

IT 179

Java ArrayList Examples

What will happen when we run this code?

3

```
public static void main(String[] args)
{
    int[] m = new int[3];

    m[0] = 5;
    m[1] = 6;
    m[2] = 4;
    m[3] = 9;

}
```

```
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 3 out of bounds for length 3
    at edu.ilstu.MultiDimArray.main(MultiDimArray.java:54)
```

Question

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- Simple arrays have a **fixed** size (are not **resizable**)
- Which Java class allows us to create **resizable arrays**?

ArrayList

5

- The `ArrayList` **class** is a **resizable** array
- You can **add** and **remove** elements from an `ArrayList` as you want
- `ArrayList` is in the package `java.util`

Syntax

6

```
import java.util.ArrayList;  
// import the ArrayList class
```

```
ArrayList<String> students = new ArrayList<String>();  
// Create an ArrayList object
```

Adding Items

7

```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    System.out.println(students);
}
```

Output: [Noel, Alex, Mark, Victoria, Sophia, Elijah]

Accessing An Item

8

```
students.get(0);  
students.get(2);
```

What will happen when you run this?

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```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    System.out.println(students.get(6));
}
```


What will happen when you run this?

10

```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    System.out.println(students.get(6));
}
```

```
Exception in thread "main" java.lang.IndexOutOfBoundsException: Index 6 out of bounds for length 6
    at java.base/jdk.internal.util.Preconditions.outOfBounds(Preconditions.java:64)
    at java.base/jdk.internal.util.Preconditions.outOfBoundsCheckIndex(Preconditions.java:70)
    at java.base/jdk.internal.util.Preconditions.checkIndex(Preconditions.java:248)
    at java.base/java.util.Objects.checkIndex(Objects.java:372)
    at java.base/java.util.ArrayList.get(ArrayList.java:459)
    at edu.ilstu.Main.main(Main.java:22)
```

Updating an Item

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```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    students.set(2, "Emma");
    System.out.println(students);
}
```

Output: [Noel, Alex, Emma, Victoria, Sophia, Elijah]

Removing Items

12

- Removing 4th Item (actually fifth since we start at 0)

```
students.remove(4);
```

- Removing ALL Items

```
students.clear();
```

ArrayList Size

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```
students.size()
```

Loop Through an ArrayList (1)

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```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    students.set(2, "Emma");

    for (int i = 0; i < students.size(); i++)
        System.out.println(students.get(i));
}
```

Output:

Noel
Alex
Emma
Victoria
Sophia
Elijah

Loop Through an ArrayList (2)

15

```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    students.set(2, "Emma");
    for (String s : students)
        System.out.println(s);
}
```

Output:

Noel
Alex
Emma
Victoria
Sophia
Elijah

Loop Through an ArrayList (3)

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```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    students.set(2, "Emma");
    students.forEach((s) -> System.out.println(s));
}
```

Output:

Noel
Alex
Emma
Victoria
Sophia
Elijah

Quiz – What will this do?

17

```
public static void main(String[] args) {  
    ArrayList<String> students = new ArrayList<String>();  
    students.add("Noel");  
    students.add("Alex");  
    students.add("Mark");  
    students.add("Victoria");  
    students.add("Sophia");  
    students.add("Elijah");  
    for (int i = 0; i < students.size(); i++) {  
        System.out.println(students.get(i));  
    }  
}
```

Noel
Alex
Mark
Victoria
Sophia
Elijah

Quiz – What will this do?

18

```
public static void main(String[] args)
{
    ArrayList<String> students = new ArrayList<String>();
    students.add("Noel");
    students.add("Alex");
    students.add("Mark");
    students.add("Victoria");
    students.add("Sophia");
    students.add("Elijah");
    for (int i = 0; i < students.size(); i++) {
        System.out.println(students.get(i));
        students.remove(i);
    }
}
```

Noel
Mark
Sophia

Quiz – What will this do?

19

```
public static void main(String[] args) {  
    ArrayList<String> students = new ArrayList<String>();  
    students.add("Noel");  
    students.add("Alex");  
    students.add("Mark");  
    students.add("Victoria");  
    students.add("Sophia");  
    students.add("Elijah");  
    for (int i = 0; i < students.size(); i++) {  
        students.remove(i);  
        System.out.println(students.get(i));  
    }  
}
```

Alex
Victoria
Elijah

Quiz – What will this do?

20

```
public static void main(String[] args) {  
    ArrayList<String> students = new ArrayList<String>();  
    students.add("Noel");  
    students.add("Alex");  
    students.add("Mark");  
    students.add("Victoria");  
    students.add("Sophia");  
    students.add("Elijah");  
    for (int i = 0; i < students.size(); i++) {  
        students.remove(i);  
        System.out.println(students.get(i));  
        students.remove(i);  
    }  
}
```

Alex
Sophia

Sort An ArrayList

21

```
import java.util.ArrayList;
import java.util.Collections;
public class Main {
    public static void main(String[] args) {
        ArrayList<String> students = new ArrayList<String>();
        students.add("Noel");
        students.add("Alex");
        students.add("Mark");
        students.add("Victoria");
        students.add("Sophia");
        students.add("Elijah");
        Collections.sort(students);
        for (String i : students)
            System.out.println(i);
    }
}
```

Alex
Elijah
Mark
Noel
Sophia
Victoria

Exercise 1

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- Using `forEach()`, write code to create a new `ArrayList` `lengths` from the `ArrayList` `students` where `lengths` contains the lengths of the elements of the `ArrayList` `students`.

Noel
Alex
Mark
Victoria
Sophia
Elijah

`students`



4
4
4
8
6
6

`lengths`

```
#students.forEach((s)->System.out.println(s.length()));
```