

Roll No :

Date :

Problem Statement:

Write a menu driven C++ program to store sets for students' names participating in different events in Equinox such as Coding contest, Project competition, Paper Presentation, Master Mind etc.

1. Find out participants who have participated in Coding and Project both
2. Find out participants who have participated in Coding or Project competition or both or Mastermind
3. Find out participants who have participated in Coding but not in Master mind.
4. Find out participants who have participated in all events.

Objectives:

Understand the concept of linear data structure "ARRAY" to be implemented in C++.

Outcomes:

Upon completion of assignment, student will be able to:

- 1) Design and identify how to use array concept in programming.
- 2) Understood the concept of linear Data Structures.

Theory

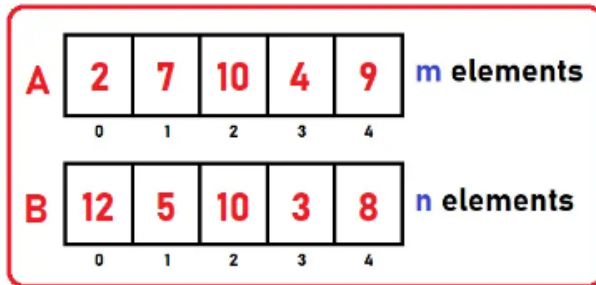
Definition of Array:

An array is a collection of data that holds fixed number of values of same data type. Arrays are fundamental data structure. In Python, arrays are container which are able to store more than one item at a same time. They are an ordered collection of elements with every value being of same data type and they are stored at contiguous memory location. Arrays are derived type of data type

First, let's see what are set operations. We will cover the following set operations in our article:

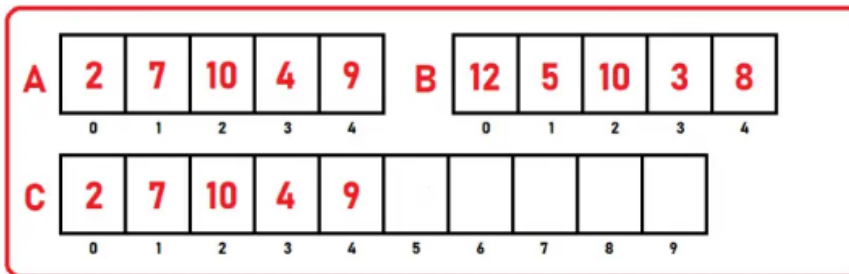
1. **Union** – It will combine the two arrays such that the final set will not contain any duplicate elements. It is similar to merging.

Let's say array A has m elements and array B has n elements.

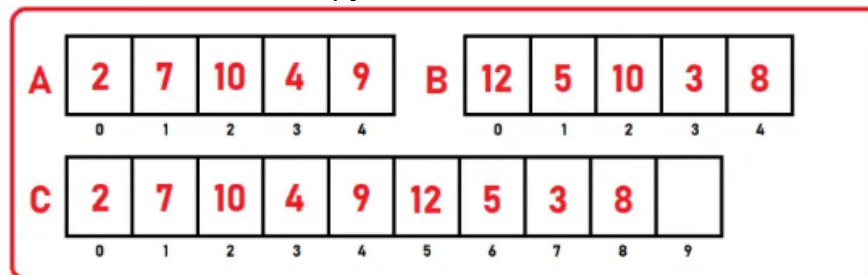


Now the procedure for union is:

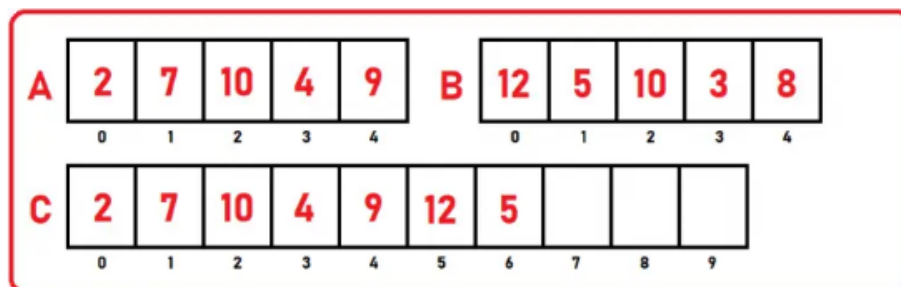
We have to create a 3rd array of the name 'C'. Its size will be the size of array A + size of array B. Then copy all the elements of the first array to our 3rd array C:



