

Assignment 3: Program – Interfaces and Implementation – 20 pts

This week we'll review how to implement Java Interfaces to enforce the public interface of an Abstract Data Type. We'll also learn about Java generics, which are used to write general data structures that can be applied to any type. Finally, we'll learn how to use the JUnit framework to easily and automatically test our code.

Due Date

Monday 2020/02/17 at 4:00pm

Instructions

Questions below marked with an asterisk (*) are group problems, and are intended to be worked on as a group. You may speak to anyone in class about the problem, ask questions, or help your classmates. However, you must write up and submit your own solution to the problem. All other questions are intended as individual work. You may not discuss them with anyone other than the Instructor or the TA. This includes questioning what the problem means, or what is expected.

Your project this week is required to use the Gradle build system. Instructions on how to set up a new Gradle project in NetBeans will be provided separately during the lab period. Project setup should be treated as a group problem for the purposes of collaborating with other members of the class.

Problems

1. *(2 pts.) Create a Java Interface file that represents a standard Queue ADT. Your Interface should include reasonable methods for a Queue class. Your interface should use Java generics to allow any reference type to be stored in your Queue. Once defined, all students in the class should use a copy of the same Interface in their project. You can simply copy-paste the file to each other.
2. *(3 pts.) Design and implement at least one basic JUnit test for each method of your Interface. You should do this before implementing your Interface. Your unit tests should use a Queue of String objects to perform their test.
3. *(5 pts.) Implement the ListQueue class such that it uses the Java library LinkedList class (i.e., `java.util.LinkedList`) to implement the required methods of the Queue interface.
4. (10 pts.) Implement the ArrayQueue class such that it uses a standard Java array (not an ArrayList or other library type) to implement the required methods of the Queue interface.