# Module 3

Arrays   1D

- Arrays are used to store multiple values in a single variable, instead of declaring separate variables for each value.

- An array is a group of contiguous or related data items that share a common name.

- To declare an array, define the variable type with **square brackets**:

    int a[];

- The elements in the array allocated by *new* will automatically be initialized to **zero** (for numeric types), **false** (for boolean), or **null** (for reference types).

Arrays

int a[];

int a[]= {12,7,6,9,4};
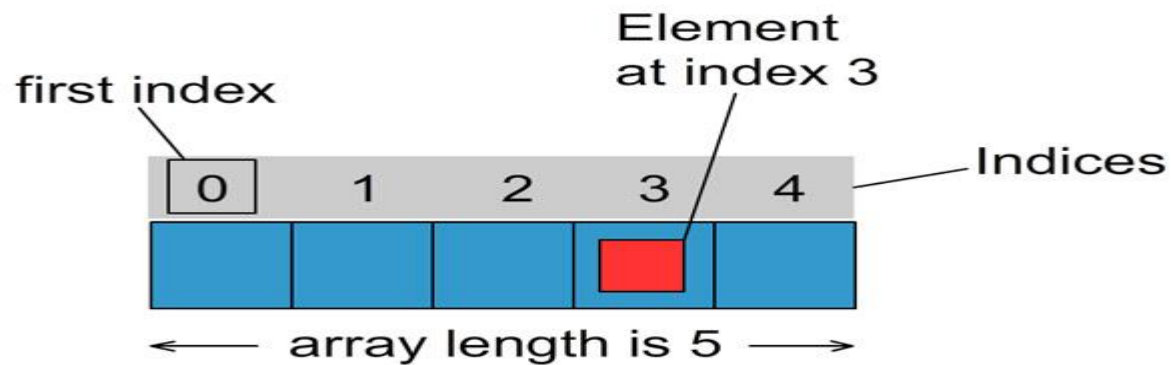
Arrays

Creating an Array:

1. Declaring the array.

> type arrayname[];
>
> > or
>
> type[] arrayname;

2. Creating memory locations

> arrayname=new type[size];
>
> > e.g.   int a[]=new int[5];
> >
> > int a[]=new int[n];

3. Putting values into the memory locations

> arrayname[subscript]=value;

Arrays

- **Access the Elements of an Array:**

You access an array element by referring to the index number.

String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
System.out.println(cars[0]);

- **Change an Array Element:**

To change the value of a specific element, refer to the index number:

String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
cars[0] = "Opel";
System.out.println(cars[0]);

Arrays

- **Array Length**:

To find out how many elements an array has, use the length property:

```
 String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
System.out.println(cars.length);
```

- **Loop Through an Array**

You can loop through the array elements with the for loop, and use the length property to specify how many times the loop should run.

```
String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
for (int i = 0; i < cars.length; i++) {
  System.out.println(cars[i]);
}
```

