Arrays Lab: The Exam App

1   Introduction

In this lab, you will create a Java program that will administrate a multiple-choice exam on the topic of Psychology.

2   Functional Requirements and Design Suggestions

This section provides the desired program functionality (also known as Functional Requirements) and some suggestions on how you could implement them (also known as Code Design).

2.1   Functional Requirement #1:

Requirement: The program shall read the exam questions from a text file.

Code Design: use `File` and `Scanner` classes from Java API.

2.2   Functional Requirement #2

Requirement: The text file shall have the following structure:

a) First line contains the Exam topic.
b) Second line is the minimum percentage of correct answers to pass the exam.
c) The rest of the file contains up to 10 sets of questions (it may vary for other exams) in the following structure:
   - First line of a given question set: The Question itself.
   - Second line of a given question set: The multiple choices separated by the symbol "#".
   - Third line of a given question set: the number of the correct answer of this set.
d) Use the contents of Appendix A at the end of this document as the basis for your exam.

Code Design:

a) Use your Scanner object to get the first line containing the exam topic (What kind of variable type should it be? Integer, double, string???). Create a variable to hold this info.
b) Use your Scanner object to get the minimum percentage of correct answer to pass the exam. Again, what type of variable should you create to store this info?
c) For the set of 10 questions, use a WHILE loop. What would be the WHILE loop "condition" to keep going?
d) There are two ways of reading the questions and performing the exam:
   1) As your program reads a given question, it presents the question to the student and after the student answer the question, your program reads the other question from the file and so on. This way your program does not need to store all the questions in the memory, just the current one.
   2) Your program reads all the questions at once and place them into arrays and then after finish reading all of them it starts the exam per say.

   Question: what are the pros and cons of using each approach?

   You are required to use the second approach, i.e., read all the questions first and then start the exam. To do so, your program shall create the following arrays to hold all the data read from the text file:

   a) 1-dimension String array, String[], to hold the questions (10 questions).
   b) 2-dimension String array, String[][], to hold the multiple choice answers, where the first index of the array is the question number and the second index is the specific answer (from 5 answers of the multiple choice).
   c) A 1-Dimension integer array, int[], containing the numbers of the correct answers.

e) Create a text file inside your NetBeans project as we have done in class (File >> New >> Other >> Empty File, and name it "psycology_test.txt"). Copy and paste the contents of Appendix A into this file. When creating the File object in your java program, get this file path and place it inside the "new File(copy it here)"

2.3   Functional Requirement #3

Requirement: Your program shall display one question of a time. The question shall be presented inside a dialog box. An example of what is expected is shown below.
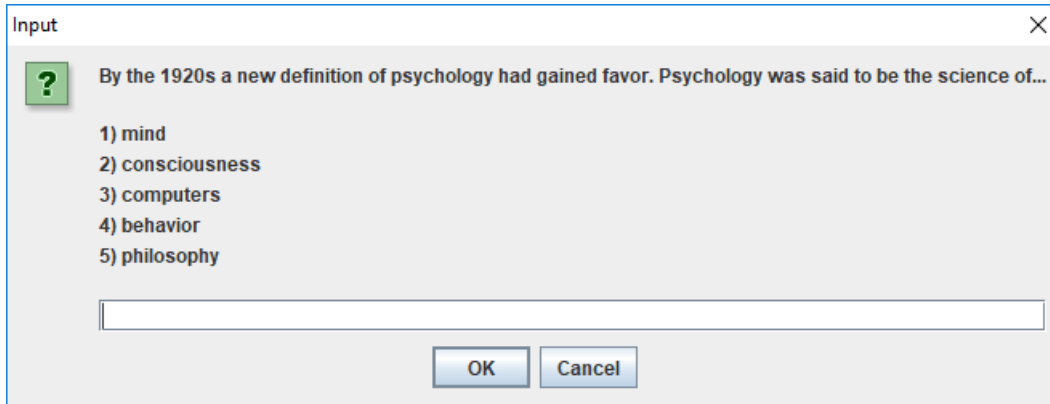
Code Design:

- Create a FOR loop to go over all the questions, one by one.
- For each question:
  - Create a String variable and concatenate the questions and the multiple choices.
  - To have new lines as shown in the figure above, concatenate "\n" after each possible answer in the multiple choice.
  - Use this concatenated string as input in your JOptionPane.showInputDialog() method.

