Arrays Recap

Lets recap what we've learned so far about arrays and discuss some of the common errors that occur when using them.

Arrays Recap

- An array is a data structure that allows us to store multiple values of the same type in a single variable.
- The default values of numeric array elements are set to zero.
- Arrays are zero-indexed, so an array with n elements is indexed from 0 to n - 1. For example, 10 elements would have the index range from 0 through 9.
- If we try to access an index that is out of range, Java will give us an **ArrayIndexOutOfBoundsException**, which indicates that the index is out of range, in other words, out of bounds.
- To access array elements, we use square braces. This is also known as the array access operator.

Arrays Recap - Creating a New Array

```
int[] array = new int[5];
```

This array contains the elements from array[0] through array[4].

It has 5 elements and an index range from 0 to 4.

The new keyword is used to create the array and initialize the array elements to their default values.

In this example, all the array elements will default to zero because it is an int array.

For boolean arrays, elements would be initialized to false.

If you use String or other objects, they would be set to a null reference.

Arrays Recap - Creating a new Array

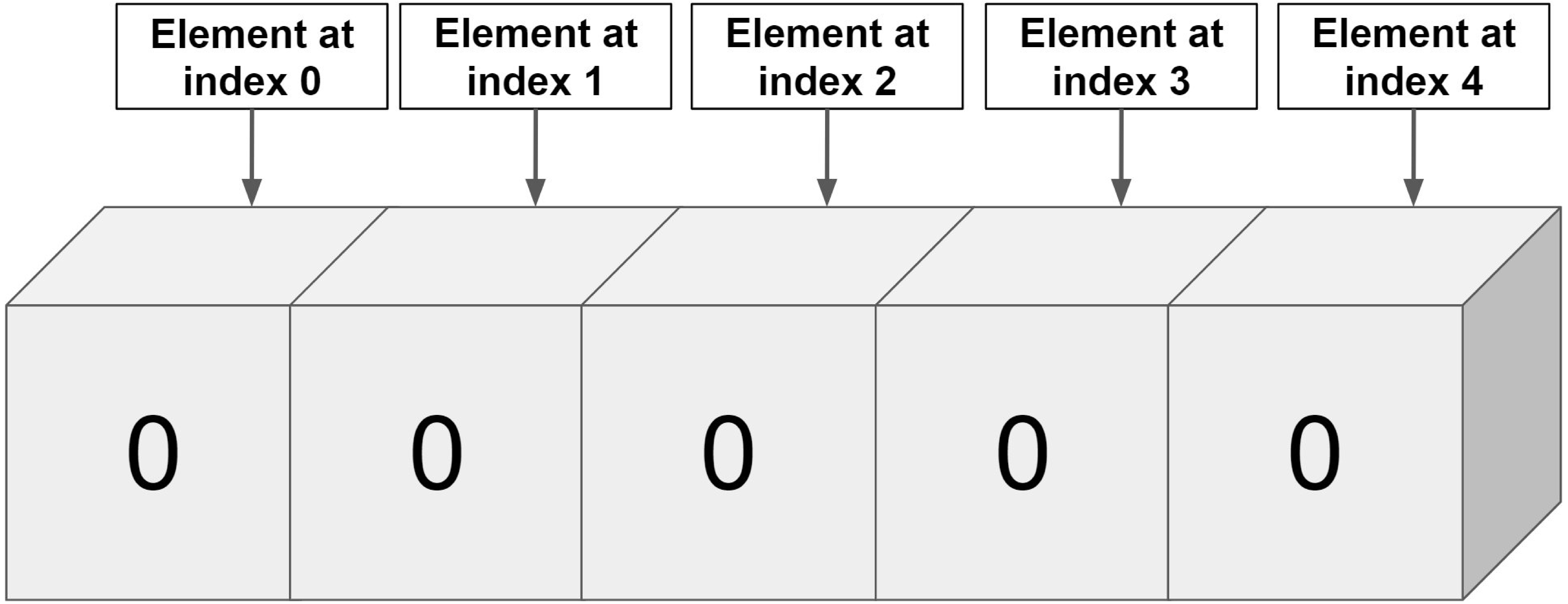
We can also initialize an array inline using an array initializer block, as shown here.

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

I define the values for the array in curly braces, in the order I want them assigned, each value separated by a comma.

