



Fundamentals of Object Oriented Programming

CSN- 103

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Multidimensional array (2-D) in java

- Syntax

- `dataType[][] arrayRefVar;` (or)
- `dataType [][]arrayRefVar;` (or)
- `dataType arrayRefVar[][];` (or)
- `dataType []arrayRefVar[];`

`arr[0][0]`
`arr[0][1]`
⋮
`arr[2][2]`

- Example

- `int[][] arr=new int[3][3];` // 3 row and 3 column

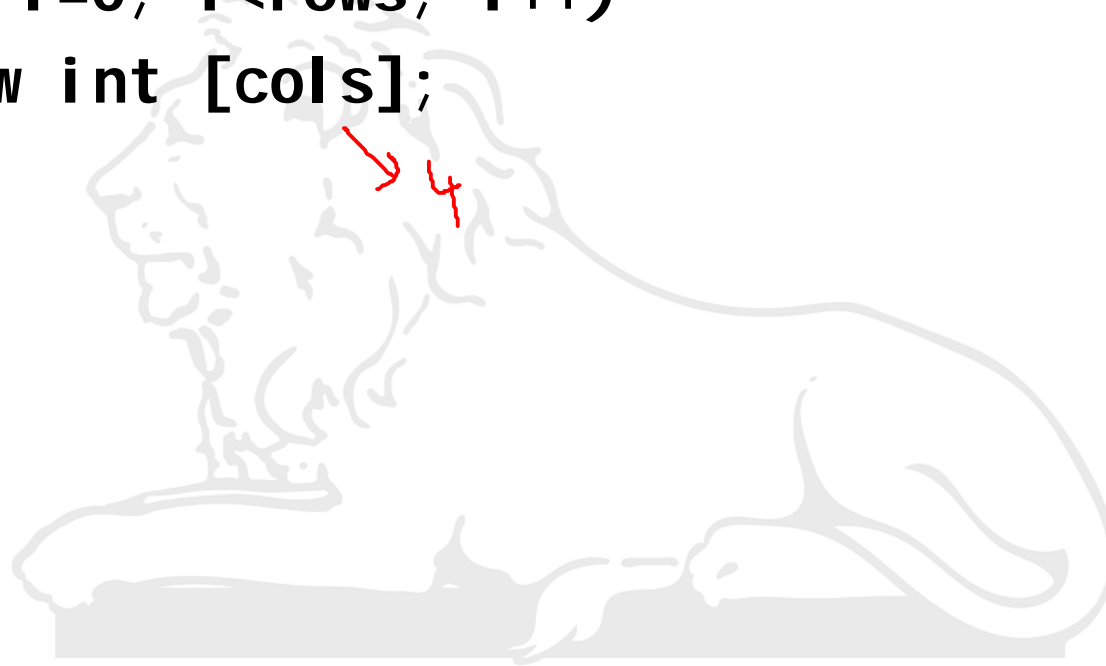
Variable Array Size

Java arrays can be multidimensional. For example, a 2-dimensional array is an array of arrays. Two-dimensional arrays need not be rectangular. Each row can be a different length. Here's an example:

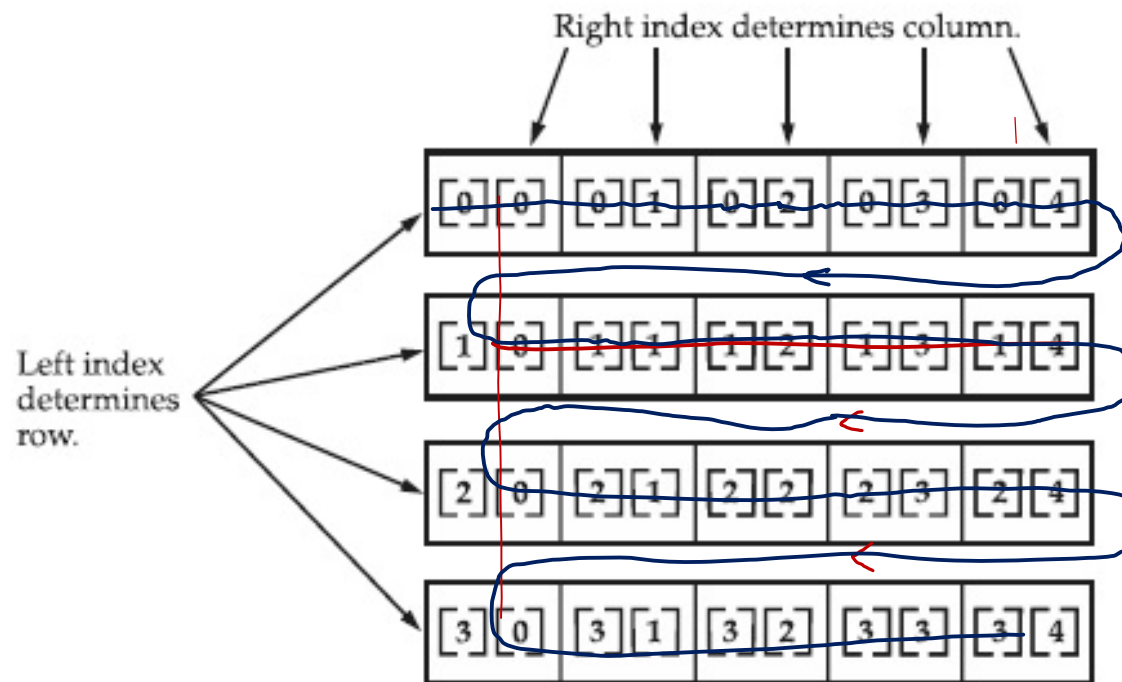
```
int [ ][ ] A;           // A is a two-dimensional array
A = new int[5][ ];      // A now has 5 rows, but no columns yet
A[0] = new int [1];     // A's first row has 1 column
A[1] = new int [2];     // A's second row has 2 columns
A[2] = new int [3];     // A's third row has 3 columns
A[3] = new int [5];     // A's fourth row has 5 columns
A[4] = new int [5];     // A's fifth row also has 5 columns
```