Arrays

- **Loop Through an Array with For-Each:**

There is also a "**for-each**" loop, which is used exclusively to loop through elements in arrays:

```
for (type variable : arrayname) {
  ...
}
```

```
String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
for (String i : cars)
{
  System.out.println(i);
}
```
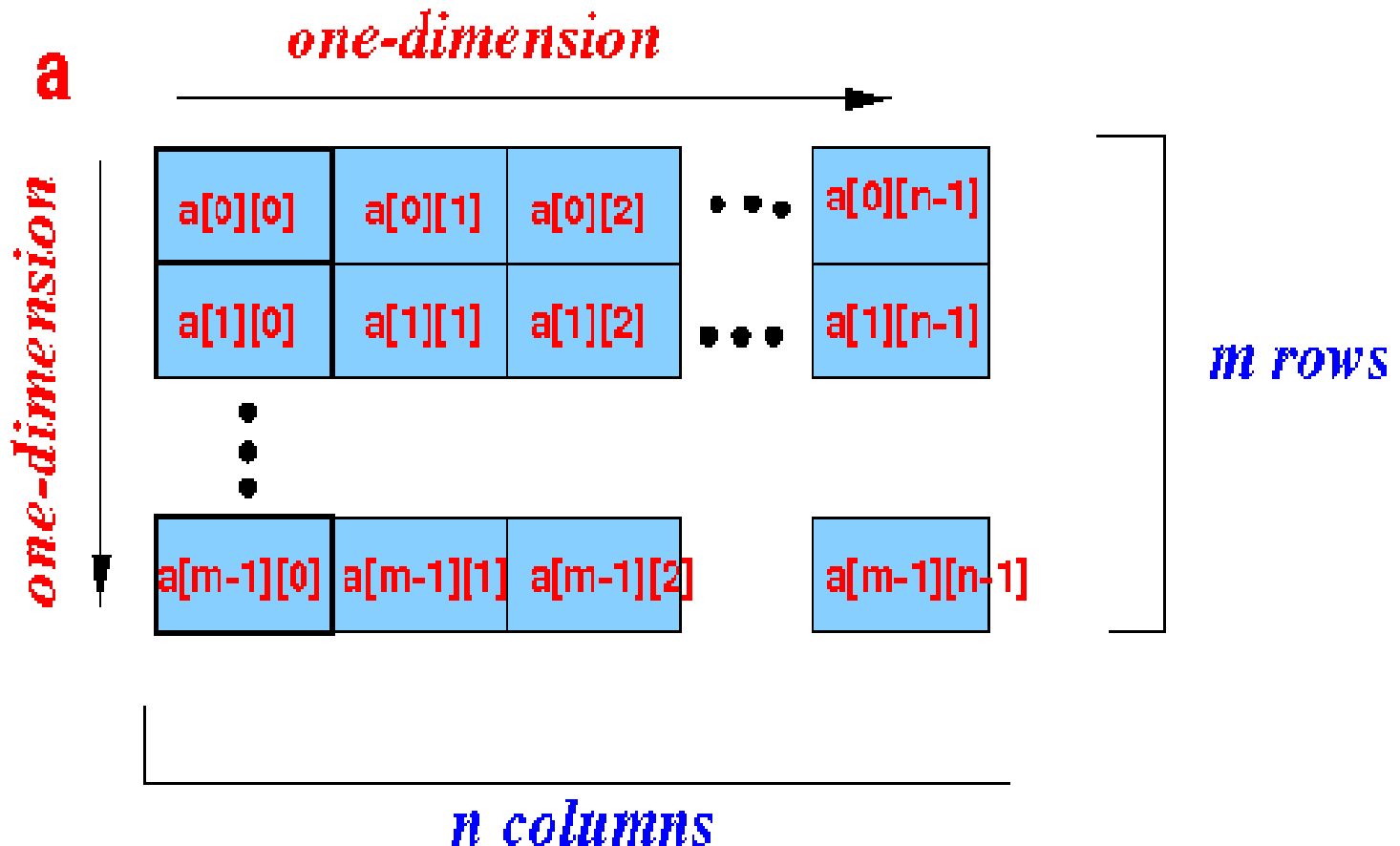
Arrays

Program to find median of an array of numbers.

2D-Arrays

- In 2D array we have rows and columns.

int a[][]= new int [m][n];

2D arrays

Program for addition of two matrices.

Program for multiplication of two matrices.

Variable size arrays/Jagged array

Variable length columns:

```
int x[][]=new int[n][ ];
    x[0]= new int[7];
    x[1]= new int[2];
    x[2]= new int[5];
            .
            .
    x[n-1]=new int[3];
```
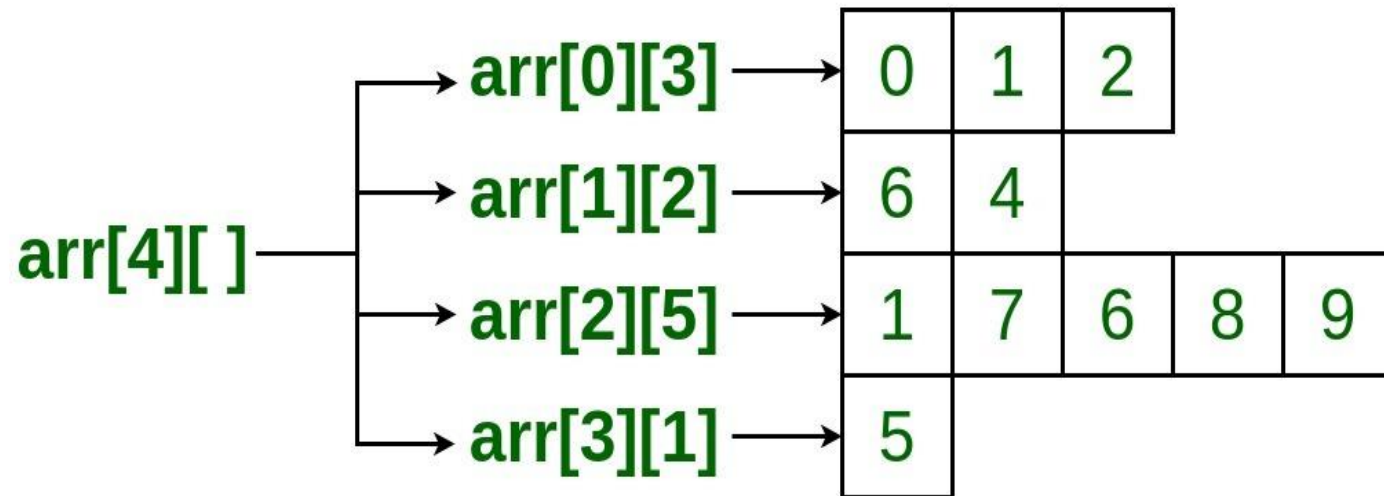
Variable size arrays/Jagged array

