OBJECT ORIENTED PROGRAMMING

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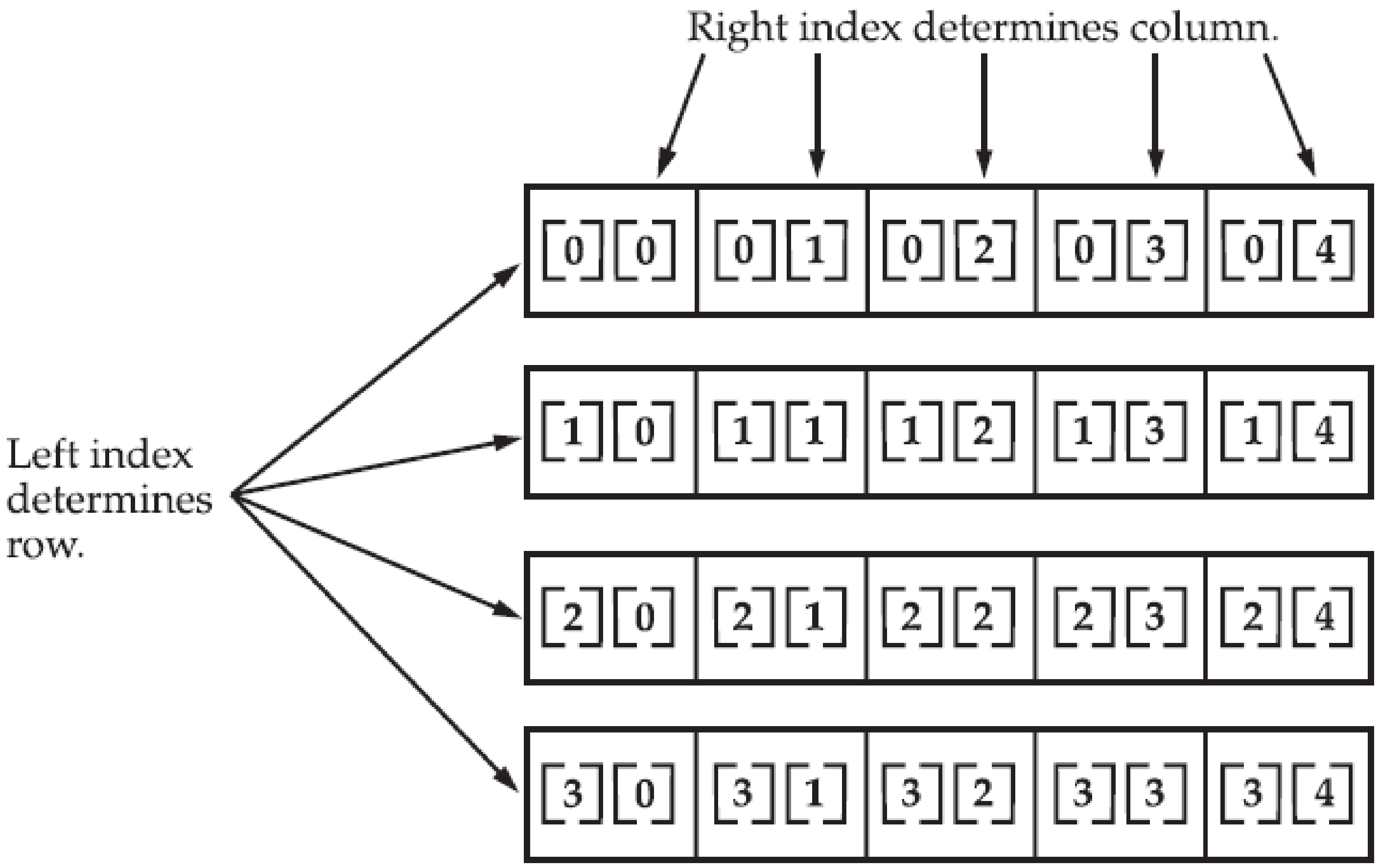
MULTIDIMENSIONAL ARRAYS

