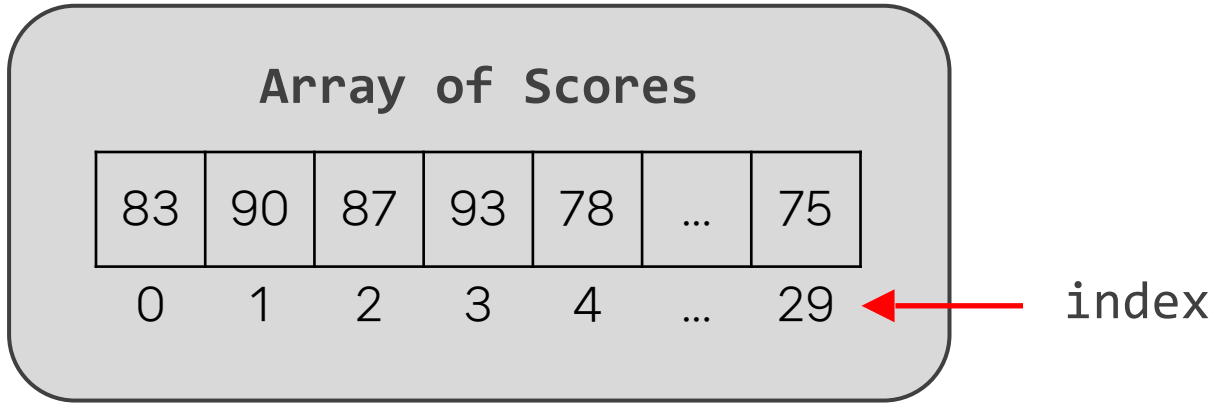
03_2 Arrays

Object-Oriented Programming

Definition of Array

- A data structure that lists **data of the same type** in a contiguous array, with **each element** having an **index**




```
score[0] = 83;
score[1] = 90;
...
score[29] = 75;
score[5] = score[2] + 3;
```

Declaration of Array

```
int[] iarray1;
double[] darray1;
String[] stArray1;

int iarray2[];
double darray2[];
String stArray2[];
```

- People generally prefer the former one.
- At this stage, memory has not yet been allocated for each array element.

Creating Array Objects

- Creating an array from a list of values
  - ex) String[] capitals = {“Seoul”, “ToKyo”, “Beijing”, ”London”}
  - ex) int[] scores = {1, 2, 5, 13, -39}

- Creating an array using the new operator
  - ex1) int[] a1 = new int[5];
    a1[0] = 35;
    a1[3] = 70;
  - ex2) String[] str = new String[3];
    str[0] = “Seoul”;
    str[1] = “Tokyo”;
    …

Default Initialization Values

- Each array element is automatically initialized as the **default initialization value** of that type.
- ex) int[] a[3]; // initialized as a[0] = a[1] = a[2] = 0

- Default initialization values
  - byte, short, int, long, float, double: 0 (or 0.0f, 0.0)
  - char: '\u0000' (null character)
  - boolean: false
  - Reference Types (including String): null

