
Arrays Part I

In this laboratory session you will:

1. Learn how to declare, create and initialize arrays
2. Learn how to manipulate arrays with loops

One-Dimensional Arrays

In Java, an array is an object that can contain multiple values of the same data type. Each of these values is an element of the array. An array that contains `int` values has data type `int[]`. An array that contains `char` values has data type `char[]`. An array of `char` named `grades` is declared with the statement

```
char[] grades;
```

The statement above merely declares `grades` to be a variable of type `char[]`. It does not create an array nor does it assign a value to `grades`. To create an array and assign that array to the variable `grades`, one uses a statement such as

```
grades = new char[5];
```

which is an assignment statement in which the `new` operator is used to create the array that is then assigned to the variable `grades`. Note that the size of the array is specified within brackets. In particular, the above statement creates an array capable of holding 5 integers. The capacity of an array is called the *length* of the array. That is, the array above is said to have length 5.

The declaration, creation, and assignment of an array can be combined into a single statement such as

```
int[] temperature = new int[24];
```

which declares an array of `int` named `temperature` and assigns to it a new array of `int` that can hold twenty-four `int` values.

Later in the program, individual elements of an array are referenced by the array name followed by the index of the particular element within brackets. As with strings, index values start at 0; that is, the first element has index 0, the second has index 1, and so on. Thus, the array `grades` as defined above is an array of length 5 whose elements are referenced by `grades[0]`, `grades[1]`, `grades[2]`, `grades[3]`, and `grades[4]`. In particular, the statements

```
grades[0] = 'B';
grades[1] = 'C';
```

assign the characters B and C to the first two elements of the array `grades`. Moreover,

```
temperature[23] = temperature[9] + temperature[12];
```

assigns the sum of the tenth and thirteenth elements (at indices 9 and 12 respectively) of `temperature` to the 24th element (at index 23).

The elements of an array can be initialized at the time the array is declared by following the declaration with an `=` symbol and a list of the values to be assigned within braces. Thus,

```
char[] grades = {'B', 'C', 'A', 'C', 'D'}
```

not only establishes an array named `grades` but also assigns the values B, C, A, C, and D to the array's elements. When declaring, creating, and initializing an array in this manner, the length of the array is determined by the number of values listed between the braces.

While an array is an object, there are no existing methods that may be invoked on an array. However, every array has one `public` instance variable named `length` of type `int` that is assigned the length of the array when the array is created. Thus, `grades.length` is 5 and `temperature.length` is 24.

