

CS220: Lab-9

(Generic Collections)

(Total: 100 points)

Learning Objectives

- Get familiar with using Generic Collections.
- Hands-on practice on creating a List, convert an array to a list, use List methods, Arrays class and Collections class.
- Hands-on practice on implementing polymorphism.

Instructions

Grade List: Write a Java program that generates 25 random integers within the range 0 to 100 (including 0 and 100) as the test grades for 25 students in a class. Store those grades into a LinkedList, and then calculate the sum of the grades, and the floating-point average of the grades. The program should also be able to insert a given grade in the grade list, and then rank the grade in the grade list. The following are the detailed steps to develop this program:

Download “GradeList.java” from assignment in Canvas course site. Open “GradeList.java”,

Step-1[10pts], In the main method, call `getStudentGrade` method, and use the returned array from `getStudentGrade()` method to create a new LinkedList object representing student grade list, use a List reference variable to reference that new LinkedList object. You may use `Arrays.asList()` method to convert an array to a list. In the main method, use that LinkedList object to get and print out all student grades to console.

Step-2[15pts]: Define a method named “`getStudentGrade`”. In that method, generate 25 random integers between 0 and 100 (including 0 and 100) (You may use **`java.util.Random`** class to generate random integers), and return those integers in an array from the method.

Step-3[15pts]: Define a method named “`getTotalGrade`”, which has a List reference variable as a parameter to calculate the sum of student grades from the grade list, and returns that total grade.

Step-4[5pts]: In the main method, call `getTotalGrade` and pass grade list as an argument to the method to calculate sum and average of the grades, and print out total and average grades to console.

Step-5[25pts], Define a method named “`insertAndRankGrade`”, which has a List reference variable as a parameter. In the method, prompt user to enter an integer number between 0 and 100. Add a try and catch block to make sure user enters a numerical value within the specified range. Add user entered integer number into the student grade list, and then use `Collections.sort()` method to sort the grade list, and then use `Collections.binarySearch()` method to find the rank of the grade in the grade list. Return a string that containing inputted grade and its rank.

Step-6[10pts], In the main method, call `insertAndRankGrade` method and print out the result string to console.

Step-7[15pts] Compile and test your program to make sure there is no syntax, logical, or run-time error before submit your assignment files. Create a Testing report file to show at least two testing cases and testing results.

Submit your assignment [5pts]

Submit all your assignment files: **GradeList.java** and **GradeList_TestingReport** in a Word, PDF, or image file to "TakeHome_Lab-9" Assignment drop box. If there are some bugs in the program that you cannot figure out, leave a message in the dropbox or in your program to mention them.