- In Java, *multidimensional arrays are actually* *arrays of arrays*.
- To declare a multidimensional array variable, specify each additional index using another set of square brackets.
  - int twoD[][] = new int[4][5];
- This allocates a 4 by 5 array and assigns it to twoD.
  - Syntax:
  - dataType[][] arrayRefVar; (or)
  - dataType [][]arrayRefVar; (or)
  - dataType arrayRefVar[][]; (or)
  - dataType []arrayRefVar[];

```
// Demonstrate a two-dimensional array.
class TwoDArray {
public static void main(String args[]) {
            int twoD[][]= new int[4][5];
            int i, j, k = 0;
            for(i=0; i<4; i++)
              for(j=0; j<5; j++) {
                      twoD[i][j] = k;
                      k++;
             }
            for(i=0; i<4; i++) {
             for(j=0; j<5; j++)
                      System.out.print(twoD[i][j] + " ");
                      System.out.println();
             }
 }
}
```

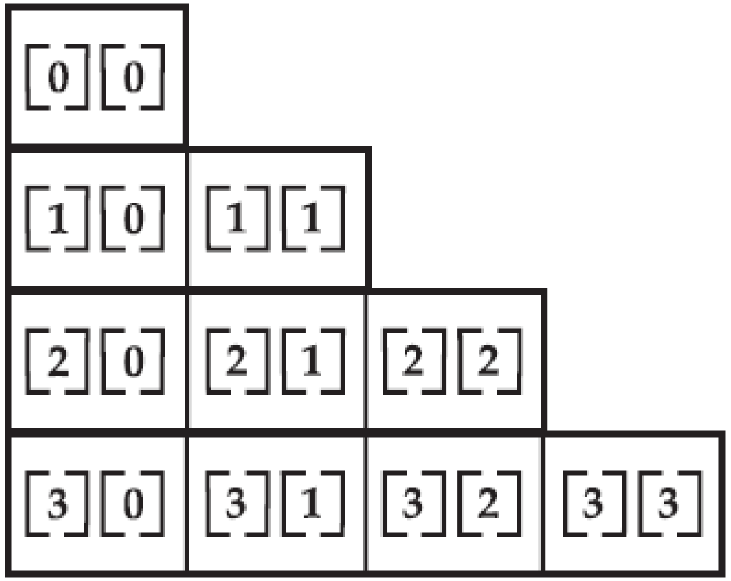
```
int twoD[][] = new int[4][];
twoD[0] = new int[5];
twoD[1] = new int[5];
twoD[2] = new int[5];
twoD[3] = new int[5];
```



Given: int twoD [ ] [ ] = new int [4] [5] ;

JAGGED ARRAY IN JAVA

- Creating odd number of columns in a 2D array, it is known as a jagged array.
- In other words, it is an array of arrays with different number of columns.



// MANUALLY ALLOCATE DIFFERING SIZE SECOND DIMENSIONS.

```
class TwoDAgain {
public static void main(String args[]) {
        int twoD[][] = new int[4][];
        twoD[0] = new int[1];
        twoD[1] = new int[2];
        twoD[2] = new int[3];
        twoD[3] = new int[4];

      int i, j, k = 0;

       for(i=0; i<4; i++) for(j=0;
      j<i+1; j++) {
                        twoD[i][j] = k;
                        k++;
                }
                for(i=0; i<4; i++) {
                        for(j=0; j<i+1; j++)
                  System.out.print(twoD[i][j] + " 
                  "); System.out.println();
                }
        }
}
```

This program generates the following output:

```
0
1 2
3 4 5
6 7 8 9
```

INITIALIZATION

- It is possible to initialize multidimensional arrays. To do so, simply enclose each dimension's initializer within its own set of curly braces.

