

# Introduction to Collections (Part 1) Tutorial

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In this tutorial, you'll create and use a **List** collection object from the Java Collections library.

The **List** is an ordered, indexed data structure like an array. What sets it apart from an array is its flexibility. You can add elements to and remove elements from a **List** and not have to worry about the size, unlike an array.

To get started, import the **07-collections-part-1-tutorial** project into Eclipse. You'll write your code in the **src\main\java\com\techelevator\Tutorial.java** file.

In **Tutorial.java**, you'll see some comments where you can type your code for each step.

## Step One: Declare a List

Find the first comment in **Tutorial.java**. You'll add your code after this line:

```
// Step One: Declare a List
```

When creating a new **List**, similarly to an array, you must specify what data type the **List** holds first.

To create an array, you specify the data type like this:

```
String[] nameList;
```

For **Lists**, this is how you specify its data type:

```
List<String> nameList;
```

This specifies the new variable as being able to contain a **List** of **Strings**. But you don't have a list yet. Like arrays, declaring a variable doesn't mean anything was created. You also need to create a new **List**.

Declare this variable and create a new **ArrayList** by putting this line of code after the first comment:

```
List<String> nameList = new ArrayList<String>();
```

Recall what the student book said about *programming to an interface* and **ArrayList** fulfilling **List**'s contract.

This creates a new **ArrayList** of **Strings** and assigns that new **ArrayList** to the **nameList** variable. Now you can work with the **nameList** variable.

## Step Two: Add values to a List

Find the second comment in `Tutorial.java`. You'll add your code after this line:

```
// Step Two: Add values to a List
```

You now have a `List` of `Strings` named `nameList`, but it's empty with a size of 0. You can add elements to it and expand it from its current size. In this step, you'll add the names of some famous programmers to the `List`.

To add an element to the end of the `List`, use the `add()` method of the `List` object. Add these lines after the second comment:

```
nameList.add("Ada");  
nameList.add("Grace");  
nameList.add("Margaret");  
nameList.add("Adele");
```

Each time you call the `add()` method, the `List` takes the element passed to it, and adds it to the end of the `List`. After the series of calls above, the `List` looks like this:

```
[ "Ada", "Grace", "Margaret", "Adele" ]
```

## Step Three: Loop through a List in a for loop

Find the third comment in `Tutorial.java`. You'll add your code after this line:

```
// Step Three: Looping through a List in a for loop
```

You can print out each of these elements using a `for` loop. `List` items are also indexed starting at 0, like arrays.

If you wanted to loop through an array, your `for` loop would look like this:

```
for (int i = 0; i < nameArray.length; i++)
```

When using a `List`, you can find out how many elements it contains with the `size()` method:

```
for (int i = 0; i < nameList.size(); i++) {  
  
}
```

Then within the `for` loop, you can print out each element with its index. Use the `get()` method and the index to access each element, like you would with an array:

```
for (int i = 0; i < nameList.size(); i++) {  
    System.out.println("The name at index " + i + " is " + nameList.get(i));  
}
```

If you run your code now, you'll see the following:

```
The name at index 0 is Ada  
The name at index 1 is Grace  
The name at index 2 is Margaret  
The name at index 3 is Adele
```

## Step Four: Remove an item from a List

Find the fourth comment in `Tutorial.java`. You'll add your code after this line:

```
// Step Four: Remove an item
```

One of the biggest advantages of `Lists` is that you can remove any item from a `List` at any time.

To remove an item from a `List`, you pass the list item to the `remove()` method:

```
nameList.remove("Ada");
```

If you don't know the value of the item, but you know you want to remove an item at a particular location in a `List`, you can use the `remove()` method, passing the index of the item you want removed:

```
nameList.remove(0);
```

Choose **one** of the above methods and place it after the fourth comment. You'll confirm that the item was removed in the next step.

## Step Five: Loop through List in a for-each loop

Find the fifth comment in `Tutorial.java`. You'll add your code after this line:

```
// Step Five: Looping through List in a for-each loop
```

For-each loops aren't limited to Collections objects. You can use them with arrays, too.

One advantage of using the for-each loop is that you don't need to keep track of an index. Instead, the for-each loop assigns the current item to a temporary variable that's available only in the loop.

You define a for-each loop like this:

```
for (String name : nameList) {  
  
}
```

This code means, "for each name in the nameList." It's important to define the temporary variable—`String name` in this case—as having the same data type as the collection.

Now you can print `name` as the loop runs:

```
for (String name : nameList) {  
    System.out.println("Name: " + name);  
}
```

If you run your code again, you'll notice that "Ada", or whichever item you chose, is no longer printed because you removed that value in step four:

```
Name: Grace  
Name: Margaret  
Name: Adele
```

## Summary

After completing this tutorial, you should understand:

- The differences between a `List` and an array.
- The common operations of a `List` and how to use them.
- How to use the for-each loop to iterate through a collection.