



Northeastern
University

Lecture 10: Bag Implementations that Use Arrays - 2

Prof. Chen-Hsiang (Jones) Yu, Ph.D.
College of Engineering

Materials are edited by Prof. Jones Yu from

Data Structures and Abstractions with Java, 5th edition. By Frank M. Carrano and Timothy M. Henry.
ISBN-13 978-0-13-483169-5 © 2019 Pearson Education, Inc.

Making the Implementation Secure

Making the Implementation Secure

```
/** Adds a new entry to this bag.
 * @param newEntry The object to be added as a new entry.
 * @return True if the addition is successful, or false if not. */
public boolean add(T newEntry)
{
    checkIntegrity();
    boolean result = true;
    if (isArrayFull())
    {
        result = false;
    }
    else
    {
        // Assertion: result is true here
        bag[numberOfEntries] = newEntry;
        numberOfEntries++;
    } // end if

    return result;
} // end add
```

Revise the method **add**

Incomplete Methods - Stubs

```
/** Removes one unspecified entry from this bag, if possible.
 *  @return Either the removed entry, if the removal
 *          was successful, or null */
public T remove()
{
    return null; // STUB
} // end remove

/** Removes one occurrence of a given entry from this bag.
 *  @param anEntry The entry to be removed
 *  @return True if the removal was successful, or false otherwise */
public boolean remove(T anEntry)
{
    return false; // STUB
} // end remove

/** Removes all entries from this bag. */
public void clear()
{
    // STUB
} // end clear
```

Stubs for **remove** and **clear**

Testing the Core Methods

```
/** A test of the constructors and the methods add and toArray,
   as defined in the first draft of the class ArrayBag.*/
public class ArrayBagDemo1
{
    public static void main(String[] args)
    {
        // Adding to an initially empty bag with sufficient capacity
        System.out.println("Testing an initially empty bag with " +
                           "sufficient capacity:");
        BagInterface<String> aBag = new ArrayBag<>();
        String[] contentsOfBag1 = {"A", "A", "B", "A", "C", "A"};
        testAdd(aBag, contentsOfBag1);

        // Filling an initially empty bag to capacity
        System.out.println("\nTesting an initially empty bag that " +
                           "will be filled to capacity:");
        aBag = new ArrayBag<>(7);
        String[] contentsOfBag2 = {"A", "B", "A", "C", "B", "C", "D",
                                  "another string"};
        testAdd(aBag, contentsOfBag2);
    } // end main
```

Listing 2-2: A program that tests core methods of the class **ArrayBag**

Testing the Core Methods

```
// Tests the method add.
private static void testAdd(BagInterface<String> aBag, String[] content)
{
    System.out.print("Adding the following strings to the bag: ");

    for (int index = 0; index < content.length; index++)
    {
        if (aBag.add(content[index]))
            System.out.print(content[index] + " ");
        else
            System.out.print("\nUnable to add " + content[index] +
                           " to the bag.");
    } // end for
    System.out.println();

    displayBag(aBag);
} // end testAdd
```

Listing 2-2: A program that tests core methods of the class [ArrayBag](#)

Testing the Core Methods

```
// Tests the method toArray while displaying the bag.
private static void displayBag(BagInterface<String> aBag)
{
    System.out.println("The bag contains the following string(s):");
    Object[] bagArray = aBag.toArray();

    for (int index = 0; index < bagArray.length; index++)
    {
        System.out.print(bagArray[index] + " ");
    } // end for

    System.out.println();
} // end displayBag
} // end ArrayBagDemo1
```

Listing 2-2: A program that tests core methods of the class `ArrayBag`

Testing the Core Methods

Output

Testing an initially empty bag with sufficient capacity:

Adding the following 6 strings to the bag: A A B A C A

The bag contains the following string(s):

A A B A C A

Testing an initially empty bag that will be filled to capacity:

Adding the following 8 strings to the bag: A B A C B C D

Unable to add another string to the bag.

The bag contains the following string(s):

A B A C B C D

Listing 2-2: A program that tests core methods of the class **ArrayBag**

Question

- Download [L10_E1](#) from “[In-class Exercise](#)” on the Brightspace
- Please write a testing program to use [ArrayBag](#) class to add a few heroes to your bag, and implement a method, [display\(\)](#), to print out all heroes in the bag.

myBag contains following heroes:

Tony Stark
Steve Rogers
Bruce Banner
Natasha Romanoff

Expected result

Answer

```
public class MyHeroes {  
  
    public static void main(String[] args) {  
        BagInterface<String> myBag = new ArrayBag<>();  
        myBag.add("Tony Stark");  
        myBag.add("Steve Rogers");  
        myBag.add("Bruce Banner");  
        myBag.add("Natasha Romanoff");  
        display(myBag);  
    }  
  
    public static void display(BagInterface<String> aBag) {  
        System.out.println("myBag contains following heroes:");  
        Object[] bagArray = aBag.toArray();  
        System.out.println(" ");  
  
        for(int index = 0; index < bagArray.length; index++) {  
            System.out.println(bagArray[index]);  
        }  
  
        System.out.println();  
    }  
}
```