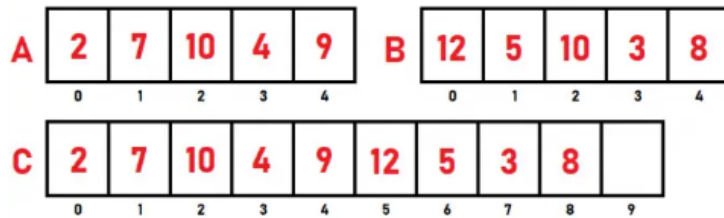
The first array is copied to array C. How much time is taken? m time. Now, should we copy all elements of array B? We cannot blindly copy 2nd set. If any element of 2nd set is already present in array C then we have to leave that element and check for the next one. i.e. Is 12 presents in set C? No, copy 12 to C:



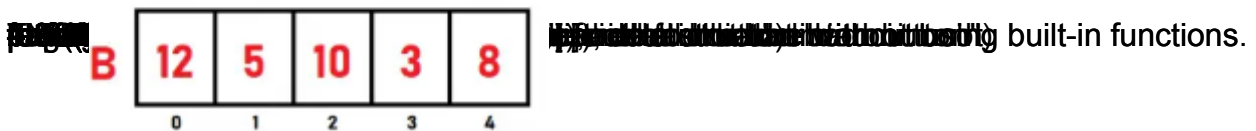
Check next element, Is 5 present in set C? No, copy 5 to C:



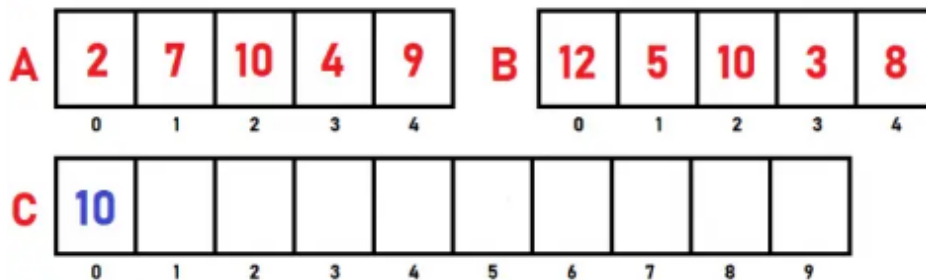
Check next, Is 10 presents in set C? Yes, so don't copy 10. In the same manner rest of the elements of set B will be copied in Set C:



2. **Intersection** – It will point to common elements between two arrays and copy those elements in a 3rd array.

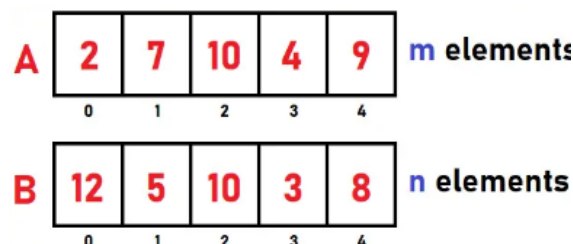


So, the procedure is to start checking the elements from set A. Check if A [0] is present in set B, if no, point to the next element and if yes copy it to set C. In our case 2 is not present in set B so point next to one. Now check if A [1] is present in set B, no, again leave it and point to the next element. Check for if A [2] is present in set B, yes, copy it to set C.

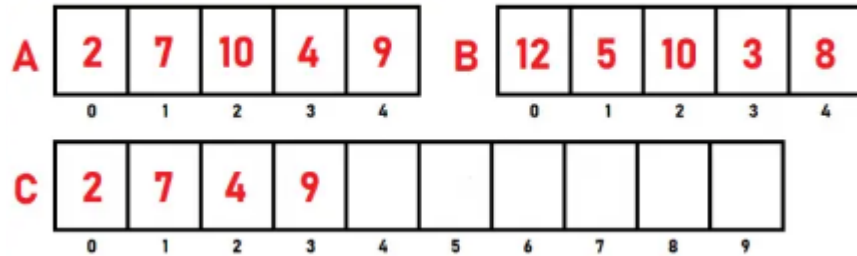


3 Difference

We have two sets then we want to perform difference operation on them such as A – B that is the subtraction of two sets. It means we want all those elements of set A which are not present in set B. So, subtract the common elements between sets A and B. Take only those elements which are only in set A but not in set B. This is difference operation. Let's perform this operation in below two sets:



We can clearly see in the above sets, 2, 7, 4, and 9 are elements which only present in set A not in B. So, what is the procedure for this? We have to check every element of A in B and check if two elements are the same then move to next, don't copy any element but if two elements are different then copy the elements of set A to set C:



Conclusion:

By this way, students can able to Understand the concept of Array and able to implement this in Set theory Operations using C++ programming.

Practice Questions

1. Discuss the time complexity of Union algorithm
2. Discuss the time complexity of intersection algorithm