Java Classes – The Quiz Helper App

1 Introduction

You have learned about the concept of Classes and Objects in Java. Classes are like blueprints while Objects are the entities (instances of) those classes. Example: the blueprint of a house describes all the features of a house, such as number of bedrooms and their locations, number of floors, kitchen size, etc. You cannot live in the blueprint though; you will need to get a constructor to build an actual house base on this blueprint. The built house is the actual object, you can live there. A land developer can built dozens of houses (objects) from a single blueprint (class). In programming word you can create multiple objects (also known as instances) from a given class, let's say Bike.

In this lab / assignment, you will create a different type of objects: you will create a multiple choice quiz questions for Introductory Psychology! You will use the concepts of OOP to develop it. You will see (in your Assignment, not in this lab) that applying OOP concepts helps you to create expandable, reusable, better codes.

2 General Overview of your program

As briefly discussed in Section 1, you are about to create a program that performs a knowledge test. When developing a program from scratch, we always start by doing a time-out to think and layout the steps required in an actual real-life test to perform such activity, and only after that we would start coding our program. The next sections describes those steps.

A- What are the portions of a multi-choice quiz?

- A quiz is divided in a list of questions.
- Each question has a list of multiple choices.

B- How a quiz is presented to the student?

- If this is an online quiz, then it is customary to have the program showing only a question and its multiple choices one at a time.
- Wait for the students to enter their choice.
- Check if the answer is right.

C- How the quiz is graded?

- Keep track of the correct answers
- Perform the overall grade (normally in percentage)
- Compare the overall grade with the percentage required to pass the quiz (what can change from quiz to quiz).

D- What else is missing?

- The main program shall read the quiz information from a text file. Each file would have all the questions to be applied, including their multiple choices and their correct answers.

3 Program design

In this section we will layout the general Java program structure. In Section 4 we will be doing the actual code implementation. The next subsections describe what we should be concerned when implementing this quiz program.

3.1 The Question Set

A quiz is a collection of question sets. A question set in this case should contain:

- The Question itself
- The multiple choice answers
- The right answer

Also, the question set should be able to perform the following tasks:

- print itself into the terminal window (question and multiple choices)
- check the student choice (i.e. compare it with the correct answer)

Each question set in the quiz will have the above features, so we should create a Java Class, let's say QuestionSet, that would have:

- Class fields: that will hold the following information:
  - The question (what type of variable should we use to hold a question? Integer, Boolean, String, double???)
  - A list of answers for the multiple choice portion. What type of variable should it be?
  - The right answer (let's say that this is first answer, second answer, etc. (i.e., 1, 2, 3, …). What type would it be?
- Class methods: that would perform the following activities:
  - Print the question and its multiple choices.
  - Check if the student answer is correct or not.

3.2 The Quiz Main Program

The quiz main program should perform the following tasks:

- Request the user to provide the name and path of the file that contains the question sets for this given quiz (code similar to the one used for the Titanic data, right?)
- Read the file and for each set of question, multiple choices, and right answer number, it should create a QuestionSet object (using the Java keyword "new QuestionSet(input arguments here)".
- Storing all QuestionSet objects into an array or list.
- Loop over this array (or list) and:
  - Requests that the QuestionSet object prints itself in the terminal window.
  - Request the students to enter their answer.
  - Request the QuestionSet object to check if the answer is correct.
  - Keep track of how many answer the students are getting right.
- After applying all the questions, the program shall compute the student score
- Compare the student score with the minimum score to pass the exame
- Display the final score and the pass / not pass statement.

The program to be created has the following features:

a) It describes a class (blueprint) for a single question set. By question set I mean the question, multiple choice answers, and the correct answer among those choices.
b) It must read a text file that contains few psychology topics
c) Shows a main menu that presents the topics in the terminal window for the student to pick one of them.
d) After picking one of the topics, your program shall open another text file, the one that is specific for that topic. This file contains multiple question sets.
e) Your program must read those question sets and as it reads them, it creates concrete objects using your class defined in item (a).
f) As you create these question sets, your program must save them in List<your class name here>
g) After reading all question sets from the file, your program shall start the quiz. Where the following must be performed:
    i) Display the question.
    ii) Display the multiple choices.
    iii) Prompt the student to provide an answer.
    iv) Read the answer and check with the correct answer.
    v) Using a JOptionPane dialog box, let the student know if the answer was correct or incorrect.
    vi) Keep track of the number of correct answers.
h) After the session of questions is finished, your program shall let the student know if they have passed the quiz or not (the score for passing the quiz is 85% or above of correct answers) by using a JOptionPane.
i) Your program shall then go back to the main menu described in item (b) above. At this point, the student may select other topic or exit the program (last menu item).

