JAVAGURU INTRODUCTION TO JAVA

LESSON 5.2

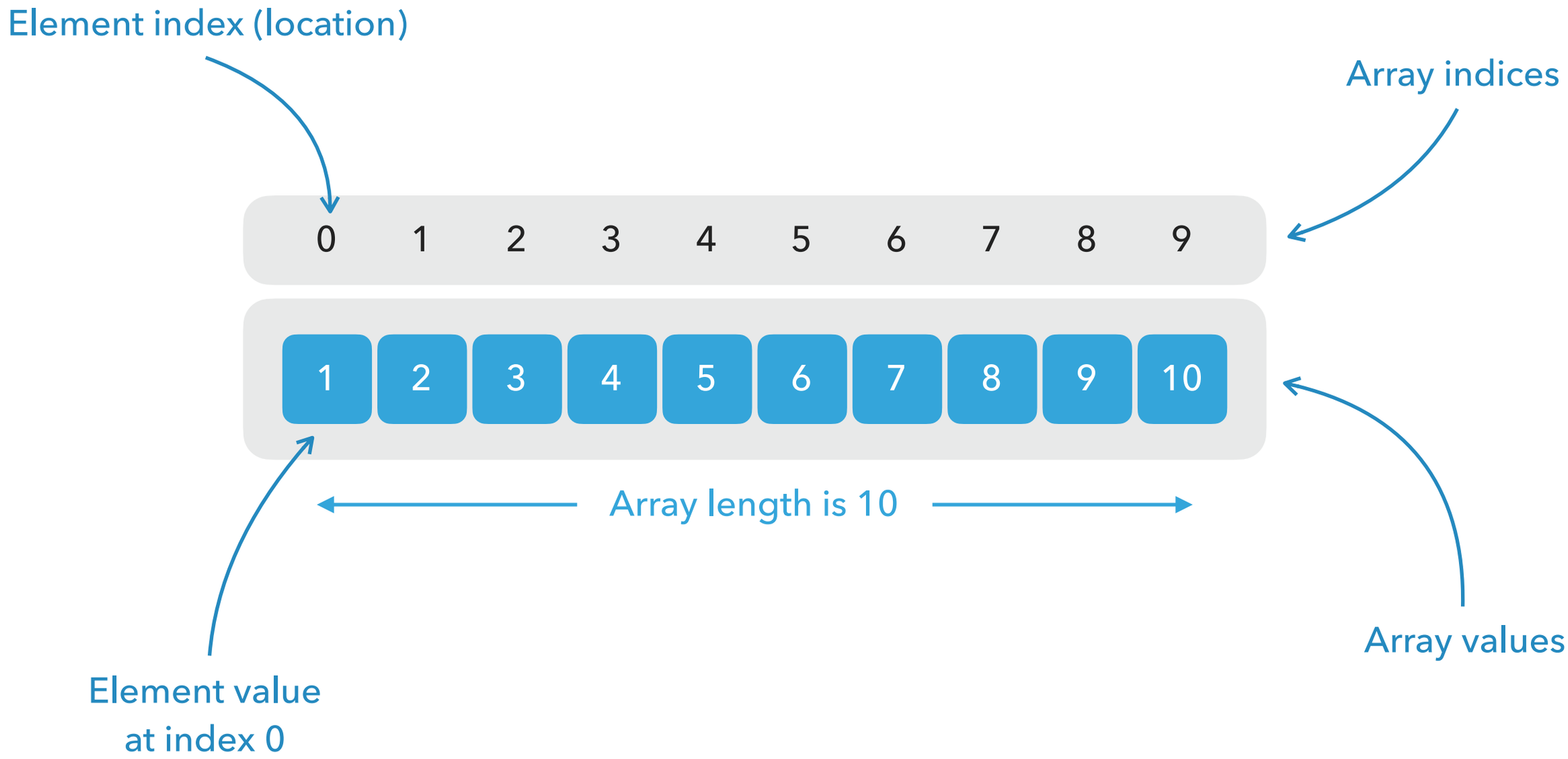
ARRAYS

OVERVIEW

DEFINITION

- An array is a container object that holds a fixed number of values of a single type
- The length of an array is established when the array is created
- After creation, its length is fixed

ARRAYS VISUALISATION



ARRAYS DECLARATION: SYNTAX

- Array declaration without instantiation

```
type[] name;
```

- Array declaration with instantiation

```
type[] name = new type[size];
```

- Array declaration with inline initialization

```
type[] name = {var1,.., varN};
```

ARRAY DECLARATION: INSTANTIATION CODE EXAMPLE

Code

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

leapYears[0] = 2020; leapYears[1] = 2016; leapYears[2] = 2012;
System.out.println("Leap years = " + Arrays.toString(leapYears));
```

Console output

```
Leap years = [2020, 2016, 2012]

Process finished with exit code 0
```

ARRAY DECLARATION: INLINE INITIALIZATION CODE EXAMPLE

Code

```
int[] leapYears = {2020, 2016, 2012};

System.out.println("Leap years = " + Arrays.toString(leapYears));
```

Console output

```
Leap years = [2020, 2016, 2012]

Process finished with exit code 0
```

PROCESSING ARRAYS

WORKING WITH ARRAYS

- When working with arrays, loops are often used because of array iterable nature
- Array contains elements of the single type and size is fixed and known in advance

1. EXAMPLE: PRINTING ARRAY CONTENT