2.4   Functional Requirement #4

Requirements: Your program shall handle the student answer in the following manner:

- Your program shall provide a feedback to the students whether they have answered the question correctly or not.
- This feedback shall be presented also via dialog box.
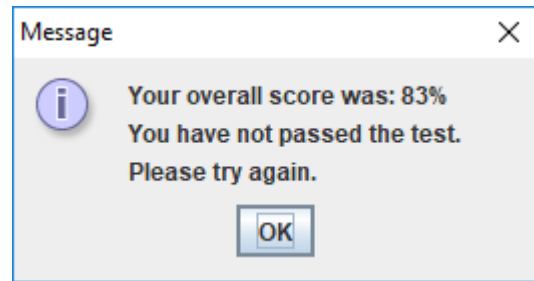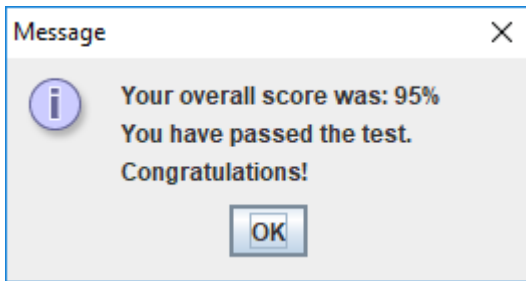- The program shall keep track of how many answers where correct.

Code Design:

- Collect the answer from the JOptionPane dialog box (you will need to convert the returning value from String to integer).
- Compare this value with the actual correct answer that you got from the text file (the integer array of correct answers that you have created.
- Create an integer variable to keep track of how many answers were correct.

2.5 Functional Requirement #5

Requirements:

- At the end of the exam, your program shall compute the percentage of correct answers.
- Your program shall verify if the student has passed or not based on the "passing score", the value that was retrieved from the text file.
- Your program shall provide the results to the student via dialog box. An example of what is expected is shown below:

Message ✕	Message ✕
(i) Your overall score was: 95% You have passed the test. Congratulations! OK	(i) Your overall score was: 83% You have not passed the test. Please try again. OK

Code Design: Use JOptionPane.showMessageDialog inside an IF statement.

3 Improving your code

Would your program work without changing a single line of code (besides the path of the text file, of course) if I give you another text file containing a Calculus exam, where instead of having 10 questions with 5 multiple choices, it would have 20 questions of 4 multiple choices?

Are the "condition" portion of your FOR loops hard-coded with 10 (for number of questions) and 5 (for the number of multiple choices)? If so, your program would not work for an exam with 20 questions and 4 multiple choices.

Modify your code to be more flexible about this issue.

Attachment A – Introduction to Psychology

Psychology and Science

85

By the 1920s a new definition of psychology had gained favor. Psychology was said to be the science of...

mind # consciousness # computers # behavior # philosophy

4

A cognitive psychologist is most likely to be interested in...

therapy research # observational research # memory and perception # research involving some medicine or placebo # phenomenology

3

Operational definitions are...

scientifically approved definitions # definitions illustrated with a concrete example or visual image # definitions which are very precise # dictionary definitions # definitions which tell how to collect data

5

What does it mean to say a definition is valid?

it can be repeated under the same circumstances and will produce the same result # it accurately represents the value of some variable # it measures what you think it measures, as shown by using a different method to measure the same variable # it is described in such a way that it can be measured # it seems reasonable

3

What does it mean to say a definition is reliable?

it means what you think it means # you can measure the same thing again and get the same results # there are no confounded variables # it can be used to make accurate predictions # it has been operationally defined

2

Replication...

relies on self-report methods # is important precisely because it involves the same claim but a different test, with different procedures # is "secondary in importance" to honesty, according to the chapter # is possible only with experimental, not observational research # is essentially repetition of research in all its details

5

In observational research there are no...

variables # operational definitions # standardized tests # experimental manipulations # statistical tests

4

What is the independent variable, in experimental research?

a variable which nobody controls or changes # the variable which is manipulated in an experiment # the variable which is measured, to see results of an experiment # a variable which describes some durable characteristic of the subject # a variable which is held steady

2

A single-blind design should be sufficient to eliminate _____ as a confounded variable.

placebo effects # experimenter effects # subject variables # self-selection # measurement effects

1

How are experimenter effects eliminated?

with a single blind design # with a double blind design # with reactive measures # with operational definitions # with convergent operations

2