SLIIT ACADEMY

FCIT – Semester 1

ONE DIMENSIONAL ARRAY

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What is an Array?

- A collection of integer data values or
  A collection of float data values
- Arrays consist of several data values maintained
- Arrays let you easily manipulate large amounts of related data.
- To access the particular value stored in an array, we specify its index(i.e., its position relative to the first array value)

Scenario - Write a program to store marks of 4 students, calculate total and print input marks followed by the total.

```
BEGIN
INT mark1,mark2,mark3,mark4,sum=0
DISPLAY 'Enter 4 numbers'
GET mark1,mark2,mark3,mark4
sum = mark1 + mark2 + mark3 + mark4
DISPLAY ' Total=',sum
DISPLAY ' Marks 1= ', mark1
DISPLAY ' Marks 2= ', mark2
DISPLAY ' Marks 3= ', mark3
DISPLAY ' Marks 4= ', mark4
END
```

Pseudocode without using arrays

Why Use Arrays?

- Suppose I am using 3 assignment marks to determine the total
  total = (mark1 + mark2 + mark3)

- What if the total was based on 25 assignment marks?
  total =
  (mark1 + mark2 + mark3 + mark4 + mark5 + mark6 + mark7 + mark8 + mark9 + mark10 + mark11 + mark12 + mark13 + mark14 + mark15 + mark16 + mark17 + mark18 + mark19 + mark20 + mark21 + mark22 + mark23 + mark24 + mark25)

- What if the total was based on 100 assignment marks?

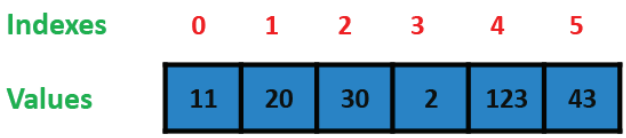
What Problems we have faced ?

- Declaring variables
- Storing values
- Accessing values
- Scalability (10,100,1000 Students)

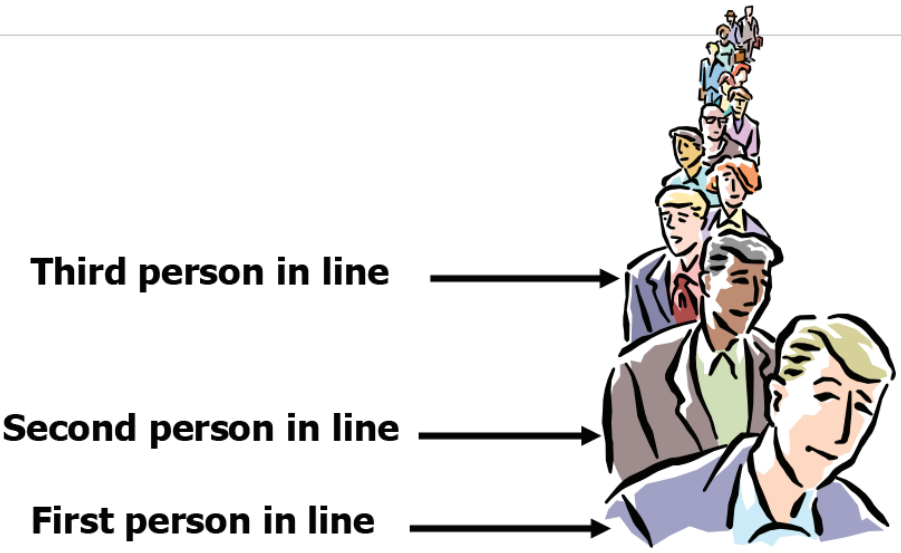
A Variable vs an Array

Single variable

Array



When Using Arrays, you can refer to members by their location



Example: Month Array

- 12 entries or items
- Month_Array refers to all 12 items
- Month_Array[0] refers to January
- Month_Array[5] refers to June
- The number in parentheses is called a subscript

Steps to Follow

- **Declare the array**
  - Specify the type of data the array contains
  - Reserve storage
- **Initialize the array**
  - Reserve storage
  - Put values in array
- **Access or lookup entries**
  - Find entries in array

Declaring arrays

To declare an array, you should specify the following things

The **data type** of the values which will be stored in the array

The **name** of the array

The **dimensionality** of the array

- One dimensional Array
- Two-dimensional Array

The **size** of each dimension

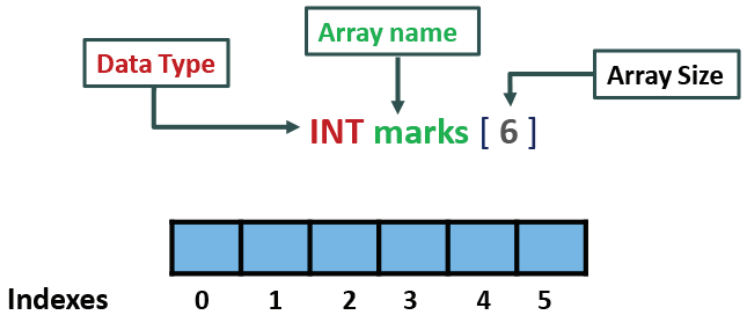
Examples

int num[10] – An integer array named **num** with size **10**

float GPA[100] – A float array named **GPA** to store the GPA of **100** students

Declaring One - Dimensional Array

A one - dimensional array is a collection of elements that can be accessed with a single index value.

