CIS150 – Programming Project (Fall 2014)

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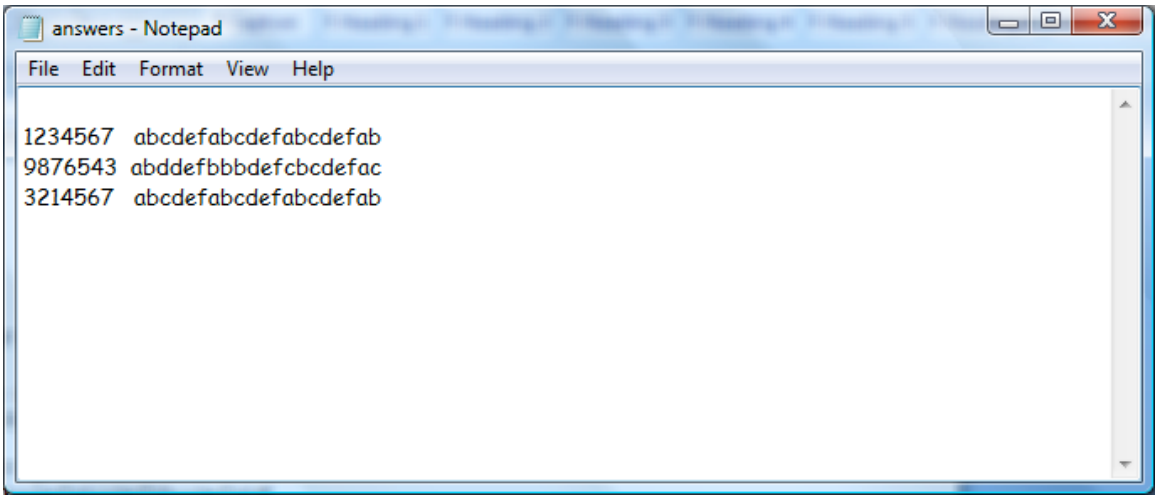
Due date: December 1st, 2014 at 12:00pm
Late submissions are NOT accepted
Project demo: During the lab session on 12/01/2014

You are asked to write a program to grade several multiple-choice exams. The exam has 20 questions, each answered with a letter in the range of 'a' through 'f'.

The answers key is declared in the program as a constant of type string. An example of answer key is "abcdefabcdefabcdefab". Note this is just an example. Your program should work for any other answer key.

The student answers are all stored in a text file named "answers.txt". Each line contains a student ID followed (in the same line) by a string of characters representing the answers of that student. The student ID and answers are separated by one or more spaces. Below is an example of file that contains the ID and answers of 3 students (one per line). Note that your program should work for ANY number of students and ANY answer. Each line corresponds to one student.



For simplicity, we assume that each student answers all the 20 questions. We also assume that for each question, the student answers with a letter in the range a-f.

Your program should also compute a percentile score for each student by comparing the answers for that student to the answers key (declared as a constant in the program), and a curved grade in 'A' though 'F' based on the following:

- >=90 A
- <90 and >=80 B

- <80 and >= 70 C
- <70 and >= 60 D
- <60 and >= 50 E
- <50 F

The results of each student are displayed by the student in the format: percentile score and a curved grade in 'A' though 'F'.

The program should also compute and display the following statistics for the graded answers: Average score, Maximum score, and Minimum score.

Below is an example of output displayed by the program for the file shown in page 1:

```
Student  1:
      ID: 1234567
      Answers: abcdefabcdefabcdefab
      Score: 100%
      Grade: A
Student  2:
      ID: 9876543
      Answers: abddefbbbdefcbcdefac
      Score: 75%
      Grade: B
Student  3:
      ID: 3214567
      Answers: abcdefabcdefabcdefab
      Score: 100%
      Grade: A

A total of 3 student answers have been processed.
Statistics:
      Average Score: 91.66%
      Minimum Score: 75%
      Maximum Score: 100%
```

To provide solutions to this project, you need to deliver ALL the following components on the basis of principles in software engineering.

Component 1: Software System Design

Use the function decomposition method to describe all functions that you will implement in this project. Use arrow lines to indicate the relationship among all functions, and their calling sequence.

Component 2: Software Testing

Design a complete suite of test cases for all possible scenarios in using your program. Summarize your test plan in the following table.

Reason for Test Case	Input Values	Expected Output	Observed Output

Component 3: Software Documentation

Precede each function with the following standard information:

// Purpose: …
// Author: ….
// Creation Date: …
// Last Modification Date: …

Also, Include a comment at the beginning of the program that includes the following information:

// Purpose: …
// Author: ….
// Creation Date: …
// Last Modification Date: …

Component 4: Screen Shots

Create a number of screen shots to demonstrate the running results of your program.

Submission of Your Work You need to prepare a SINGLE MS word document that contains all of your answers to Components 1-4 as well as your source code (by copy-and-paste). Upload the file to Canvas.

Grade Distribution

Demo: 40 points
Source Code: 20 points
Component 1 through 4: 10 points each

Extra Credit (used toward the midterm or final):

1. Display the results in an output file (instead of console): 3 points
2. Read the answer key from a file (instead of declaring it as a constant): 1 point
3. Ask the user to enter the name of the file that contains students' answers: 1 point