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

EXAMPLE

```
        class Testarray3{
        public static void main(String args[]){
        //declaring and initializing 2D array

        int arr[][]={{1,2,3},{2,4,5},{4,4,5}};
        //printing 2D array

        for(int i=0;i<3;i++){

                        for(int j=0;j<3;j++){

                        System.out.print(arr[i][j]+" ");
                    }

         System.out.println();
        }

}}
```

EXAMPLE

```
// Demonstrate a three-dimensional array.

class ThreeDMatrix {
public static void main(String args[]) { int threeD[][][] = new int[3][4][5]; int i, j, k;

    for(i=0; i<3; i++)

            for(j=0; j<4; j++)

                    for(k=0; k<5; k++)

                            threeD[i][j][k] = i * j* k;
for(i=0; i<3; i++) {

  for(j=0; j<4; j++) {

      for(k=0; k<5; k++)
          System.out.print(threeD[i][j][k] + " ");

          System.out.println(); }

      System.out.println();
} }}
```

```
output:
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0

0 0 0 0 0
0 1 2 3 4
0 2 4 6 8
0 3 6 9 12

0 0 0 0 0
0 2 4 6 8
0 4 8 12 16
0 6 12 18 24
```

ALTERNATIVE ARRAY DECLARATION SYNTAX

There is a second form used to declare an array:

type[ ] var-name;

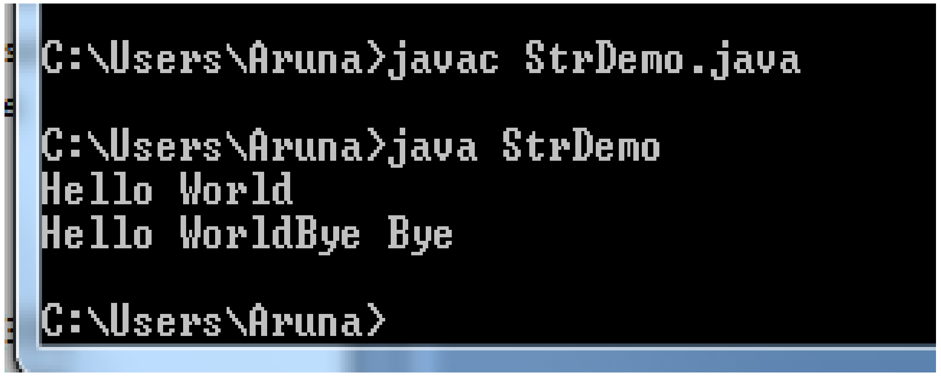
```
int a1[] = new int[3];

int[] a2 = new int[3];


char twod1[][] = new char[3][4];
char[][] twod2 = new char[3][4];


int[] nums, nums2, nums3; // create three arrays
```

STRING

- Java's string type, called String, is not a simple type. Nor is it simply an array of characters. Rather, String defines an object.
- The String type is used to declare string variables.
- Also declare arrays of strings.
- A quoted string constant can be assigned to a String variable.
- A variable of type String can be assigned to another variable of type String.
  - String str = "this is a test";

    System.out.println(str);

EXAMPLE



```
C:\Users\Aruna>javac StrDemo.java

C:\Users\Aruna>java StrDemo
Hello World
Hello WorldBye Bye

C:\Users\Aruna>
```

```
class StrDemo {
 public static void main(String args[]) {
          String str1 = new String();
                    str1 = "Hello World";
          System.out.println(str1);
          String str2 = "Bye Bye";
          System.out.println(str1+str2);
} }
```

POINTERS

- Java does not support or allow pointers.
- Java cannot allow pointers, because doing so would allow Java programs to breach the firewall between the Java execution environment and the host computer.
- (Remember, a pointer can be given any address in memory—even addresses that might be outside the Java run-time system.)
- Java is designed in such a way that as long as you stay within the confines of the execution environment, you will never need to use a pointer, nor would there be any benefit in using one.