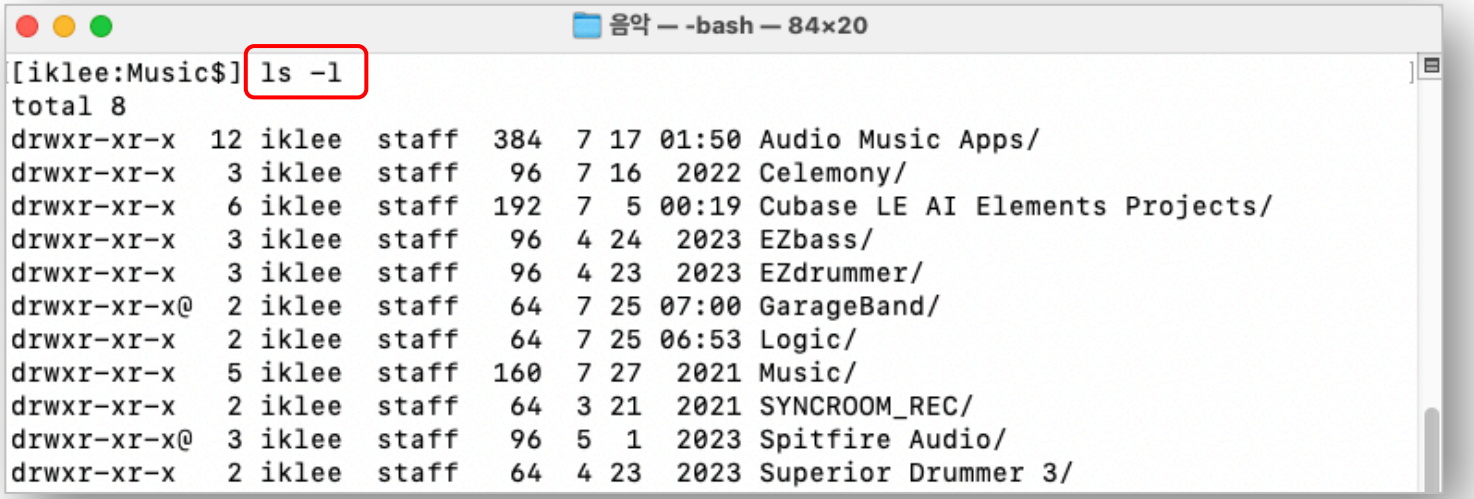
Length of an Array

- 'length’ field of an array
- ‘length’ is a read-only field
- ex) int[] intArray = {10, 20, 30};
  int size = intArray.length; // 3

Command Line Arguments (1/4)

- An array of strings passed as a parameter to the main method.

```
public class CommandLineArguments {
    public static void main(String[] args) {
        System.out.println("args[0] = " + args[0]);
        System.out.println("args[1] = " + args[1]);
    }
}
```



Command Line Arguments (2/4)

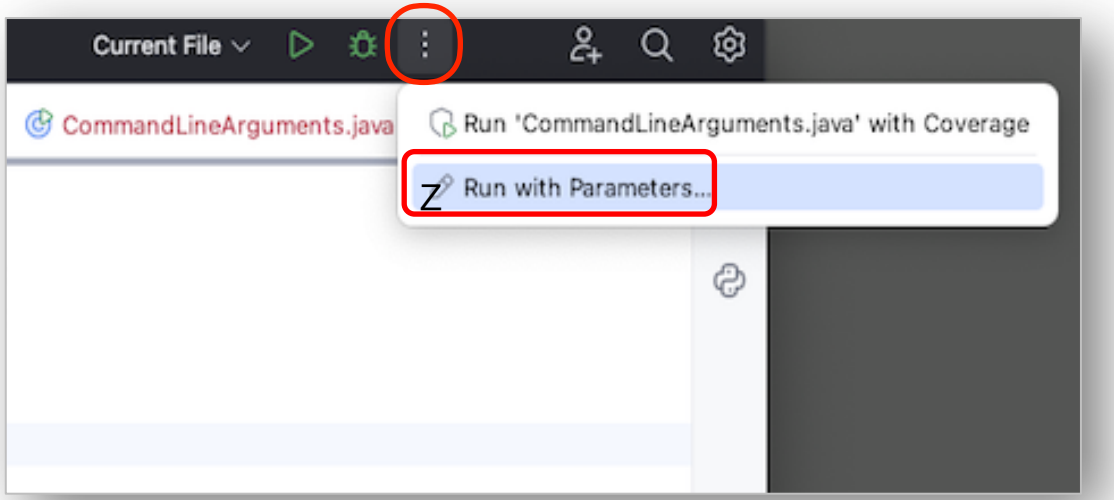
- An array of strings passed as a parameter to the main method.

