هياكل البيانات

المرحلة الثانية

محاضرة(2)

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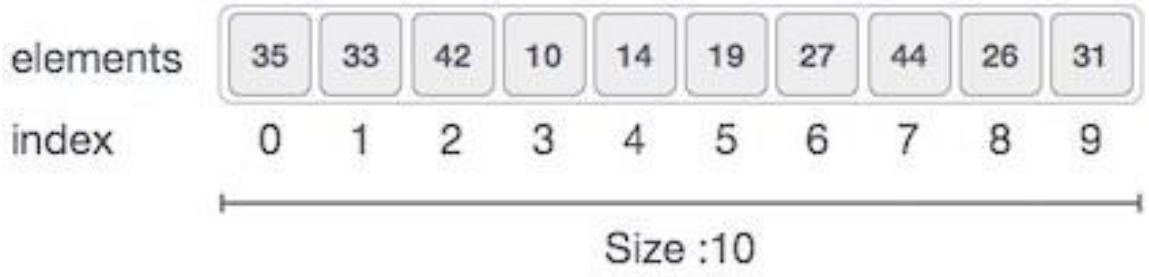
1.ARRAY DATA STRUCTURE

Array is the first data structure that is built in the C language so it can be considered as a data type in the language. The simplest form of **array a one dimensional array** that may be defined abstractly as a **finite ordered** set of **homogenous** elements.

- "**Finite"** we mean that these is a specific number of elements in the array. This number may be large or small, but it must exit.
- "**Ordered**" we mean that the elements of the array are arranged so that there is a zeroth, first, second, third, and so forth.
- **"homogeneous"** we mean that all the elements in the array must be of the same type. For example an array may contain all integers or all characters but may not contain both.

1.2 REPRESENTATION OF ONE –DIMENSIONAL ARRAY



As per the above illustration, following are the important points to be considered.

- Index starts with 0.
- Array length is 10 which means it can store 10 elements.
- Each element can be accessed via its index.

```
Int a[5];
a[0]=2;
a[2]=0;
a[4]=7;
```

1.3 BAISC OPERATIONS IN ONE –DIMINSIONAL ARRAY

1. Creating an Array : This operation is to input elements in an array:

```
void input(int a[4])
{
    for(int i=0;i<4;i++)
    cin>>a[i];
}
```

2.Traverser operation

This operation is to traverse through the elements of an array. Following program traverses and prints the elements of an array:

```
void output(int a[n])
{
        for(int i=0;i<n;i++)
    cout<<a[i];
}
```

3.Check element in an array

```
int find(int a[n],int x)
{
        for(int i=0;i<n;i++)
        if (a[i]==x)
        return 1;
}
```

3.Replacement

To replace two elements in a specific array, we need three important steps:

A. Checking if the two elements really exist in the array by calling find function.

```
if (find(a,x)==1&&find(a,y)==1)
```

B. Store the current locations of the two items to be swapped into (w,z)

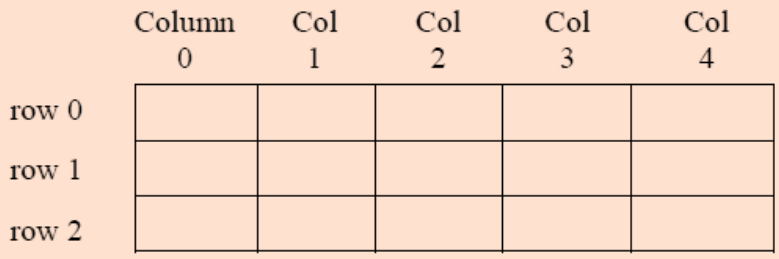
```
for(int i=0;i<n;i++)
        {
                if (a[i]==x)
                w=i;
                if( a[i]==y)
                z=i;
        }
```

C. swapped by using a third variables (f)

```
int f=a[w];
        a[w]=a[z];
        a[z]=f;
```

1.4 REPRESENTATION OF TWO– DIMENSIONAL ARRAY

Multidimensional arrays can be described as "arrays of arrays" .An element of two dimensional array is accessed by specifying two indices: a raw number and column number.



Two-dimensional array

The number of rows or Columns is called the range of the dimension. In the Array a, the range of the first dimension is 3 and the Second is 5 .

"Array data type" array name [row][column];

Exmple: int a [4][5]

BAISC OPERATIONS IN ONE –DIMINSIONAL ARRAY

1. Creating an Array : This operation is to input elements in an array:

```
void input(int a[n][n])
{
        for(int i=0;i<n;i++)
                for(int j=0;j<n;j++)
        cin>>a[i][j];
}
```

2. Traverser operation

This operation is to traverse through the elements of an array. Following program traverses and prints the elements of an array:

void output(int a[n][n])

```
{
        for(int i=0;i<n;i++)
          for(int j=0;j<n;j++)
              cout<<a[i][j]<<" ";
}
```

3. Replacement To replace two elements in an array, apply the three steps:
   A. Checking if the two elements really exist in the array by calling find function.

```
if (find(a,x)==1&&find(a,y)==1)
```

   B. Store the current locations of the two element to be swapped into (w1,w2,z1,z2) because we have row and column:

```
for(int i=0;i<n;i++)
        {
           For(int j=0;j<n;j++)
                if (a[i][j]==x)
                {
                 w1=i;
                w2=j;
                 }
                 if( a[i][j]==y)
                {
                 z1=i;
                z2=j;
                  }
         }
```

   C. swapped by using a third variables (f)

```
int f=a[w1][w2];
        a[w1][w2]=a[z1][z2];
        a[z1][z2]=f;
```