$A[0] \rightarrow \circ$
 $A[1] \rightarrow \circ \circ$
 $A[2] \rightarrow \circ \circ \circ$
 $A[3] \rightarrow \circ \circ \circ \circ \circ$
 $A[4] \rightarrow \circ \circ \circ \circ \circ$

```
int [] [] A;  
A= new int[rows][5];  
for (int i=0; i<rows; i++)  
    A[i]=new int [cols4];
```



```
int mat[ ][ ] = new int[4][5];
```



Row-Major
form

2-D Arrays

```
1 class Testarray3{
2     public static void main(String args[]){
3
4         //declaring and initializing 2D array
5         int arr[][]={{1,2,3},{2,4,5},{4,4,5}};
6
7         //printing 2D array
8         for(int i=0;i<3;i++){
9             for(int j=0;j<3;j++){
10                 System.out.print(arr[i][j]+" ");
11             }
12             System.out.println();
13         }
14
15     }}
```

Terminal

```
sh-4.3$ javac Testarray3.java
sh-4.3$ java Testarray3
1 2 3
2 4 5
4 4 5
sh-4.3$
```



Addition of Two matrices in JAVA

```
1 class Testarray5{
2 public static void main(String args[]){
3 //creating two matrices
4 int a[][]={{10,20,30},{40,50,60}};
5 int b[][]={{20,40,60},{30,40,50}};
6
7 //creating another matrix to store the sum of two matrices
8 int c[][]=new int[2][3];
9
10 //adding and printing addition of 2 matrices
11 for(int i=0;i<2;i++){
12 for(int j=0;j<3;j++){
13 c[i][j]=a[i][j]+b[i][j];
14 System.out.print(c[i][j]+" ");
15 }
16 System.out.println();//new line
17 }
18
19 }}
```

Terminal

```
sh-4.3$ javac Testarray5.java
sh-4.3$ java Testarray5
30 60 90
70 90 110
sh-4.3$
```

