) If x is present in second array, then copy x to I.
4) Return I.

CODE:

```
#include<iostream>
using namespace std;


void create(int *s1,int *s2);
void display(int *s);
void intersection(int *s1,int *s2);
void insert(int *s);
void remove(int *s);
void contain(int *s);
void set_size(int *s);
void intersection(int *s1,int *s2);
int linear(int *s,int e);
#define SIZE 20


int main()
{
        int s1[SIZE], s2[SIZE];
        int element,ch,c,i,r;

        do{
                cout<<"\n***MENU***";
                cout<<"\n1:CREATE \n2:ADD ELEMENT \n3:REMOVE ELEMENT
\n4:CONTAIN ELEMENT \n5:SIZE OF ELEMENT \n6:INTERSECTION";
                cout<<"\n Enter your choice:";
                cin>>ch;
                switch(ch)
                {
```

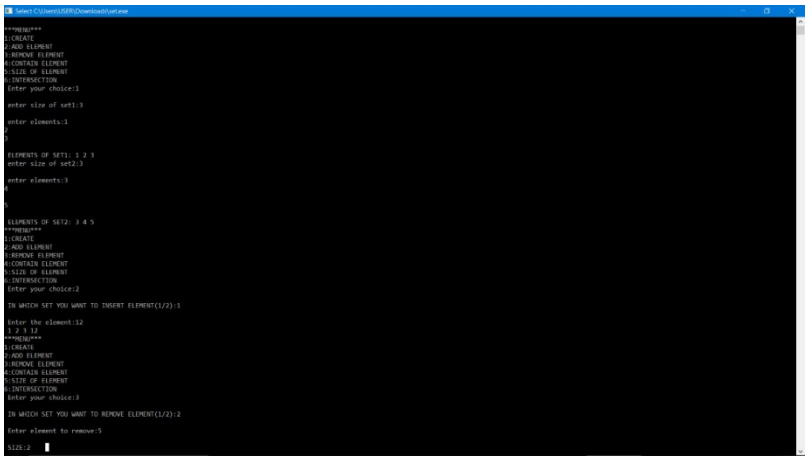
```
                case 1:create(s1,s2);
                        break;
                case 2: cout<<"\n IN WHICH SET YOU WANT TO INSERT
ELEMENT(1/2):";
                        cin>>c;
                        if(c==1)
                                insert(s1);
                        else
                                insert(s2);
                        break;
                case 3:cout<<"\n IN WHICH SET YOU WANT TO REMOVE
ELEMENT(1/2):";
                        cin>>c;
                        if(c==1)
                                remove(s1);
                        else
                                remove(s2);

                        break;
                case 4:cout<<"\n IN WHICH SET YOU WANT TO CHECK THE
ELEMENT(1/2):";
                        cin>>c;
                        if(c==1)
                                contain(s1);
                        else
                                contain(s2);
                        break;
                case 5:cout<<"\n IN WHICH SET YOU WANT TO CHECK THE
SIZE(1/2):";
                        cin>>c;
                        if(c==1)
                                set_size(s1);
                        else
                                set_size(s2);

                        break;
                case 6:intersection(s1,s2);
                default: cout<<"\n WRONG CHOICE!!!";
        }

    }while(ch<6);
    return 0;
}
```

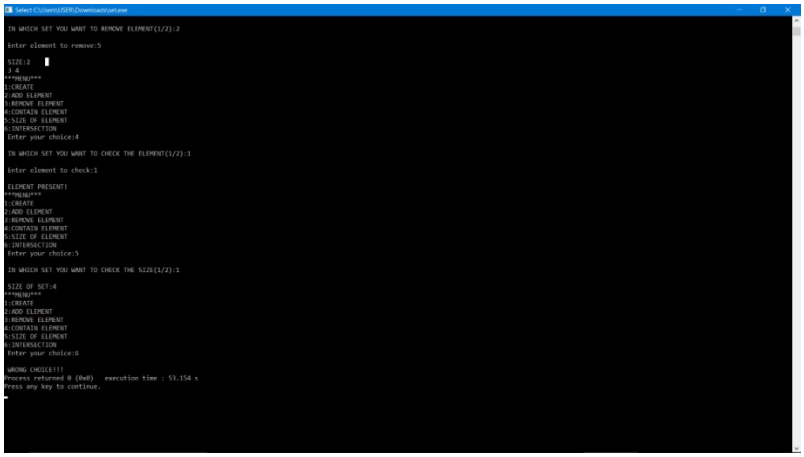
```
int linear(int *s, int e)
{
	int f;
	for(int i=1;i<=s[0];i++)
	{
		if(s[i]==e)
		{
			f=1;
			return f;
		}
	}
	if(f==0)
		return f;

}
void intersection(int *s1,int *s2)
{
	int s3[SIZE],i,j=1;
	for( i=1;i<=s1[0];i++)
	{
	if(linear(s2,s1[i])==1)
	{
		s3[j]=s1[i];
		}
	}
}
void set_size(int *s)
{
	cout<<"\n SIZE OF SET:"<<s[0];
}
void contain(int *s)
{
	int element;
	cout<<"\n Enter element to check:";
	cin>>element;
	if(linear(s,element)==1)
		cout<<"\n ELEMENT PRESENT!";
	else
		cout<<"\n ELEMENT NOT PRESENT!!!";


}
void remove(int *s)
```

```
{
	int element,i,j;
	cout<<"\n Enter element to remove:";
	cin>>element;
	for(i=1;i<=s[0];i++)
	{
		if(s[i]==element)
		{
			for(int j=i;j<=s[0];j++)
				{
					s[j]=s[j+1];
				}
				s[0]-=1;
				cout<<"\n SIZE:"<<s[0]<<"\n";
				display(s);
				return;
		}
	}
	cout<<"\n ELEMENT NOT FOUND!!!";
}

void insert(int *s)
{
	int element;
	cout<<"\n Enter the element:";
	cin>>element;
	int size=s[0];
	s[++size]=element;
	s[0]=size;
	display(s);
}

void create(int *s1,int *s2)
{
	int n,i;
	cout<<"\n enter size of set1:";
	cin>>n;
	s1[0]=n;
	cout<<"\n enter elements:";
	for(i=1;i<=n;i++)
	{
	cin>>s1[i];
	}
```

```
        cout<<"\n ELEMENTS OF SET1:";
        display(s1);
        cout<<"\n enter size of set2:";
        cin>>n;
        s2[0]=n;
        cout<<"\n enter elements:";
        for(i=1;i<=n;i++)
        {
        cin>>s2[i];
        }
        cout<<"\n ELEMENTS OF SET2:";
        display(s2);

}
void display(int *s)
{
        int i;
        for(i=1;i<=s[0];i++)
        {
                cout<<" "<<s[i];
        }
}
```

OUTPUT:





CONCLUSION: We saw all the algorithms the STL offers to operate on sets, that are collections of sorted elements, in the general sense.