BINUS UNIVERSITY

People
Innovation
Excellence

Course : Object Oriented Programming

Array
Session 3

People
Innovation
Excellence

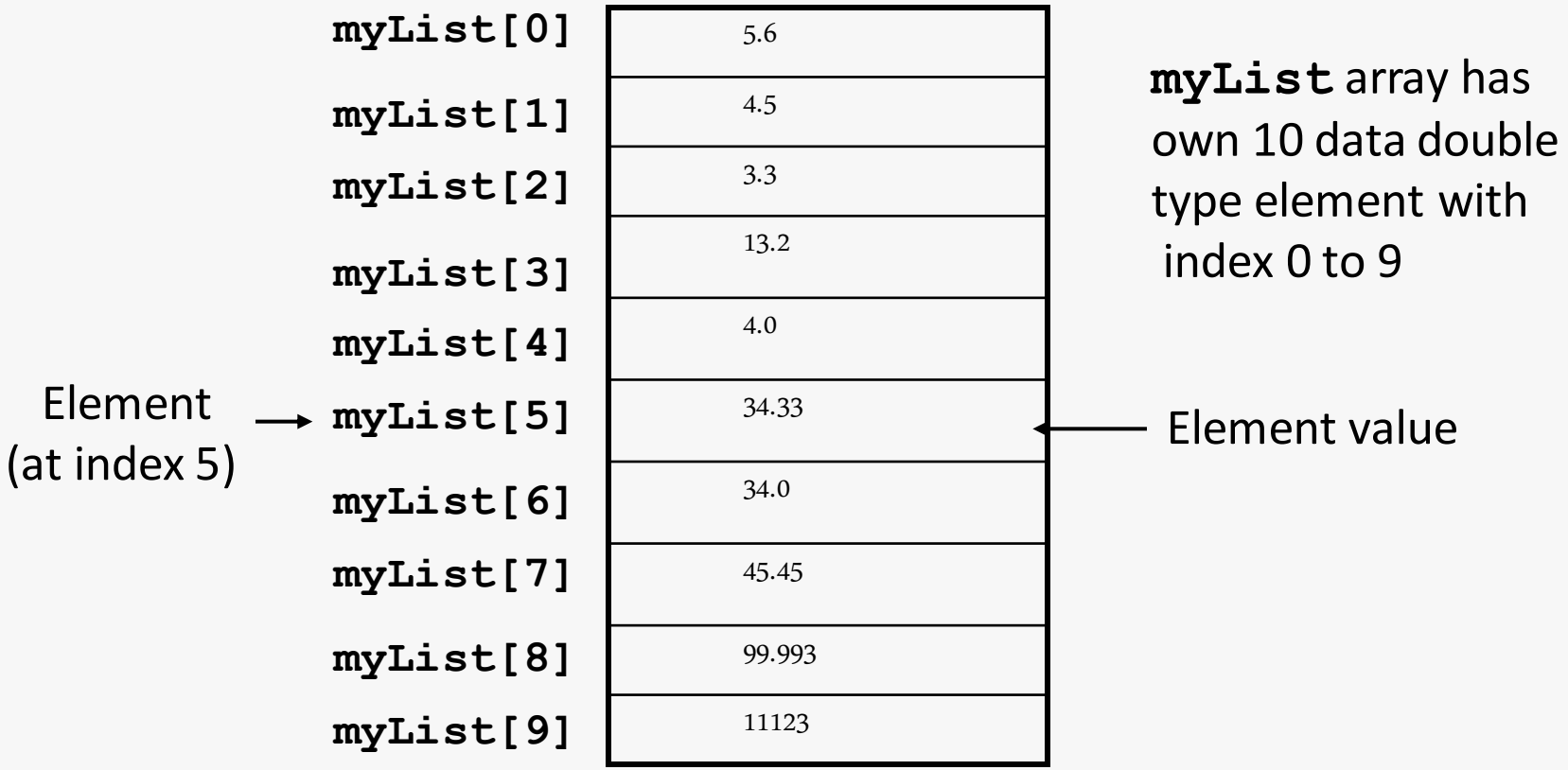
Array Definition

- A group of homogeny data type with fix dimension and sequential.
- Store linear collections of elements.
- Part of data structure.
- Declaration group variable efficiently.
- Access by index.

