**Assignment No: E-20**

**Aim:** To study STL function to perform set operations

**Problem Statement:** To create ADT that implements the SET concept. a. Add (newElement) -Place a value into the set

1. Remove (element) Remove the value
2. Contains (element) Return true if element is in collection
3. Size () Return number of values in collection Iterator () Return an iterator used to loop over collection
4. Intersection of two sets,
5. Union of two sets,
6. Difference between two sets,
7. Subset

**Theory:**

The Standard Template Library (STL) is a software library for the C++ programming language that influenced many parts of the C++ Standard Library. It provides four components called algorithms, containers, functional, and iterators.

The STL provides a set of common classes for C++, such as containers and associative arrays, that can be used with any built-in type and with any user-defined type that supports some elementary operations (such as copying and assignment). STL algorithms are independent of containers, which significantly reduces the complexity of the library.

The STL achieves its results through the use of templates. This approach provides compile-time polymorphism that is often more efficient than traditional run-time polymorphism. Modern C++ compilers are tuned to minimize abstraction penalty arising from heavy use of the STL.

At the core of the C++ Standard Template Library are following three wellstructured components:

|  |  |
| --- | --- |
| **Component** | **Description** |
| Containers | Containers are used to manage collections of objects of a certain kind. There are several different types of containers like deque, list, vector, map etc. |
| Algorithms | Algorithms act on containers. They provide the means by which you will perform initialization, sorting, searching, and transforming of the contents of containers. |
| Iterators | Iterators are used to step through the elements of collections of objects. These collections may be containers or subsets of containers. |

We will discuss about all the three C++ STL components in next chapter while discussing C++ Standard Library. For now, keep in mind that all the three components have a rich set of predefined functions which help us in doing complicated tasks in very easy fashion.

Let us take the following program demonstrates the vector container (a C++ Standard Template) which is similar to an array with an exception that it automatically handles its own storage requirements in case it grows:

#include <iostream> #include <vector>

using namespace std;

int main() {

// create a vector to store int

vector<int> vec;

int i;

// display the original size of vec

cout << "vector size = " << vec.size() << endl;

// push 5 values into the vector for(i = 0; i < 5; i++){

vec.push\_back(i);

}

// display extended size of vec

cout << "extended vector size = " << vec.size() << endl;

// access 5 values from the vector

for(i = 0; i < 5; i++){

cout << "value of vec [" << i << "] = " << vec[i] << endl;

}

// use iterator to access the values vector<int>::iterator v = vec.begin(); while( v != vec.end()) {

cout << "value of v = " << \*v << endl; v++;

}

return 0; }

Here are following points to be noted related to various functions we used in the above example:  The push\_back( ) member function inserts value at the end of the vector, expanding its size as needed.

* The size( ) function displays the size of the vector.
* The function begin( ) returns an iterator to the start of the vector.  The function end( ) returns an iterator to the end of the vector.

**Algorithm:**

1. Declare Header file #include <set>, #include<algorithm> and #include<vector>
2. Create a set to perform basic operation on set i.e. set<int> st;
3. Create a vector to perform union, intersection and difference operation of set i.e. vector<int> v(10);
4. Create iterator to access set and vector elements set<int>::iterator it; vector<int>::iterator it1;
5. Perform following basic operation of set

Insert Element into the Set

Delete Element of the Set

Size of the Set

Find Element in a Set

Display by Iterator

1. Perform following basic operation of set using vector

Union

Interaction

Difference

1. Stop.

FAQ:

1. Enlist standard library function to perform basic set operations?
2. What is the use of iterator?
3. What is use of vector?