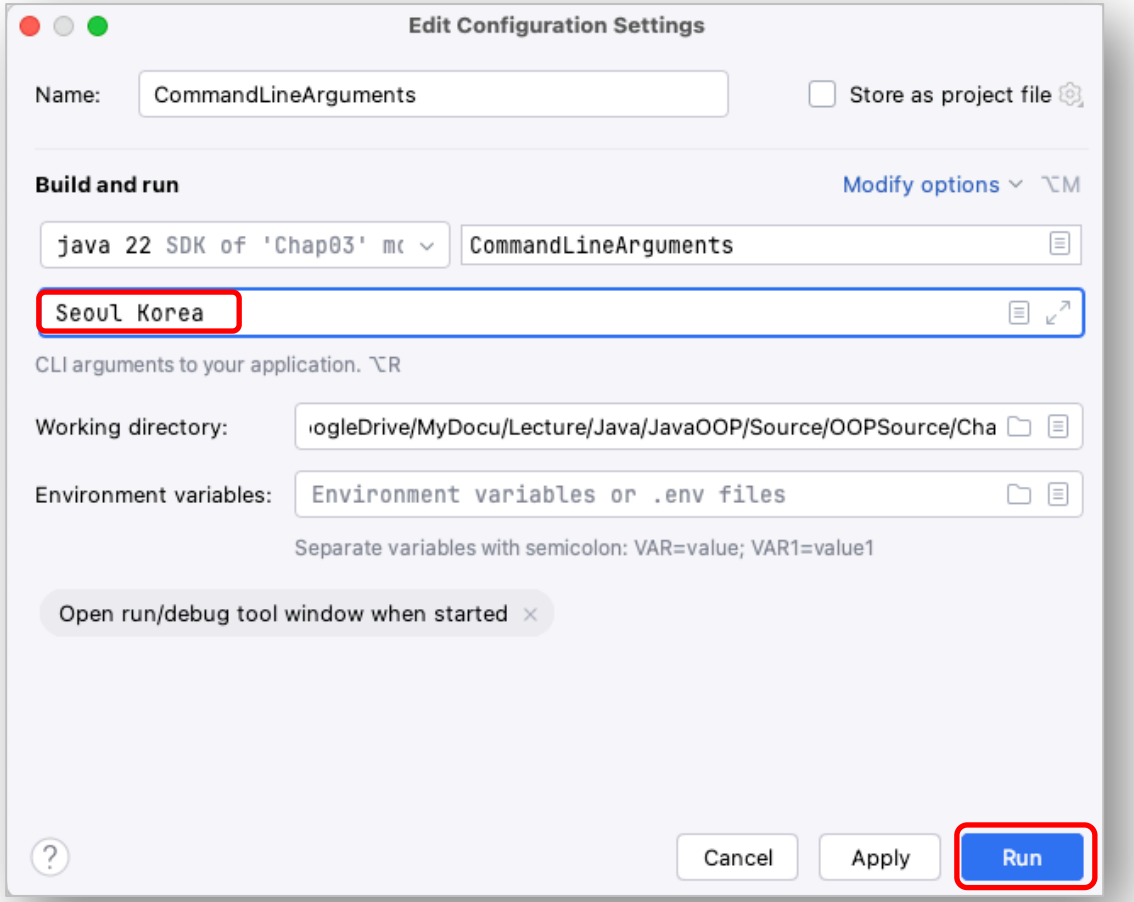
```
public class CommandLineArguments {
    public static void main(String[] args) {
        System.out.println("args[0] = " + args[0]);
        System.out.println("args[1] = " + args[1]);
    }
}
```

- If we try to run the program, exception occurs:

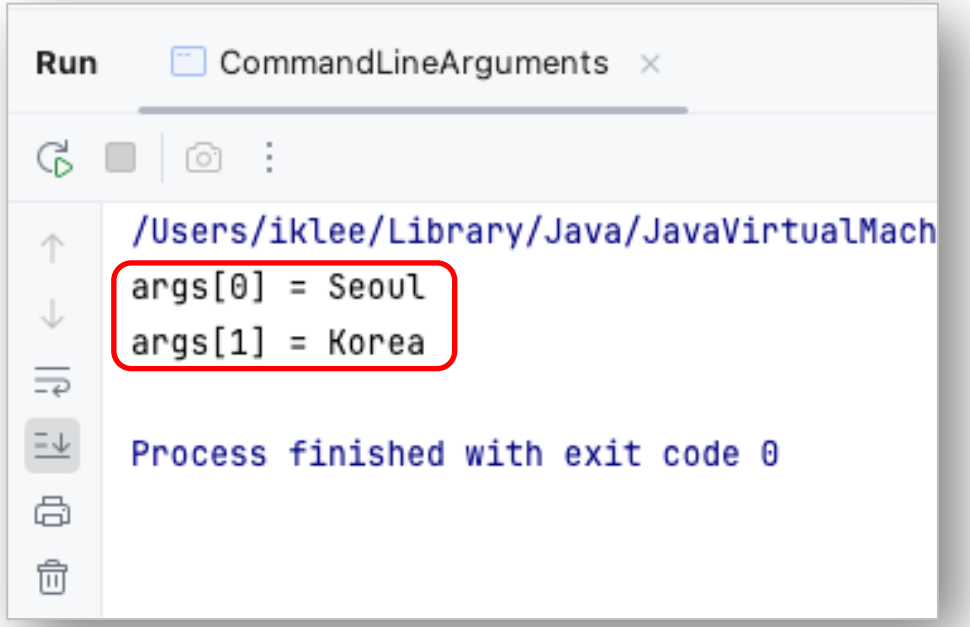
```
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 0 out of bounds for length 0
        at CommandLineArguments.main(CommandLineArguments.java:3)
```

Command Line Arguments (2/3)





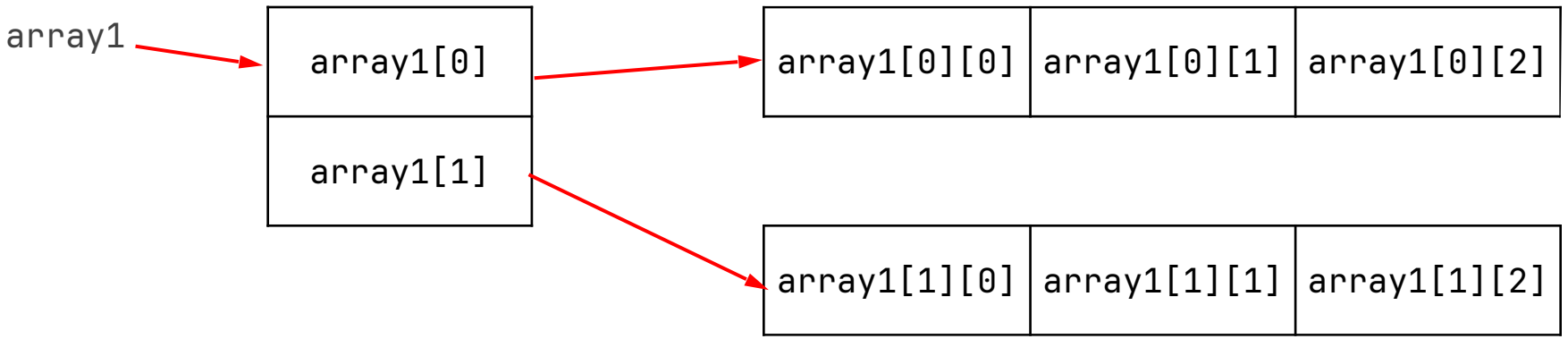
Command Line Arguments (3/3)



Multidimensional Array (1/2)

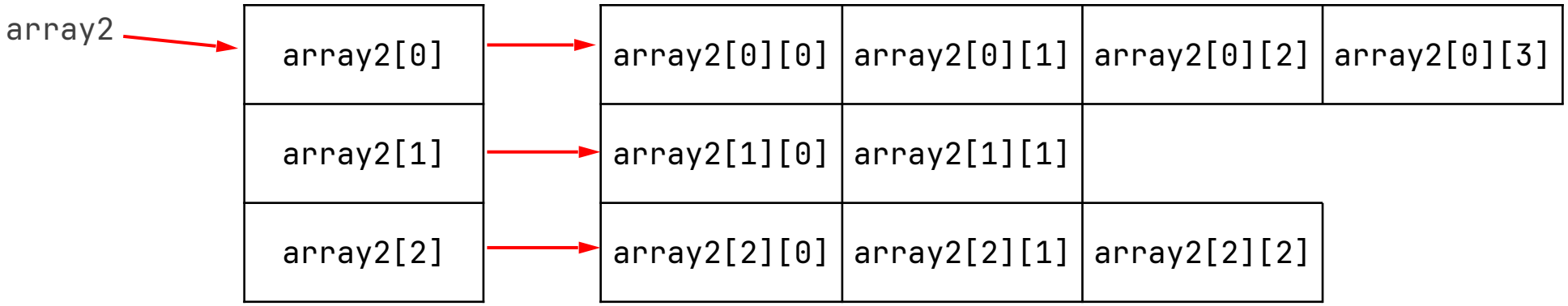
```java
public class MultiDArray1 {
    public static void main(String[] argv) {
        int[][] array1 = new int[2][3];

        for (int i = 0; i < array1.length; i++) // fill the array1
            for (int j = 0; j < array1[i].length; j++) {
                array1[i][j] = i + j;
            }
```