People
Innovation
Excellence

Array Illustration

```
double[] myList = new double[10];
```



People
Innovation
Excellence

Array Initialization

- Automatic initialization

```
double[] myList = { 1.9, 2.9, 3.0, 3.5 };
```

- Manual initialization

```
double[] mylist2 = new double[2];
mylist2[0] = 1.9;
mylist2[1] = 3.5;
```

- Example of Array data char type:

```
char[] city = {'D','a','l','l','a','s'};
System.out.println(city);
```

- Example of Array for String:

```
String[] name={"Andre", "Bunga", "Christine",
  "Dony"};
System.out.println(name[0]);
System.out.println(name[1]);
```

BINUS UNIVERSITY

People
Innovation
Excellence

Simple Sample of Single Array

```
public class MyArray{
      public static void main(String[] args){
         final int numStd = 4;
         double[] gpa = new double[numStd];
         String[] name = {"Andre", "Bunga", "Christine", "Dony"};

         for(int i=0; i<numStd; i++)
            gpa[i] = 3+((double)i/10);

         System.out.printf("%-10s %4s\n", "Name", "GPA");
         for(int j=0; j<numStd; j++)
            System.out.printf("%-10s %1.2f\n", name[j], gpa[j]);
      }
}
```

```
Name          GPA
Andre        3.00
Bunga        3.10
Christine    3.20
Dony         3.30
```

Processing an Array

- Need looping, because of:
  - Element array has uniform data type can process repeatedly by the same way.
  - Known Array size support looping process.
- Example of biggest number searching:

```
double max = myList[0];
for (int i = 1; i < myList.length; i++) {
    if (myList[i] > max)
        max = myList[i];
}
```

- Example of summarization:

```
double total = 0;
for (int i = 0; i < myList.length; i++) {
    total += myList[i];
}
```

People
Innovation
Excellence

Two Dimensional Array

- Store a matrix or a table.
- For example:

Distance Table (in miles)

	Chicago	Boston	New York	Atlanta	Miami
Chicago	0	983	787	714	1375
Boston	983	0	214	1102	1763
New York	787	214	0	888	1549
Atlanta	714	1102	888	0	661
Miami	1375	1763	1549	661	0

Initializing Two-Dimensional Array

- For Example:

```
int[][] matrix =  { { 1, 2, 3 },
                    { 4, 5, 6 },
                    { 7, 8, 9 },
                    { 10, 11, 12 } };
```

- Will create:

	[0]	[1]	[2]
[0]	1	2	3
[1]	4	5	6
[2]	7	8	9
[3]	10	11	12

Orientation [row][column] , thus, matrix[2][1] value 8

People
Innovation
Excellence

Sample of Processing Two-Dimensional Array

- Process array 2 dimension (example all value summation)

```
public class Array2D{
    public static void main(String[] args){
        int [][] array = {{1,2,3}, {4,5,6}, {7,8,9}, {10,11,12}};
        int total = 0;

        for(int row=0; row<4; row++){
            for(int col=0; col<3; col++){
                System.out.printf("%3d", array[row][col]);
                total += array[row][col];
            }
            System.out.println();
        }
        System.out.println(" Total " + total);
    }
}
```

```
 1  2  3
 4  5  6
 7  8  9
10 11 12
Total 78
```