4 Program Implementation

The next subsections give general guidelines of what you should implement. There is not explicit code herein.

4.1 Create a new NetBeans Project

Create a new project in NetBeans called QuizPerformer. After creating this project, NetBeans creates a QuizPerformer.java class by default. We will use this class later to perform the quiz. For now, let's leave it as it is.

4.2 The QuestionSet Class

Create a new Java Class (not a project) inside this project. Name it QuestionSet.

Create the following Class Fields:

- question: which will hold the question for any given QuestionSet object.
- multipleChoices: which will hold an array (or list) of multiple choice answers.
- correctAnswerNumber: which will hold a number of the correct answer found in the multiple choice array.

Create and implement the necessary code for the following Class Methods:

- displayQuestion: a method that displays the question and its multiple choices in the terminal window
- isAnswerRight: a method that verifies if the student choice is correct or not. This method requires and user choice as input argument.

Create a non-default Class Constructor:

- Create a class constructor that takes the following input parameters and sets their respective class fields:
  - The Question of the given question set.
  - The array (or list) containing the multiple choice answers.
  - The correct answer number.

All right, with this QuestionSet Class (the blueprint), the QuizPerformer can create QuestionSet Objects containing the actual questions, multiple choices, and correct answers for all the questions found in the text file discussed in Section 3.2 item (b).

4.3 The QuizPerformer Main Program

The main program (the QuizPerformer.java file) shall perform the following tasks:

- Read the text file (shown as appendix on this lab/assignment document). The text file name can be hardcoded for this step. On Section 6 we will improve this a little bit.
- As the program reads the data found in the text file, your program shall create objects of the QuestionSet class and save these objects in an array (or list).
- After reading all the question sets from the text file, your program shall administrate the quiz as discussed

5 Running your QuizPerformer

In NetBeans, run your QuizPerformer program and check if it correctly administrates the quiz.

Note: I tried to not peak on the correct answers when I was typing the text file and I failed miserably on the quiz multiple times…

6 Final improvements

In implementing this type of program QuizPerformer, we should try to have it as flexible as possible to administrate different types of quizzes. The quiz type that we have performed in the previous sections of this lab was related to Introduction to Psychology Course. We should implement others.

What I would like to do here is to image a Proctor setting up a computer for you to take a given quiz, based on your request. So if you go to the Proctor's office and say: "I need to take the CS-0401 exam", the proctor would set the computer to start that specific Exam. If you asked for Chemistry Exam, the proctor would set up the computer to start the other exam, and so on. Both exams would have questions, multiple solutions, final scores, etc. These exams would follow a standard format (a Class Quiz as a blueprint). As you can imagine, the Proctor's only responsibility is to setup the computer. The exam is really administrated by the Quiz class, that will read the specific data file for that exam, will go over the questions and retrieve your answers and finally give your score.

6.1 The Quiz Class

To make your current implementation as discussed above, we should:

a) Rename your main program from PsychologyTest to Proctor. (Easily done by right click on its name inside the NetBeans >> Refactory >> Rename.
b) Create a new class called Quiz (this would be the exam that you are taking). This Quiz class would have the following features:

Quiz Class Fields:

- quizTopic (such as "Introductory to Psychology, or CS-0401).
- QuestionSet[] questionSets (a list of QuestionSet Objects, as you have implemented before).
- numberOfQuestions in this Quiz.
- numberOfCorrectAnswers (how many answers the student got right).
- minimumScoreToPass

Basically all the above functionality was placed originally in your PsychologyTest main program that you have renamed as Proctor. Move this functionality from Proctor to Quiz Class. You will probably need to do some adjustments but you will survive.