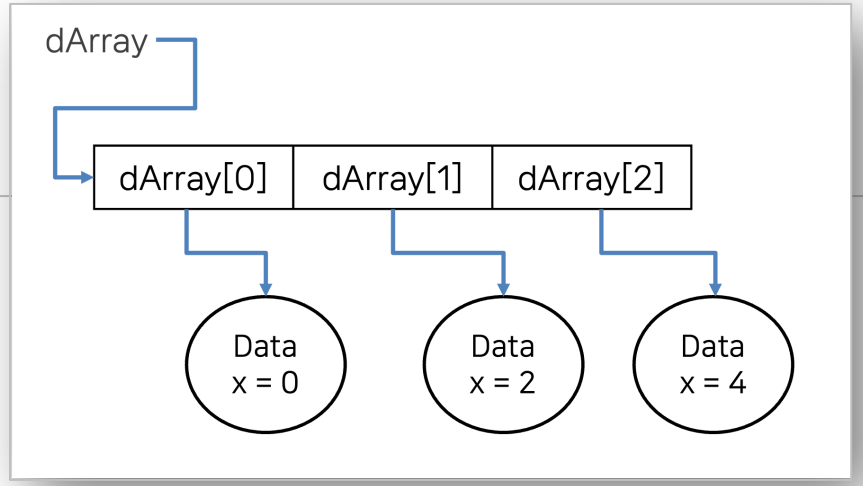


Multidimensional Array (2/2)

```
int[][] array2 = {{1, 2, 3, 4}, {5, 6}, {7, 8, 9}};
```



Array of Objects




```
class Data {
    int x;
}

public class ArrayOfObjects {
    public static void main(String[] argc) {
        Data[] dArray = new Data[3];  // array of class object 'Data'
        for (int i = 0; i < dArray.length; i++) {
            dArray[i] = new Data();   // each object dArray[i] should be created
            dArray[i].x = i * 2;      // 0, 2, 4
        }
        for (int i = 0; i < dArray.length; i++) {
            System.out.print(dArray[i].x + " ");    // 0 2 4
        }
    }
}
```

Enumeration Type (1/2)

- A type that stores one of the enumeration constants

```
enum Day {
    SUNDAY,
    MONDAY,
    TUESDAY,
    WEDNESDAY,
    THURSDAY,
    FRIDAY,
    SATURDAY
}
```

```
public class DayEnumDemo {
    public static void main(String[] args) {
        Day today = Day.WEDNESDAY;
        System.out.println("Today is: " + today);
        // Today is: WEDNESDAY
        switch (today) {
            case SATURDAY:
            case SUNDAY:
                System.out.println(today + " is a weekend.");
                break;
            default:
                System.out.println(today + " is a weekday.");
                break;
        }   // WEDNESDAY is a weekday.
```

Enumeration Type (2/2)

```
        System.out.println("All days of the week:");
        for (Day day : Day.values()) {
            String name = day.name();
            int order = day.ordinal();
            System.out.println(order + ") " + day + " " + name + " ");
        }
        Day theDay = Day.valueOf("FRIDAY");
    }
}
```

```
All days of the week:
0) SUNDAY SUNDAY
1) MONDAY MONDAY
2) TUESDAY TUESDAY
3) WEDNESDAY WEDNESDAY
4) THURSDAY THURSDAY
5) FRIDAY FRIDAY
6) SATURDAY SATURDAY
```