C++
ARRAY-1

Lecture-11

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Today's checklist

1) Introduction to Arrays
2) Syntax , accessing elements of Arrays
3) Printing Output and Taking Input
4) Types of Arrays
5) Size operator
6) Memory allocation in array,address of array elements
7) Linear search
8) Basic problems

What is an array? → List → Collection of similar data types

Data Structure → Storage to store data

int x;

char ch;

Class XII - A → 100 bacche

↓

percentage

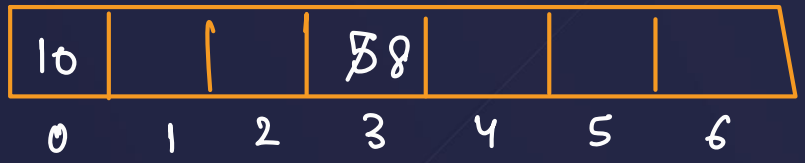
float x1 = 99.8

float x2 = 90.1

Syntax and Declaration

size

```
int x[7];
```




```
x[3] = 5;
```

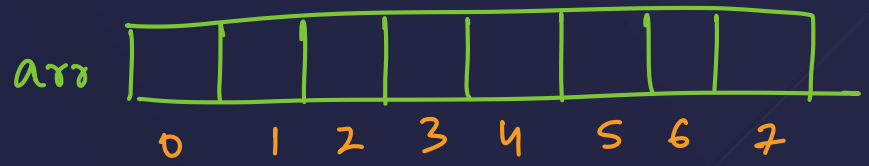
→ 3 & 0 are indices

```
x[0] = 10;

x[3] = 8;
```

```
int arr[3] = {1, 2, 3};
```

How to access Elements in Array ?



arr[4]

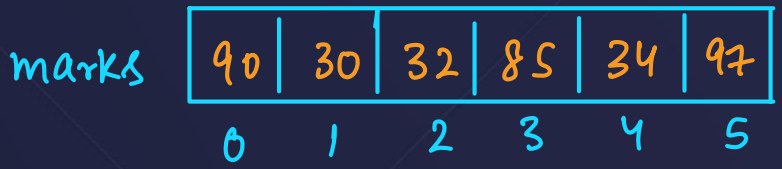
Printing Output and Taking Input

For Loop → output & input using indices

↓

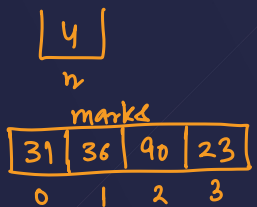
i

Ques: Given an array of marks of students, if the marks of any student is less than 35 print its roll number. [roll number here refers to the index of the array.]



```cpp
int n;
cout<<"enter no of students : ";
cin>>n;
int marks[n]; // 0 to n-1
cout<<"Enter the marks : ";
// input
for(int i=0;i<=n-1;i++){
    cin>>marks[i];
}

for(int i=0;i<=n-1;i++){
    if(marks[i]<35) cout<<i<<" ";
}
```



Output / Input

- Enter no. of students : 4
- Enter the marks : 31 36 90 23
- 0 3

Ques : Are the following array declarations correct?

int a (25) ; wrong → int a[25];

int size = 10, b[size] ; Correct

int size = 10;
int b[size];

int c = {0,1,2} ; wrong

int c[] = {0, 1, 2};

Ques : Which element of the array does this expression reference?

num[4] → 4^{th} index → 5^{th} element

Types of Arrays

1) One dimensional Array
2) Two dimensional Array → matrix

Size and sizeof operator(How can we use it to find the Length of array?)

```
int arr[] = {2, 3, 4, 1, 2, 9, 10, 11, 100, 17, 19, 18, 16};
int n = sizeof(arr) / sizeof(arr[0]);
```

