CSC 212 Programming Assignment # 0
Warm Up
Due date: 19/09/2019
Mark(bonus):+1. Plagiarism:-1.

Guidelines:	This is an **individual** assignment. This assignment is optional. The assignment must be submitted to **Web-CAT**

The following interface represents a structure that can be split into two structures of type `U`, one containing the first element, and the other containing the remaining elements (see Example 1 below):

```
// Separable structure
public interface Separable<U> {
  // Return the length.
  int length();
  // Return the first element.
  U first();
  // Return all elements except the the first one.
  U rest();
  // Concatenate the two parameters. The current object is not changed.
  U concat(U s1, U s2);
}
```

1. Complete the class `GArray` below by implementing the methods of the interface `Separable`.

```
class GArray<T> implements Separable<GArray<T>> {
  private T[] data;
  @SuppressWarnings("unchecked")
  public GArray(int n) {
    data = (T[]) new Object[n];
  }
  // Return the element at position i
  public T get(int i) {
    return data[i];
  }
  // Set the element at position i
  public void set(int i, T e) {
    data[i] = e;
  }
  @Override
  public int length() {
    return 0; // Change this
  }
  @Override
```

```
  public GArray<T> first() {
    return null; // Change this
  }
  @Override
  public GArray<T> rest() {
    return null; // Change this
  }
  @Override
  public GArray<T> concat(GArray<T> s1, GArray<T> s2) {
    return null; // Change this
  }
}
```

2. Write the class `Utils` that implements the two following methods. You are free to use **recursion**.

```
public class Utils {
  // Return the reverse of s without changing s.
  public static <U extends Separable<U>> U reverse(U s) {
    return null;
  }
  // Return the last part of s without changing s.
  public static <U extends Separable<U>> U last(U s) {
    return null;
  }
}
```

Example 1. *The class `Main` below shows an example of using `GArray` and `Utils`.*

```
public class Main {
  public static void main(String[] args) {
    GArray<Integer> a = new GArray<Integer>(5);
    a.set(0, 1);
    a.set(1, 2);
    a.set(2, 3);
    a.set(3, 4);
    a.set(4, 5);
    print(a.first()); // prints: 1
    print(a.rest());  // prints: 2 3 4 5
    print(a.concat(a.rest(), a.first()));  // prints: 2 3 4 5 1
    print(Utils.reverse(a)); // prints: 5 4 3 2 1
    print(Utils.last(a)); // prints: 5
    print(a); // prints: 1 2 3 4 5
  }
  public static <T> void print(GArray<T> a) {
    for (int i = 0; i < a.length(); i++) {
      System.out.print(a.get(i) + "␣");
    }
    System.out.println();
  }
}
```

1 Deliverable and rules

You must deliver:

1. Source code submission to Web-CAT. You have to upload the following classes in a zipped file:

   - `GArray`
   - `Utils`.

   Notice that you should **not upload**:

   - The interface `Separable`.
   - The class `Main`.

The submission **deadline** is: **19/09/2019**.

You have to read and follow the following rules:

1. The specification given in the assignment (**class and interface names, and method signatures**) must not be modified. Any change to the specification results in compilation errors and consequently the mark zero.

2. All data structures used in this assignment **must be implemented** by the student. The use of Java collections or any other data structures library is strictly forbidden.

3. This is an individual assignment. Sharing code with other students will result in harsh penalties.

4. Posting the code of the assignment or a link to it on public servers, social platforms or any communication media including but not limited to Facebook, Twitter or WhatsApp will result in disciplinary measures against any involved parties.

5. The submitted software will be evaluated automatically using Web-Cat.

6. All submitted code will be automatically checked for similarity, and if plagiarism is confirmed penalties will apply.

7. You may be selected for discussing your code with an examiner at the discretion of the teaching team. If the examiner concludes plagiarism has taken place, penalties will apply.