People
Innovation
Excellence

BINUS UNIVERSITY

People
Innovation
Excellence

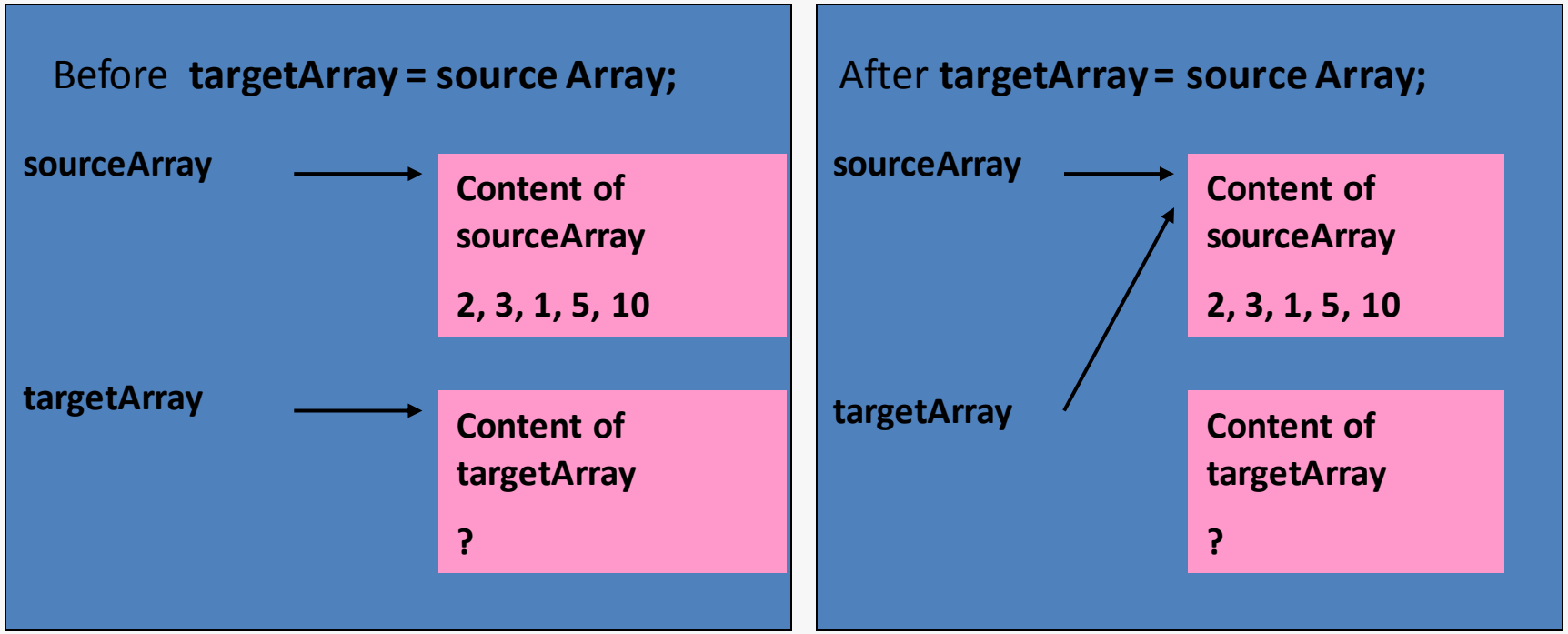
Array Duplication (Incorrect Way)

- Duplicate content of array to another array.
- Incorrect way:

```
int[] sourceArray = { 2, 3, 1, 5, 10 };
int[] targetArray;
targetArray = sourceArray;
```

People
Innovation
Excellence

Array Duplication (Incorrect Way) Cont'



People
Innovation
Excellence

Array Duplication (Correct Way)