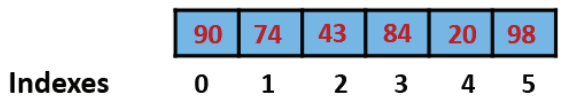


Initializing One - Dimensional Arrays

There are **two** common ways to initialize one - dimensional arrays

1. If the values do not change the simplest way to load an array is to "hardcode" the values within the program, e.g.

```
marks[0] = 90
marks[1] = 74
marks[2] = 43
marks[3] = 84
marks[4] = 20
marks[5] = 98
```



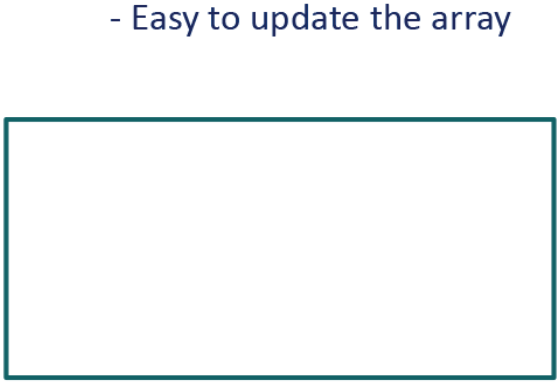
But this method can be very tedious, time-consuming and inflexible.

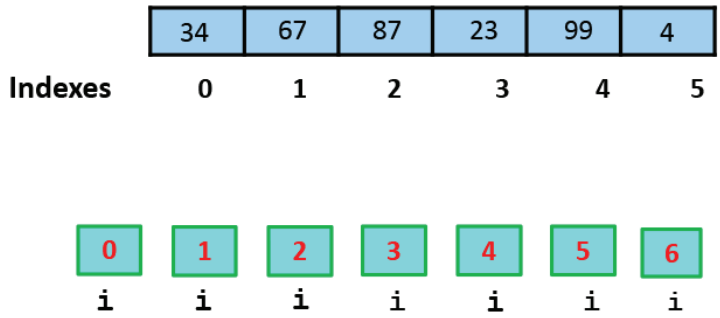
Initializing One - Dimensional Arrays

2. Using Loops

   - Accept user inputs to fill the array.

   - Easy to update the array



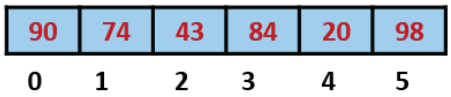


Accessing values stored in One-Dimensional Array

1. Accessing values without using a loop

Display marks[0],marks[1],marks[2],marks[3],marks[4],marks[5]

Output - 90 74 43 84 20 98



Display ' Element One is : ', marks[0]

Output - Element One is : 90

Display marks[3]

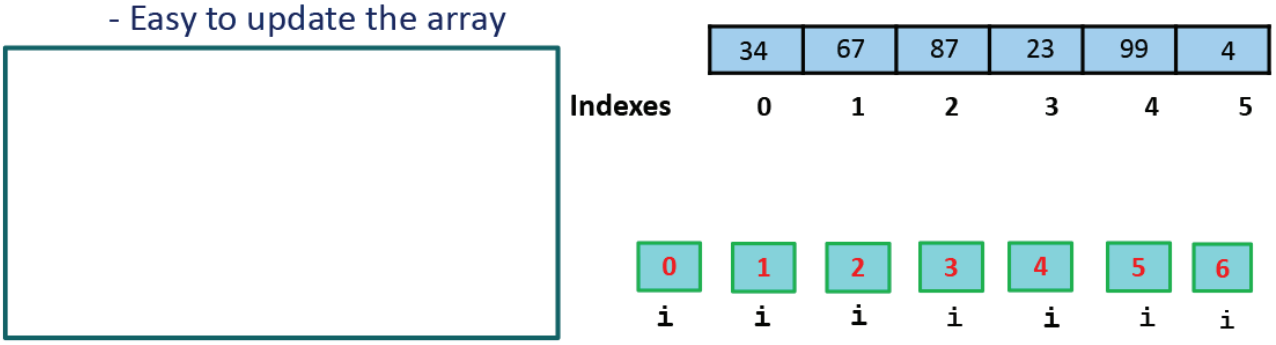
Output - 84

Accessing values stored in One-Dimensional Array

2. Using Loops

   - Easy to Display the values.

   - Easy to update the array



Output - 34 67 87 23 99 4

Scenario - Write a program to store marks of 100 students in an array, calculate total and print input marks followed by the total.

Scenario - Write a program to store marks of 4 students in an array, find and Display the maximum mark stored in the array.

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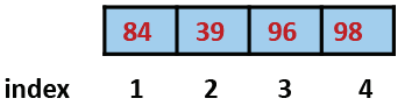

max	m	m < = 4	max < marks [m]	Output
84	0	1 <= 4 True	84 < 84 False	
84	1	2 <= 4 True	84 < 39 False	
84	2	3 <= 4 True	84 < 96 True	
96	3	4 <= 4 True	96 < 98 True	
98	4	5 <= 4 False	-	Maximum Mark = 98

```
BEGIN
FLOAT marks[4],max
INT i,m
FOR i=0 to 3
    DISPLAY 'Please enter marks'
    GET marks[i]
    i=i+1
ENDFOR
max = marks[0]
FOR m=0 to 3
   IF(max < marks[m])THEN
      max = marks[m]
   ENDIF
   m = m + 1
ENDFOR
DISPLAY 'Maximum Mark =',max
END
```

Summary

- What is an Array?
- Use of Arrays
- Declaring, Initializing and printing an array