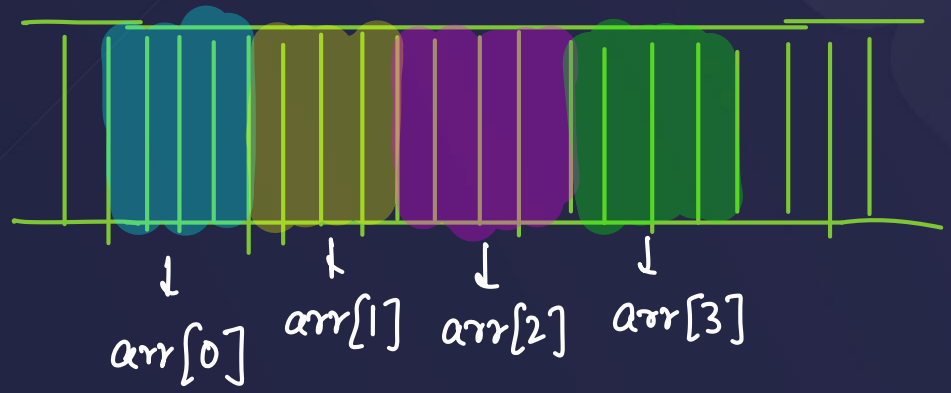
Memory Allocation in Arrays

Continuous memory allocation.

```
int arr[4] = {1, 2, 3, 5};
```

arr

1	2	3	5
0	1	2	3




```
cout << &arr ;
        ↓
cout << arr ;
```

→ address → first element → &arr[0]

Memory Allocation in Arrays

```
int arr[5];
cout<<&arr[0]<<endl;
cout<<&arr[1]<<endl;
cout<<&arr[2]<<endl;
cout<<&arr[3]<<endl;
cout<<&arr[4]<<endl;
// 0x16cfab3d4   d4
// 0x16cfab3d8   d8
// 0x16cfab3dc   dc
// 0x16cfab3e0   e0
// 0x16cfab3e4   e4
```

0 1 2 3 4 5 6 7 8 9 a b c d e f

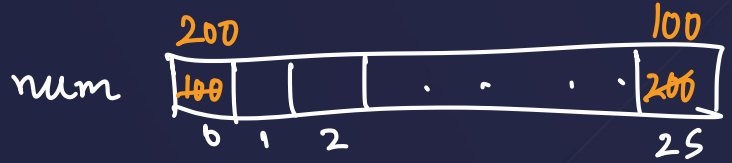
Address of Array Elements

↓

Continuous

Predict the output :

```
main( )
{
   int num[26], temp ;
   num[0] = 100 ;
   num[25] = 200 ;
   temp = num[25] ;
   num[25] = num[0] ;
   num[0] = temp ;
   cout<<endl<<num[0]<<" "<<num[25] ;
}
```



Output

200 100

Point out the errors(if any) in the following code:

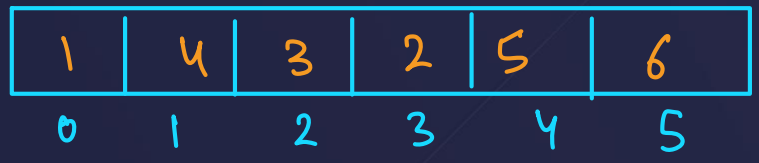
```
int main( ) {
    int size ;
    cin>>size ;
    int arr[size] ;
    for ( i = 1 ; i <= size ; i++ ) {
            cin>>arr[i] ;
            cout<<arr[i] ;
        }
      return 0;
}
```

Output/Input

- 4

Undeclared identifier

Ques : Calculate the sum of all the elements in the given array.

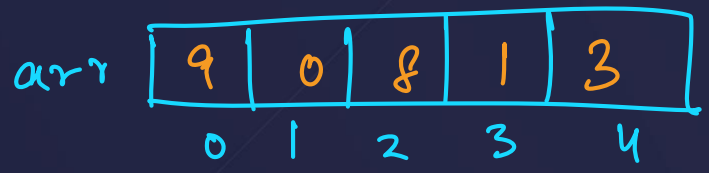



```
int Sum;
```

Linear search

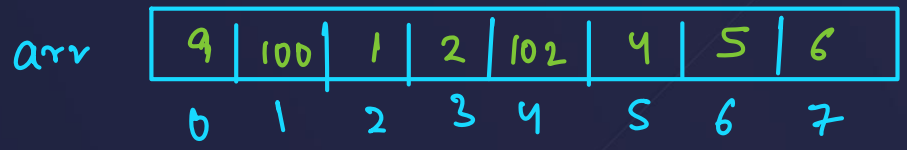
Ques : Find the element x in the array . Take array and x as input.

```
int n;
cin>>n;
int arr[n];
// input
int x;
cin>>x;
```




```
if(arr[i]==x) cout<<"element is present";
```

Ques : Find the maximum value out of all the elements in the array.