Exercise

- WAP to find the multiplication of two matrices



Real Application in Digital Image Processing



Strings

- Character array

```
char ch = 'a';
```

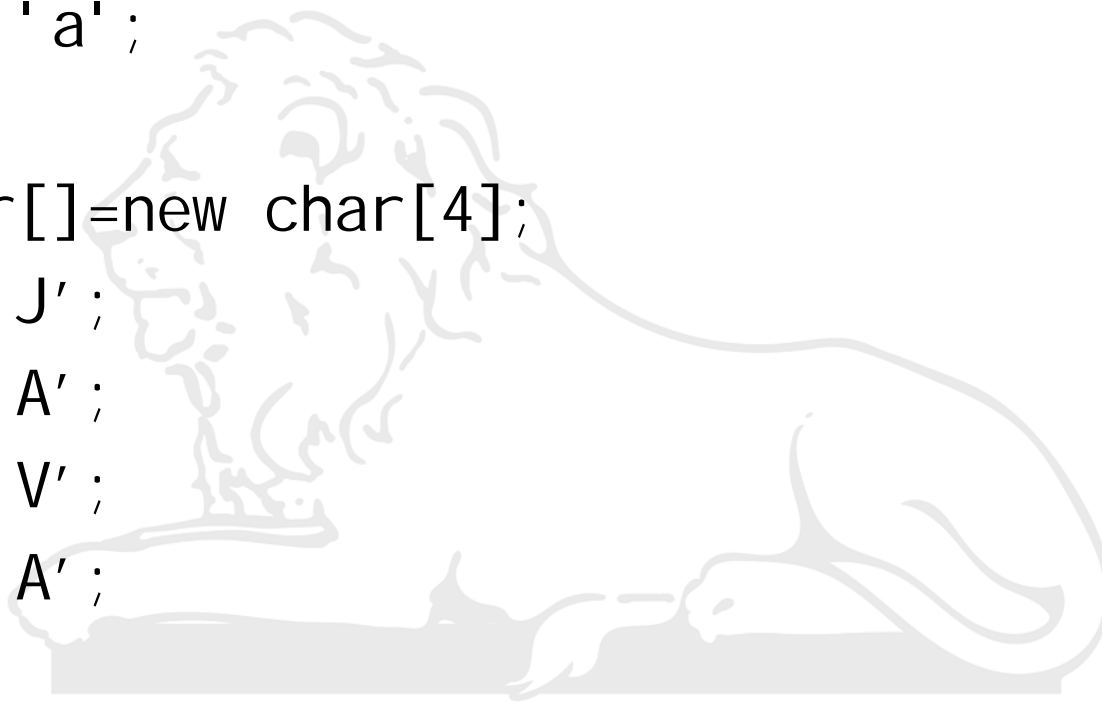
```
char chArr[] = new char[4];
```

```
chArr[0] = 'J';
```

```
chArr[1] = 'A';
```

```
chArr[2] = 'V';
```

```
chArr[3] = 'A';
```



```
1 ▶ public class StringExample{
2 ▶ public static void main(String args[]){
3   String s1="java";//creating string by java string literal
4
5   char ch[]={'s','t','r','i','n','g','s'};
6
7   String s2=new String(ch);//converting char array to string
8   String s3=new String("example");//creating java string by new keyword
9
10  System.out.println(ch);
11  System.out.println(s1);
12  System.out.println(s2);
13  System.out.println(s3);
14  }}
```

Terminal

```
sh-4.3$ javac StringExample.java
sh-4.3$ java StringExample
strings
java
strings
example
sh-4.3$
```

✓ s1[0] = "INDIA";



```
1 public class StringExample{
2     public static void main(String args[]){
3         String s1[]=new String[10];
4         s1[0]="I";
5         s1[1]="I";
6         s1[2]="T";
7         s1[3]="R";
8         s1[4]="O";
9         s1[5]="O";
10        s1[6]="R";
11        s1[7]="K";
12        s1[8]="E";
13        s1[9]="E";
14
15        //System.out.println(ch);
16        for (int i=0; i<10;i++)
17            System.out.print(s1[i]);
18    }}
```

Terminal

```
sh-4.3$ javac StringExample.java
sh-4.3$ java StringExample
IITROORKEesh-4.3$
```

```
1 public class StringExample{
2     public static void main(String args[]){
3         String s1="java";//creating string by java string literal
4
5         char ch[]={'s','t','r','i','n','g','s'};
6         //char ch[]={'s'};
7
8         String s2=new String(ch);//converting char array to string
9         String s3=new String("example");//creating java string by new keyword
10
11         String test=s1+s3;
12         String city="New"+"Delhi";
13
14         System.out.println(test);
15         System.out.println(city);
16     }}
```

```
sh-4.3$ javac StringExample.java
sh-4.3$ java StringExample
javaexample
NewDelhi
sh-4.3$
```

```
1 public class StringExample{
2     public static void main(String args[]){
3         String s1="java";//creating string by java string literal
4
5         char ch[]={'s','t','r','i','n','g','s'};
6         //char ch[]={'s'};
7
8         String s2=new String(ch);//converting char array to string
9         String s3=new String("example");//creating java string by new keyword
10
11         String test=s1+" "+s3;
12         String city="IIT"+" "+s3;
13
14         System.out.println(test);
15         System.out.println(city);
16     }}
```

Terminal

```
sh-4.3$ javac StringExample.java
sh-4.3$ java StringExample
java example
IIT Roorkee
sh-4.3$
```

```
1 import java.util.Scanner;
2
3 class GetInputFromUser
4 {
5     public static void main(String args[])
6     {
7         String s1;
8         String s2;
9
10        Scanner in = new Scanner(System.in);
11
12        System.out.println("Enter a string");
13        ✓ s1 = in.nextLine();
14        System.out.println("You entered string "+s1);
15
16        System.out.println("Enter a string");
17        s2 = in.nextLine();
18        System.out.println("You entered string "+s2);
19
20        String s3;
21        s3=s1+" "+s2+" "+"Congratulations!";
22        System.out.println(s3);
23    }}
```

Terminal

```
sh-4.3$ javac GetInputFromUser.java
sh-4.3$ java GetInputFromUser
Enter a string
INDIA
You entered string INDIA
Enter a string
WON
You entered string WON
INDIA WON Congratulations!
sh-4.3$
```