Your Quiz Class should have the following structure:

```
public Quiz(String topic, QuestionSet[] questions) {
    this.topic = topic;
    this.questionSets = questions;
    numberOfQuestions = questions.length;
    numberOfCorrectAnswers = 0;
}

public void performQuiz() {
    displayQuizTopic();
    displayQuestionSets();
    displayFinalResults();
}
```

You must implement the methods shown above.

6.2 The Proctor Class

The Proctor main program shall display a menu asking the user to select what exam they want to take. After the student defines it, the Proctor class shall create an object of the Quiz exam with the correct text file, and let the Quiz take control of the exam.

The code in Attachment B provides a possible implementation of the Proctor Class. You will need to create the other text files also attached to this lab, shown in Attachments C and D.

Run the Proctor program and try different exams.

Let us know if you get stuck in any part.

Good luck.

Attachment A – Introduction to Psychology Exam

The First line is the Exam topic, in this case “Psychology and Science”

The second line is the passing score, in this case 85%

Then comes 10 sets of the following data:

- 1 question
- 1 line containing 5 multiple choices separated by the symbol “#” (use the String method Split() to separate then inside your program.
- 1 number indicating the right answer

//

```
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

Attachment B – The Proctor Class

```
package psychologytest;

import java.io.File;
import java.io.IOException;
import java.util.Scanner;

public class Proctor {

    private Quiz quiz;

    public static void main(String[] args) throws IOException {
        Proctor psychologyTest = new Proctor();
    }

    public Proctor() throws IOException {
        String quizFileName = examToBeTaken();
        createQuizFromFile(quizFileName);
        performQuiz();
    }

    private String examToBeTaken() {
        displayExamTopicMenu();
        int userSelectedTopic = getUserSelectedTopic();
        String textFileContainingQuiz = getTopicRelatedTextFile(userSelectedTopic);
        return textFileContainingQuiz;
    }

    private void displayExamTopicMenu() {
        // display menu with exam topics
        System.out.println("Select Exam to be taken:");
        System.out.println("1) Introduction to Psychology");
        System.out.println("2) Next topic here");
        System.out.println("3) Yet another topic here");
    }

    private int getUserSelectedTopic() {
        Scanner keyboard = new Scanner(System.in);
        System.out.print("Please choose the exam type: ");
        int userSelection = keyboard.nextInt();
        return userSelection;
    }

    private String getTopicRelatedTextFile(int userSelectedTopic) {
        String textFile = "";
        switch(userSelectedTopic) {
            case 1: textFile = "psychologyAndScienceQuiz.txt";
                    break;
            case 2: textFile = "anotherquizfilehere.txt";
                    break;
            case 3: textFile = "yetanotherquizfilehere.txt";
                    break;

        }
        return textFile;
    }

    private void createQuizFromFile(String quizFileName) throws IOException {
        File file = new
File(getClass().getClassLoader().getResource(quizFileName).getFile());
```

```
        Scanner quizFileScanner = new Scanner(file);
        String quizTopic = getQuizTopic(quizFileScanner);
        double quizMinimumScore = getQuizMininumScore(quizFileScanner);
        QuestionSet[] questionSets = getQuestionSets(quizFileScanner);
        quiz = new Quiz(quizTopic, questionSets);
    }

    private String getQuizTopic(Scanner quiz) {
        return quiz.nextLine().trim();
    }

    private double getQuizMininumScore(Scanner quiz) {
        return Double.parseDouble(quiz.nextLine().trim());
    }

    private QuestionSet[] getQuestionSets(Scanner quiz) {
        QuestionSet[] questionSets = new QuestionSet[10];
        int counter = 0;
        while (quiz.hasNext()) {
            String question = quiz.nextLine();
            String[] multipleChoices = quiz.nextLine().split("#");
            int correctAnswerNumber = Integer.parseInt(quiz.nextLine().trim());
            QuestionSet questionSet = new QuestionSet(question, multipleChoices,
                    correctAnswerNumber);
            questionSets[counter] = questionSet;
            counter++;
        }
        return questionSets;
    }

