2. Array Data Structure

What is an array?

Arrays are a group of continuous similar type of variables referred by a common name.

In C++, array can be declared and used as follows:

				0	1	2	3	4
intnum[5];	num							

				0	1	2	3	4
num[2]=3;	num					3		

				0	1	2	3	4
num[4]=2*num[2];	num							6

```
cout<<num[4]+num[2];   9
```

A program to store and print elements in an array:

```cpp
#include<iostream.h>
#include<conio.h>
void main()
{
        int i;
        char keys[6]={'Q','W','E','R','T','Y'};
        cout<<"The first 6 keys of a keyboard are ";
        for (i=0; i<=5; i++)
                cout<<keys[i]<<" ";
}
```

A program to search and replace an element in an array:

```cpp
#include<iostream.h>
#include<conio.h>
void main()
{
        int i;
        char s,r;
        int found=0; //found=false
        char keys[6]={'Q','W','E','R','T','Y'};
        cout<<"Enter a character to be searched: "; cin>>s;
        cout<<"Enter a character to replace: "; cin>>r;
        i= (-1);
        while (i<5 && found==0)
                if (keys[++i]==s) found=1;
        if (found==1)
                keys[i]=r;
        else
                cout<<"No such element.";
}
```

A program to delete an elementfrom an array:

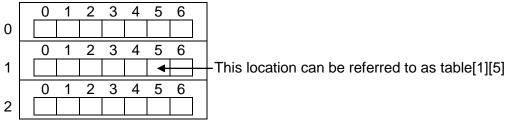Actually we can't delete an element from an array.

If we want to delete an element, we have to move all the subsequent elements forward.

Or otherwise we can replace the element with invalid values (e.g.: 0 or NULL).

```cpp
#include<iostream.h>
#include<conio.h>
void main()
{
        int i;
        char d;
```

```
            int found=0; //found=false
            char keys[6]={'Q','W','E','R','T','Y'};
            cout<<"Enter a character to be deleted: "; cin>>d;
            i= (-1);
            while (i<5 && found==0)
                    if (keys[++i]==d) found=1;
            if (found==1)
                    keys[i]=NULL;
            else
                    cout<<"No such element."
}
```
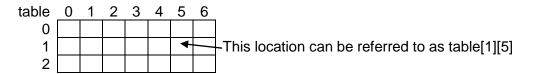
Multi-Dimensional Array:

Multi-dimensional array can be considered as an array of arrays.

For example a two dimensional array may look like as follows:

Or simply we can imagine a two dimensional array as follows:

A program to store and print elements in a two dimensional array:

```
#include<iostream.h>
#include<conio.h>
void main()
{
        Int i,j;
        clrscr();
        int matrix[3][4]={{5,3,6,4},{2,5,3,7},{3,6,5,8}};
        cout<<"The elements of the array are";
        for (i=0; i<3; i++)
        {
                for (j=0; j<4; j++)
                        cout<<matrix[i][j]<<"\t";
                cout<<"\n";
        }
}
```

Advantages of arrays:

Fast access if index is known

Easy to add an element in a particular location.

Disadvantages of arrays:

Fixed size

Same data type

Slow in searching an element

Slow in inserting/deleting an element