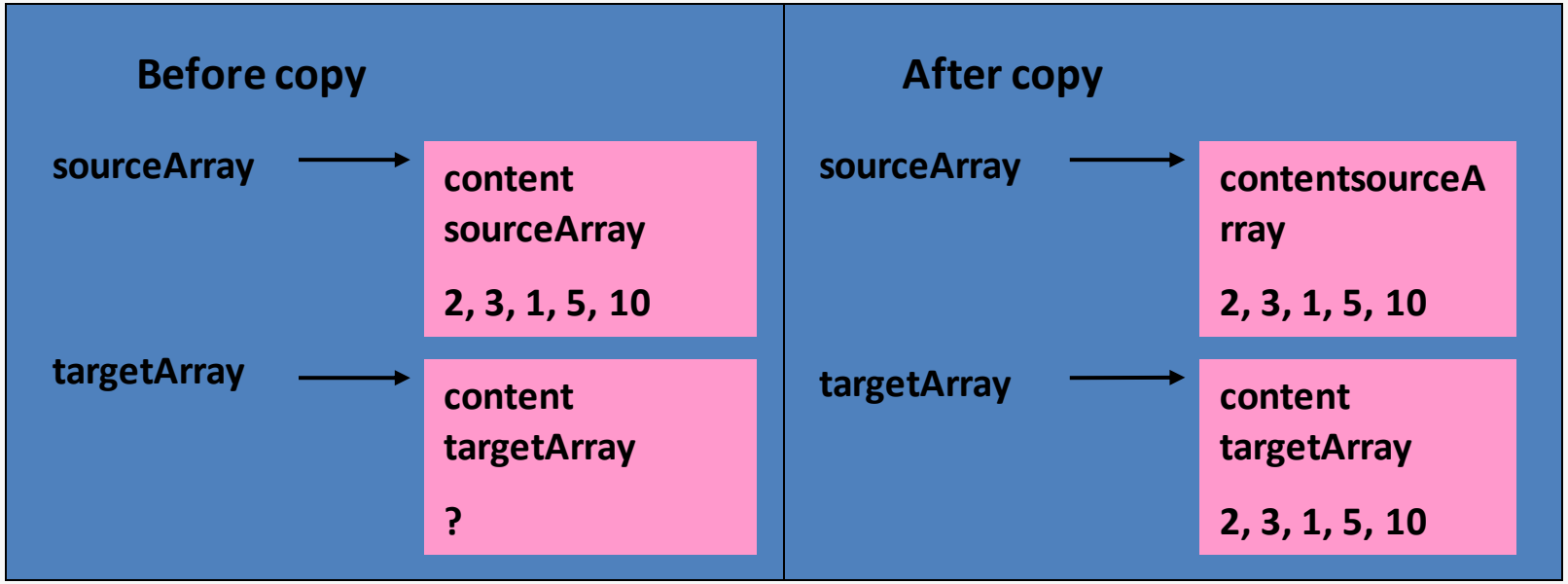
- Correct way:
  - Using looping
  - Using arraycopy from System
  - Using clone
- Example of using looping:

```
int[] sourceArray = { 2, 3, 1, 5, 10 };
int[] targetArray = new int[5];

for (int i = 0; i < 5; i++)
    targetArray[i] = sourceArray[i];
```

People
Innovation
Excellence

Correct Way of Duplicating Array Illustration



- **arraycopy** not allocated memory automatically.
- **arraycopy** against names convention, should be **arrayCopy.**

BINUS UNIVERSITY

People
Innovation
Excellence

Did You Know?

- Maximum value for array dimension
  - 2GB – 1 → (2 * 1024 * 1024 * 1024) – 1 → 2147483648 – 1 → 2147483647
  - So array dimension maximum:
    - boolean bool = new boolean[2147483647];
    - int i = new int[2147483647];
    - long l = new long[2147483647];
- Array unitization has default value:
  - boolean → false
  - numeric (byte, int, long, float, double) → 0
  - char → '\x000' (ASCII 0)
  - String → "null"

BINUS UNIVERSITY

People
Innovation
Excellence

Did You Know?

- To know length of array can use array.length
- Example:
  - Array 1 dimension:
  -
```
int[] number = new int[10];
System.out.println("length of  array 1 "
                   + "dimension: "
                   + number.length);
```
  - Array 2 dimension:
  -
```
int[][] table = new int[5][10];
System.out.println("length of  array "
                   + "2 dimension : "
                   +table.length
                   +" x " + table[0].length);
```

```
length of  array 2 dimension : 5 x 10
```