The C++ Standard Template Library (STL)

The ***Standard Template Library (STL***) is a **set of C++ template classes** to provide common programming data structures and functions such as lists, stacks, arrays, etc. It is a library of container classes, algorithms and iterators. It is a generalized library and so, its **components are parameterized**. A working knowledge of template classes is a prerequisite for working with STL.

STL has four components

- Algorithms
- Containers
- Functions
- Iterators

Algorithms

The header algorithm defines a collection of functions especially designed to be used on ranges of elements.They act on containers and provide means for various operations for the contents of the containers.

- Algorithm
  - Sorting
  - Searching
  - Important STL Algorithms
  - Useful Array algorithms
  - Partition Operations
- Numeric
  - valarray class

Containers

Containers or container classes store objects and data.

A container is **a holder object** that **stores a collection of other objects (its elements).** They are **implemented as class templates**, which allows a great flexibility in the types supported as elements.

The container manages the storage space for its elements and **provides member functions to access them,** either directly or through iterators (reference objects with similar properties to pointers).

There are in total **seven** standard "first-class" container classes and **three container** adaptor classes and only seven header files that provide access to these containers or container adaptors.

- Sequence Containers: implement data structures which can be accessed in a sequential manner.
  - vector
  - list
  - deque
  - arrays
  - forward_list(Introduced in C++11)

    (You can use vector like:

```
#include <vector>
using namespace std;
//...
vector<int> v; // // declares a vector of integers
```

)
- Container Adaptors : provide a different interface for sequential containers.
  - queue
  - priority_queue

    - stack
- Associative Containers : implement sorted data structures that can be quickly searched (O(log n)complexity).
    - set
    - multiset
    - map
    - multimap

Functions

The STL includes classes that overload the function call operator. Instances of such classes are called function objects or functors. Functors allow the working of the associated function to be customized with the help of parameters to be passed.

- Functors

Iterators

As the name suggests, iterators are used for working upon a sequence of values. They are the major feature that allow generality in STL.

- Iterators

Utility Library

Defined under <utility header>

- pair