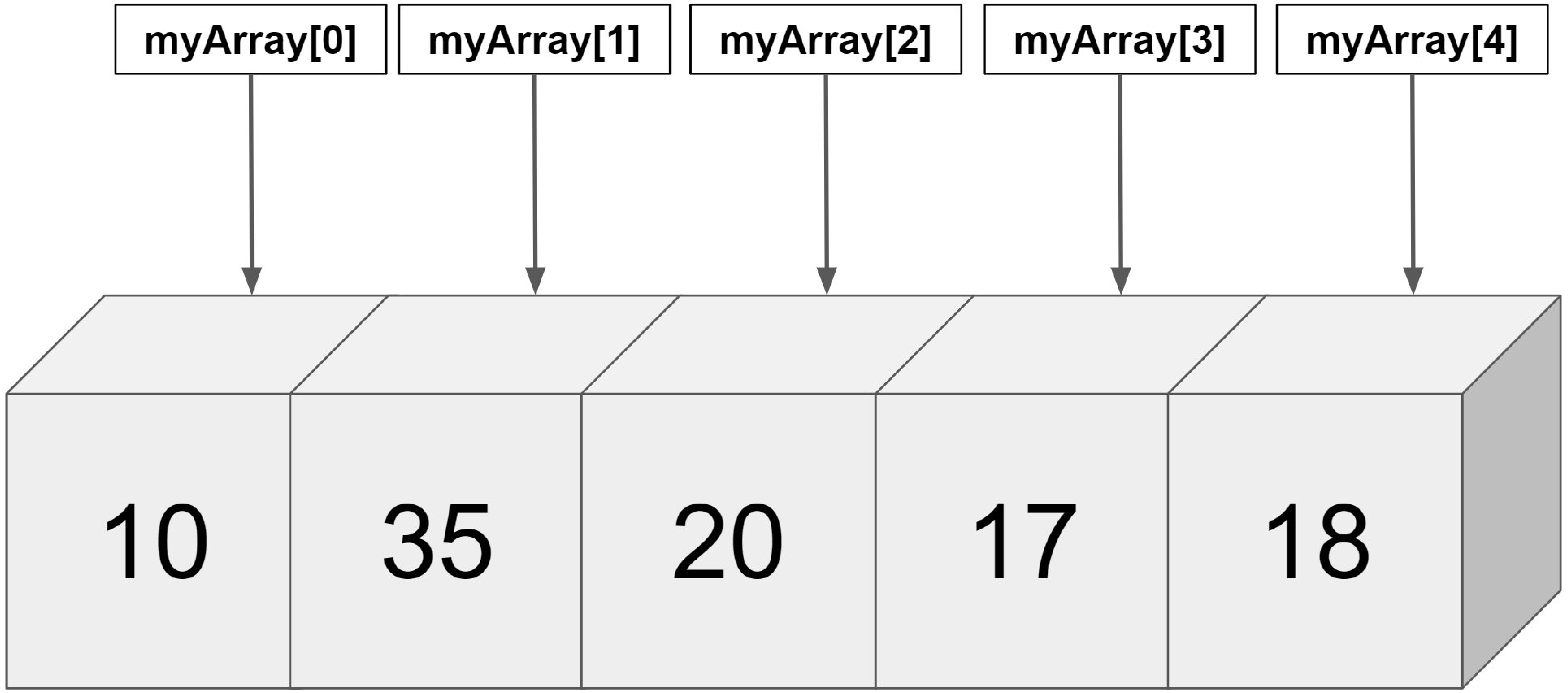
Arrays Recap

```java
int[] myArray = new int[5];
```



Arrays Recap

```java
int[] myArray = {10, 35, 20, 17, 18};
```



First Common Error

```
int[] myArray = {10, 35, 20, 17, 18};
myArray[5] = 55;      // out of bounds
```

- Accessing index out of range will cause error in other words **ArrayIndexOutOfBoundsException**
- We have **5 elements and index range is 0 to 4**

Element at index -1
out of bounds
Element at index 0
Element at index 4
Element at index 5
out of bounds
10
35
20
17
18

Second Common Error

```java
int[] myArray = {10, 35, 20, 17, 18};

for (int i = 1; i < myArray.length; i++) {
    System.out.println("value = " + myArray[i]);
}
```

OUTPUT:

```
value= 35
value= 20
value= 17
value= 18
```

Third Common Error

```java
int[] myArray = {10, 35, 20, 17, 18};

for (int i = 0; i <= myArray.length; i++) {
    System.out.println("value = " + myArray[i]);
}
```

OUTPUT:

```
value = 10        // printed when i = 0        -> condition 0 <= 5 is true
value = 35        // printed when i = 1        -> condition 1 <= 5 is true
value = 20        // printed when i = 2        -> condition 2 <= 5 is true
value = 17        // printed when i = 3        -> condition 3 <= 5 is true
value = 18        // printed when i = 4        -> condition 4 <= 5 is true
ArrayIndexOutOfBoundsException when i = 5 since condition 5 <= 5 is true
```

Third Common Error

```
int[] myArray = {10, 35, 20, 17, 18};

for (int i = 0; i < myArray.length; i++) {
    System.out.println("value = " + myArray[i]);
}
```

OUTPUT:

```
value = 10      // printed when i = 0      -> condition 0 <= 5 is true
value = 35      // printed when i = 1      -> condition 1 <= 5 is true
value = 20      // printed when i = 2      -> condition 2 <= 5 is true
value = 17      // printed when i = 3      -> condition 3 <= 5 is true
value = 18      // printed when i = 4      -> condition 4 <= 5 is true
```

Use Enhanced For Loop to avoid some of these errors

Use the enhanced for loop if you're looping through elements from first to last, and you want to process them one at a time, and you're not setting or assigning values to elements.

Enhanced For Loop (Preferred for this kind of processing)

```java
int[] myArray = {10, 35, 20, 17, 18};

for (int myInt : myArray) {
    System.out.println("value = " + myInt);
}
```

Traditional For Loop

```java
int[] myArray = {10, 35, 20, 17, 18};

for (int i = 0; i < myArray.length; i++) {
    System.out.println("value = " + myArray[i]);
}
```