# *Programming III (420-B31-HR)*

# *Lab 6 –Introduction to Collections and Iterators; for-each loop*

Date assigned: Tuesday, September 27, 2016

\*This is a 2 hour lab, preceded by a two hour lecture

**Objectives:**

Learn to

1. use the **BasicCollection** class.
2. practise designing test cases.
3. use an Iterator to traverse a list;
4. use the Java for-each construct;

**Reference:** Notes from class: *Collections*

**To Start:**

1. Copy the **B31\_L06\_Iterators** folder from Moodle. Rename it to ***username*\_B31\_L06\_Iterators**.
2. Rename **B31\_L06\_Answers.doc** to ***username*\_B31\_L06\_Answers.doc**.
3. Start **Eclipse** and use your **420-B31\Labs** folder as your workspace.
4. Create a new **Java Project** called ***username*\_ B31\_L06\_Iterators**. Add Junit4 to your build path.

**To be handed in:**

1. Your ***username*\_ B31\_L06\_Iterators** folder should be zipped and uploaded to **Moodle**.

# Testing Review

**Objectives:** Practise writing test cases and using JUnit to test.

**To Do:**

## To ensure you understand how a **BasicCollection** works, fill in the blank entries for the table in ***username\_*B31\_L06\_Answers.doc**. Refer to your notes from class where we did a similar exercise. Complete your answer in the space provided in ***username\_*B31\_L06\_Answers.doc**

## Prepare a test case for the containsAll() method. The **boolean containsAll(Collection <?> c)** method returns true if this collection contains all of the elements in the collection c. The first test case has been completed for you and the first steps of four more test cases have been done. Complete test cases 2-5 in your ***username\_*B31\_L06\_Answers.doc** file.

# Iterators

**Objectives:** Learn to use an **Iterator** to traverse a list.

**To Do:**

## Create a new class containing a **main()** method in the **B31\_L06\_basic\_collection** package. Call the class **MyFavouriteThings**. Create a **BasicCollection** of **Strings** called **myFavouriteThings** containing the names of 7 of your favourite things.

## Create an **Iterator** for the **myFavouriteThings** collection and print all the things in the collection.

## Run your program to make sure that it is working.

## Open the **MyBasicList** class. It contains a stub method for the **countOccurrences()** method. The **countOccurrences()** method is passed a **Collection**, counts the number of times each of the items in the collection occurs in the collection and stores the count in a **Collection** of Integers. We are going to use two iterators to count the number of times each item occurs in the **Collection**. The algorithm for the method follows.

## A junit TestCase has been written to test the **countOccurrences()** method using a collection with no duplicates, a collection with one item that occurs more than once and a collection with the same value for all the items. Run **MyBasicListTest** to test your method.

**Loop Algorithm**

1. Declare and initialize a **Collection** of **Integer**s called **counts**.
2. Initialize the first **Iterator** (**iter1**) to an **Iterator** for the **c** collection.
3. Loop while there are more elements in **c** pointed to by **iter1**
   1. Get the next element in **c** using iter1 and store it in a String (**string1**).
   2. Initialize **count** to 0
   3. Initialize the second **Iterator** (**iter2**) to an **Iterator** for the **c** collection.
   4. Loop while there are more elements in **c** pointed to by **iter2**
      1. If **string1** = the next element pointed to by **iter2**, increment **count**
   5. End loop
   6. add **count** to the **counts** collection.
4. End loop
5. Return **counts**

# The for-each Loop Construct

**Objectives:** Learn to use the Java for-each loop construct.

**To Do:**

## Open **LoopDeLoop.java**. It creates an array of **Animal** objects and loops through the array displaying each one. Run it.

## Add a second loop to display the array using the for-each construct. Put the loop after the appropriate comment. Refer to the PowerPoint lecture for chapter 4 in Moodle for the format.

## Add a **BasicCollection** of **Animal** objects called **animals** where indicated by the comment. Add the animals from the array to the collection using a for-each loop.

## Use the for-each construct to display each of the elements in the list.

## Run your program to test your changes.

**Marking Scheme**

|  |  |  |
| --- | --- | --- |
| **Question** | **Marks** | **Out of** |
| A1 – Basic Collection Review |  | 20 |
| A2 – Test Case for containsAll() |  | 13 |
| B1 – MyFavouriteThings |  | 9 |
| B1 – MyBasicList |  | 16 |
| C - LoopDeLoop |  | 8 |
| **Total** |  | **66** |