Jagged Array

arr[4][ ] →

arr[0][3] → | 0 | 1 | 2 |

arr[1][2] → | 6 | 4 |

arr[2][5] → | 1 | 7 | 6 | 8 | 9 |

arr[3][1] → | 5 |

Variable size arrays/Jagged array

Write a program which stores information about n students in a two dimensional array. The array should contain number of rows equal to number of students. Each row will have number of columns equal to number of semesters by that student which

 may vary from student to student. The program should display student number (index +1),percentage scored by that student in each semester and its average percentage as output. (It is expected to assign columns to each row dynamically after getting no of semesters value from user)

An Array of objects

- Unlike traditional array which store values like string, integer, Boolean, etc. array of objects stores objects.
- The array elements store the location of reference variables of the object.
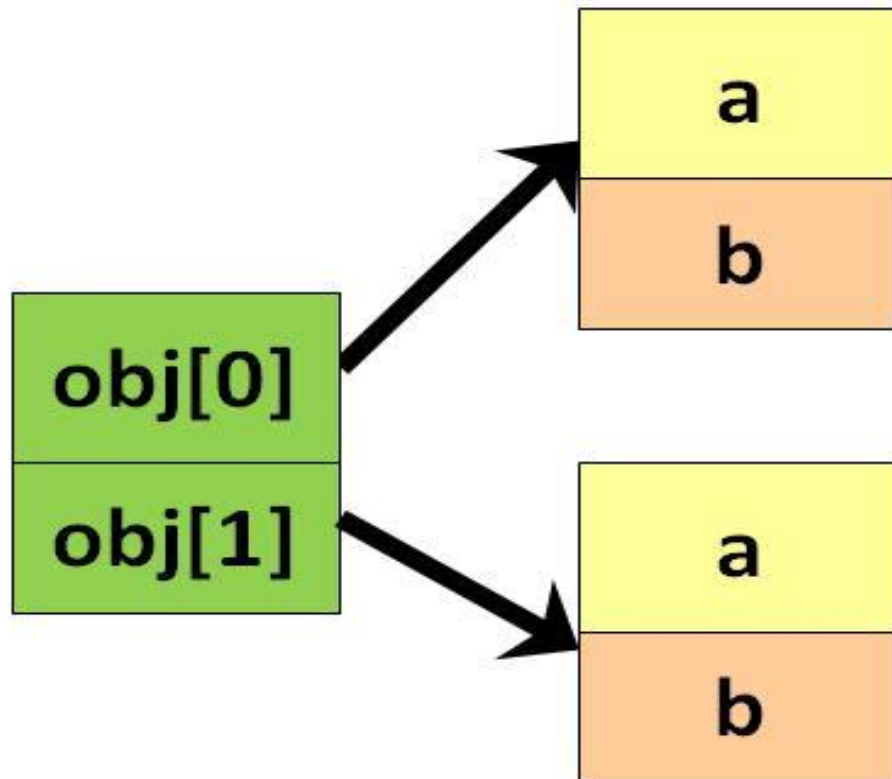
An Array of objects

1. **You can declare and instantiate the array of objects as shown below:**

    syntax: Class obj[]= new Class[array_length];

    Employee emp[] = new Employee[2];

2. Once an array of objects is instantiated like above, the   individual elements of the array of objects need to be created using new.

- One way to initialize the array of objects is by using the constructors.

- When you create actual objects, you can assign initial values to each of the objects by passing values to the constructor.

- You can also have a separate member method in a class that will assign data to the objects.

An Array of objects

```java
class Main
{ public static void main(String args[])
{
Employee[] obj = new Employee[2] ;
obj[0] = new Employee(100,"ABC");
obj[1] = new Employee(200,"XYZ");
System.out.println("Employee Object 1:");
obj[0].showData();
System.out.println("Employee Object 2:");
 obj[1].showData();
 } }
class Employee
{
 int empId; String name;
Employee(int eid, String n)
{
 empId = eid; name = n; }
public void showData()
{
System.out.println("EmpId = "+empId + " " + " Employee Name = "+name); } }
```

An Array of objects

Problem Statement:

Write a program which accepts information about n no of students from user

.Create an array of objects to store stud_id ,name,avg_marks.

Your program should provide following functionalities

1.To add student

2.To delete any student detail

3. To display student details.