    private void performQuiz() {
        quiz.performQuiz();
    }
}
```

Attachment C – Conditioning Quiz

Conditioning
90
What is Pavlovian conditioning, in a nutshell?
modification of behavior by reinforcement#an anticipatory biological response#any influence upon learned behavior by reflexes#learning from the effects of behavior#establishing a connection between behavior and its consequences
2
A tone which predicts a puff of air elicits an eyeblink. What is the puff of air?
the S+#the UCR#the CS#the CR#the UCS
5
You had a car crash; now all cars scare you. _____ is occurring.
extinction#discrimination#secondary reinforcement#generalization#punishment
4
What is a CER, by definition?
any neurotic or persistent, maladaptive response#any conditional response preceded by a shock or emotional trauma#a response of the autonomic nervous system to immune system activation#an emotional response like anxiety or happiness, set off by a CS#an S- used in punishment
4
What is a formal definition of "operant"?
a contingent or noncontingent stimulus-induced response#a behavior#a discriminative stimulus#a behavior under the control of a stimulus#a class of behaviors with an equivalent effect on the environment
5
To what does the term "positive" refer, in the term "positive reinforcement"?
pleasant emotions#logical positivism#the scientist's assumption that the procedure will increase frequency of behavior#the application or addition of a stimulus to a situation#an excitatory influence on neurons
4
Negative reinforcement...
increases the rate of behavior#involves following a behavior with a noxious or aversive stimulus#is a form of punishment#is also called DRL#requires an extinction period
1
How can escape learning be converted into avoidance learning?
by giving the animal a warning signal#by preventing extinction#by allowing the animal to respond to the punishment with several different behaviors#by increasing variability of behavior#by using generalization gradients
1
What is true of differential reinforcement, but not true of shaping (the method of successive approximations)?
reinforcement is used#a combination of positive and negative reinforcement may be used#not every response is reinforced#the desired response already occurs#an S- is used
4
How can something intended as a punisher actually function as a reinforcer?
if frequency of the "punished" behavior goes up#if it comes too late after the behavior#if shaping is used#if punishment is actually desired by the child#if the child is on a DRO schedule
1

Attachment D – Memory Quiz

Memory
85
What is a "trial" in memory research?
a controlled study of forgetting#a memory test#a test of a theory#a presentation of stimulus materials to a subject#a difficult subject
4
When would serial learning definitely be needed?
memorizing a grocery list#memorizing the meanings of traffic symbols for a driver's test#memorizing the turns to get through a crowded city#memorizing names of people you met only once#learning to recognize faces
3
A drawback of the yes/no method of recognition testing is that...
it makes recognition into a matter of probabilities#it forces people to make a choice#different people require different levels of confidence before saying "yes"#it eliminates the effects of experience#it prohibits mnemonic techniques
3
Sperling, in his pioneering studies of iconic memory...
had subjects relearn a language they heard as infants#tested subject's memory for pictures#asked subjects to read briefly flashed letters#studied memory for medieval Russian religious paintings#studied recognition errors
3
Rehearsal resembles...
echoic memory#acoustic interference#autobiographical stories#encoding#"re-hearing" something
5
What is a "chunk," in short term memory?
a partial memory, not complete#a single organized thing or item#a "magic number" which aids retrieval#a hierarchy#a binary "bit" of information
2
Procedural memory, unlike declarative memory....
records facts#preserves images#includes sounds and smells#involves the hippocampus#involves sequences or routines
5
Why are mnemonic devices effective?
to remember material, you must first pay attention to it#memory depends on the strength of the memory trace and how often it is rehearsed#memory depends on retrieval strategies#they all use imagery#they stir up emotions
3
The notion of task-appropriate processing implies that if you are preparing for a quiz you should...
quiz yourself#generate images#devise mnemonic strategies#prepare a crib sheet#sleep
1
Which of the following is NOT something extraordinary memorists generally have in common?
the use of "great effort" to memorize important material#the use of imagery#a trancelike state of absorption#attention to the inner structure of events#taking an interest in the subject matter