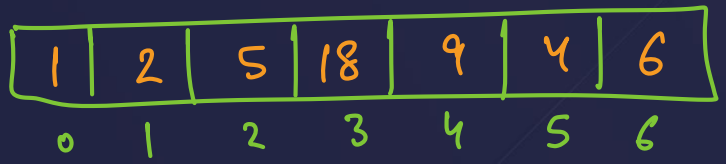
Output

```
int max = arr[0]; // max = INT_MIN
for(int i=1 ; i<=n-1 ; i++){
|   if(max < arr[i])  max = arr[i];
}
cout << max;
```

max = ~~9~~ ~~100~~ 102

Ques : Find the second largest element in the given Array.

arr



Step-1 : Find largest , max = 18

Step-2 : traverse through the array , if (smax < arr[i] && arr[i] != max)

```
int max = INT_MIN;
int smax = INT_MIN;
```

if (max < arr[i]) max = arr[i]

Ques : Find the second largest element in the given Array.

max = ~~INT_MIN~~ 1 2 18

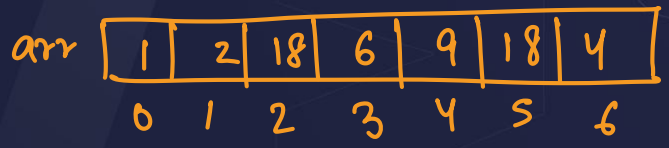
i = 0 1 2 3 4 5 6 7 0 1 2

```
int max = INT_MIN;
for(int i=0;i<=n-1;i++){
    if(max<arr[i]) max = arr[i];
}

int smax = INT_MIN;
for(int i=0;i<=n-1;i++){
    if(arr[i]!=max && smax<arr[i]) smax = arr[i];
}
cout<<max<<endl;
cout<<smax;
```

smax = ~~INT_MIN~~ 1 2 6 9

18
9



MCQ : What is the difference between the 5's in these two expressions?

```
int num[5];
num[5] = 11;
```

size of num

5th index pe 11 daal do

1. first is particular element, second is type
2. first is array size, second is particular element
3. first is particular element, second is array size
4. both specify array size

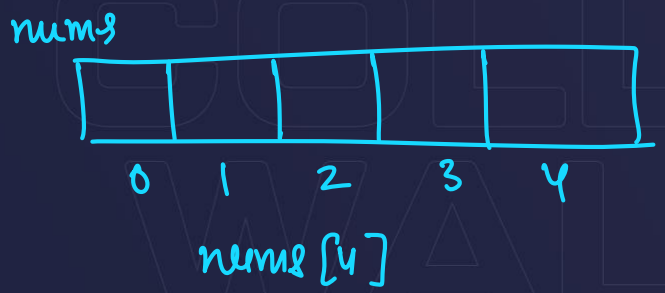
MCQ : What would happen if you assign a value to an element of an array whose subscript exceeds the size of the array? `int arr[5];` `arr[8] = 2;` error

1. the element will be set to 0
2. nothing, it's done all the time
3. other data may be overwritten
4. error message from the compiler ✓

State TRUE or FALSE :

1. The array int num[26] has twenty-six elements. T
2. The expression num[1] designates the first element in the array F
3. It is necessary to initialize the array at the time of declaration. F
4. The expression num[27] designates the twenty-eighth element in the array. T

```
int arr[26];
```



Ques : Count the number of elements in given array greater than a given number x.

arr, x

```
int count = 0;
for(int i=0 ; i<=n-1 ; i++){
|   if(arr[i] > x) count++;
}
cout << count ;
```

THANK YOU