```
public class PrintingArrayDemo {

    public static void main(String[] args) {

        String[] alphabet = new String[5];

        alphabet[0] = "A";
        alphabet[1] = "B";
        alphabet[2] = "C";
        alphabet[3] = "D";
        alphabet[4] = "E";

        for (int i = 0; i < alphabet.length; i++) {
            System.out.println("[" + i + "]: " + alphabet[i]);

        }

    }

}
```

2. EXAMPLE: SUM OF ARRAY ELEMENTS

```
public class SumOfArrayElementsDemo {

    public static void main(String[] args) {

        int[] numbers = {1, 2, 3, 4, 5, 6, 7, 8, 9};
        int sum = 0;

        for (int i = 0; i < numbers.length; i++) {
            sum += numbers[i];
        }

        System.out.println("Sum = " + sum);

    }
}
```

3. EXAMPLE: FIND SMALLEST ELEMENT IN ARRAY

```
public class SmallestArrayElementDemo {

    public static void main(String[] args) {

        int[] numbers = {61, 97, 4, 37, 12};
        int min = numbers[0];

        for (int i = 0; i < numbers.length; i++) {
            if (numbers[i] < min) {
                min = numbers[i];
            }
        }

        System.out.println("min = " + min);

    }

}
```

ADVANCED ITERATION METHODS

FOR EACH (ENHANCED) LOOP: SUMMARY

- For each loop, also known as enhanced loop, is another way to traverse the array
- There is no use of the index or rather the counter variable
- Data type declared in the foreach must match the data type of the array that you are iterating
- Can access only current element
- Significantly reduces amount of code

FOR EACH (ENHANCED) LOOP: SYNTAX

for each loop declaration

```
type[] name = {var1,.., varN};

for (type item : name) {
    statements...
}
```

Iterator specification

Statement(s) that executed inside of the loop body

FOR EACH (ENHANCED) LOOP: CODE EXAMPLE

```
public class ForEachDemo {

    public static void main(String[] args) {

        String[] dogBreeds = {
                "Beagle",
                "Golden Retriever",
                "Pug",
                "Shiba Inu"
        };

        for (String breed : dogBreeds) {
            System.out.println(breed);
        }

    }

}
```

STATIC KEYWORD

OVERVIEW

STATIC KEYWORD OVERVIEW

- The keyword static indicates that the particular member belongs to a type itself, rather than to an instance of that type
- Only one instance of that static member is created which is shared across all instances of class
- Can be applied to the following elements:
  - Fields (variables)
  - Methods
  - Inner methods
  - Static code block

STATIC FIELDS

- Exactly a single copy of static field is created and shared among instances of that class
- No matter how many times class is initialized.. Always single copy of static field

1. STATIC FIELDS CODE EXAMPLE: MESSAGE CLASS

```
public class Message {

    public static int instancesCreated = 0;
    private String text;

    public Message(String text) {
        this.text = text;

        System.out.println("Creating message = '" + text + "'");
        instancesCreated++;
    }

}
```

2. STATIC FIELDS CODE EXAMPLE: MESSAGE CLASS

Code

```
System.out.println("Created = " + Message.instancesCreated);
Message greeting = new Message("Hi!");
Message question = new Message("How are you?");
Message farewell = new Message("Goodbye!");
System.out.println("Created = " + Message.instancesCreated);
```

Console output

```
Created = 0
Creating message = 'Hi!'
Creating message = 'How are you?'
Creating message = 'Goodbye!'
Created = 3
```

REASONS TO USE STATIC FIELDS

- When the value of variable is independent of objects
- When the value is supposed to be shared across all objects

KEY POINTS TO REMEMBER

- Since static fields belong to a class, they can be accessed directly using class name and don't need any object reference
- Static variables can only be declared at the class level
- Static fields can be accessed without object initialization
- Although static field can be accessed through reference, access via class name is preferred

STATIC METHODS

- Also belong to a class instead of the object
- Can be called without creating the object of the class in which they reside
- Generally used to perform an operation that is not dependent upon instance creation
- Widely used to create utility classes so that they can be obtained without creating a new object of these classes

1. STATIC METHODS CODE EXAMPLE: MATHS CLASS

```
public class QuickMaths {

    public static int min(int[] numbers) {
        if (numbers.length == 0) {
            return 0;
        }

        int min = numbers[0];

        for (int number : numbers) {
            if (number < min) {
                min = number;
            }
        }

        return min;
    }

}
```

2. STATIC METHODS CODE EXAMPLE: MATHS CLASS

Code

```
int[] values = {44, 65, 61, 16, 89};

int result = QuickMaths.min(values);

System.out.println("result = " + result);
```

Console output

```
result = 16

Process finished with exit code 0
```

REASONS TO USE STATIC METHODS

- To access or manipulate static variables and other static members that don't depend upon objects
- Widely used in stateless utility classes

KEY POINTS TO REMEMBER

- Static methods cannot be overridden
- Instance methods can directly access both instance methods and instance variables
- Instance methods can directly access both static variables and static methods
- Static methods can access all static variables and other static methods
- Static methods cannot access instance variables and instance methods directly; only via object reference

REFERENCES

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- https://www.baeldung.com/java-static
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