1

Attachment E – Senses and Perception Quiz

Senses and Perception
85
What is myopia?
strain in eye muscles#degeneration of the retina#too much pressure in the vitreous humor#a problem focussing the visual image#a problem seeing things which are either too close or too far away
3
Green afterimages after staring at red objects is evidence for..
color blindness#two channels of information#two types of rod receptor#two colors signaled by the same channel#black and white opponent processes
4
Evidence from brain scans shows...
no sign of either hallucinations or illusions, showing they are imagined#evidence of illusions, but not hallucinations#evidence of hallucinations, but not illusions#evidence of both illusions and hallucinations#evidence of illusions turning into hallucinations
4
What do the ossicles accomplish?
collecting sound#amplifying vibrations#transducing sound to nerve impulses#equalizing pressure between the middle and outer ear#equaling pressure between the middle and inner ear
2
The frequency theory of auditory encoding suggests that different frequencies of sound...
result in different frequencies of nerve impulses#result in different frequencies of brain rhythms#activate different neurons#create "resonance frequencies" in the middle ear#are frequently perceived as "the same"
1
The little bumps visible on your tongue are...
taste buds#taste cells#papillae#receptors#epithelium
3
What sense dominates our ability to taste foods and liquids?
olfactory#gustatory#cutaneous#kinesthetic#equilibratory
1
How do scientists know endorphins are involved in placebo pain relief?
endorphins go up when people take aspirin#endorphins go up when people take any pain reliever, no matter what the chemical composition#naloxone, an opiate-blocker, eliminates placebo pain relief#placebo pain relief disappears if people are informed that they took a placebo#when people are informed that they are receiving endorphins, they show placebo pain relief
3
What is the vestibular apparatus?
the cochlea and surrounding bone#part of the kinesthetic sense#the organs for the sense of balance#a specialized nucleus which connects equilibratory and auditory nerves#the same thing as the endolymph
3
The chapter said which of these might account for some ESP-like experiences?
fever-induced polydipsia#synchronicity#precognitive dreams#anniversary phenomena#"hot flashes"
4

Attachment F – States of Consciousness

States of Consciousness
80
Some psychologists, echoing Watson, point out that consciousness is subjective and "if you can measure it..."
"then, and only then, will you have a science"#"that will only be the beginning of a long, uncertain validation process"#"I'll be a monkey's uncle...no offense to Darwin"#"you just have neural activity, not consciousness"#"you are in fact studying behavior"
5
What is true of NON-REM sleep, in contrast to REM sleep?
no mental activity#total relaxation of muscles below the neck#desynchrony or "noise" on the EEG#slower and more regular breathing#irregular pulse
4
What is the hypnagogic state?
a state closely resembling hypnotism#a state during which it is particularly easy to talk to someone in their sleep#the state of transition into sleep#a state of confusion and disorientation#a state "halfway between sleep and hypnosis"
3
What is a lucid dream?
a dream with unusually clear meaning#what Pieron called a "limpid" dream#a dream where you know you are dreaming#a type of nightmare#a dream vision of the future
3
Most psychologists agree hypnosis involves...
synchronization of brain waves#eye fatigue#the locus coeruleus#split personality#hypersuggestibility
5
Which would be categorized as a "leading question" when interviewing somebody under hypnosis?
What did you do last night?#What do you remember?#Do you remember the face of the intruder?#What do you see when you turn the corner?#Did the robber seem nervous?
5
Many forms of meditation involve...
stopping or ignoring the inner voice#hypnosis by an expert, to get started#the period of calmness right after a meal#explorations of the thought processes, using the "inner voice"#a form of waking REM sleep
1
Which of the following is a narcotic?
cocaine#marijuana#PCP#morphine#LSD
4
"Alcohol myopia" is said to be...
a "myth"#a reason alcohol consumption is a "risk factor" for sexually transmitted diseases#a factor which makes social interaction seem "larger and close up"#the reason for blurry vision during intoxication#similar in effect to "marijuana myopia"
2
What is "anandamide"
a brain chemical which appears in the frontal lobes and hippocampus#the active ingredient in nitrous oxide#a chemical which counteracts or antagonizes the effect of marijuana#a hallucinogenic "designer drug"#a chemical relative of morphine
1