Lab 4 D - QuizTime

Due No Due Date   **Points** None

In this lab you will learn inheritance, polymorphism, and abstract classes.

Problem Statement: Write a program called **QuizTime** that offers two types of quizzes: Math quiz and English quiz.

- The Math quiz poses a question to add, subtract, or multiply two single digit numbers. The two numbers are generated randomly between 0 and 9, and an operand is chosen randomly from +, -, or *.
- The English quiz displays a meaning for which the user has to input a word. The word:meaning combinations are read from a text file EnglishgQuizWords.txt as shown in Fig. 3.

The program asks user to choose a number from a menu. Depending on the user choice, QuizTime asks a Math or English question and waits for user input. If the answer is correct, then QuizTime increments scores and the count of rounds of question. Once user chooses Exit option, the program prints scores for MathQuiz, EnglishQuiz, and total score and exits.

Two sample scenarios are provided in Fig1 and 2 below.

Fig 1: Scenario 1

```
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
3. Exit
Enter choice:
1
What is: 2-4
-2
Correct!
-----------------------------
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
3. Exit
Enter choice:
2
What is:  In or to a higher place; higher than; on or over the
upper surface; over;
above
Correct!
-----------------------------
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
```

Fig. 2: Scenario 2

```
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
3. Exit
Enter choice:
1
What is: 0*0
0
Correct!
-----------------------------
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
3. Exit
Enter choice:
2
What is:  To stay; to continue in a place; to have one's
abode; to dwell; to sojourn;
abc
Incorrect!
-----------------------------
*** Welcome to QuizTime!***
1. Math Quiz
2. English Quiz
```

3. Exit

Enter choice:

3

Your Math score: 1/1

Your English score: 1/1

Your total score: 2/2

3. Exit

Enter choice:

1

What is: 3-9

-6

Correct!

*** Welcome to QuizTime!***

1. Math Quiz

2. English Quiz

3. Exit

Enter choice:

3

Your Math score: 2/2

Your English score: 0/1

Your total score: 2/3

Fig. 3: EnglishQuizWords.txt

Abide: To stay; to continue in a place; to have one's abode; to dwell; to sojourn;

Ability: The quality or state of being able; power to perform, whether physical, moral, intellectual, conventional, or legal; capacity; skill or competence in doing; sufficiency of strength, skill, resources, etc.;

Abject: Sunk to a low condition; down in spirit or hope; degraded; servile; groveling; despicable;

Abode: Place of continuance, or where one dwells; abiding place; residence; a dwelling; a habitation.

Abolish: To do away with wholly; to annul; to make void;

Abound: To be in great plenty; to be very prevalent; to be plentiful.

About: Around; all round; on every side of.

Above: In or to a higher place; higher than; on or over the upper surface; over;

Abrupt: Without notice to prepare the mind for the event; sudden; hasty; unceremonious.

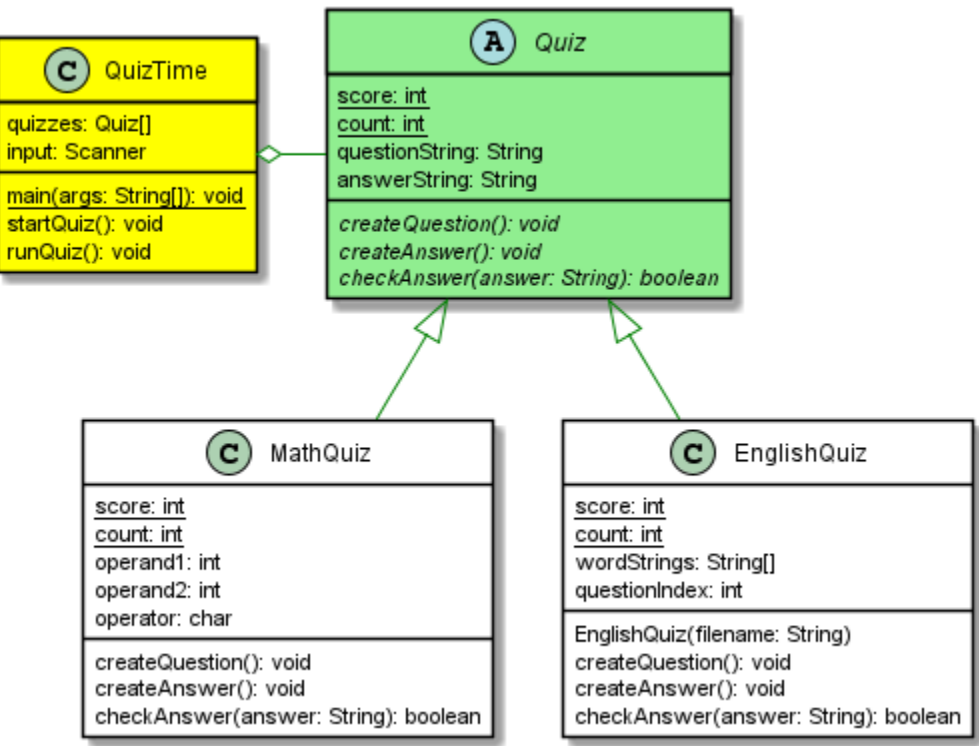Absent: Being away from a place; withdrawn from a place; not present.

Solution Design: As shown in the class diagram below, there are four classes in this program. QuizTime is partially coded, and Quiz is fully coded. Please refer to the comments in the code file provided to you for more details.

The other two classes - MathQuiz and EnglishQuiz need to be created and coded by you.

- **MathQuiz**:
  - createQuestion() method uses Random class to generate random numbers between 0 and 9 to initialize operand1 and operand2. It also initializes operand by randomly picking one of the three operators +, -, *. Once three elements are selected, questionString is initialized, e.g. as 3+5
  - createAnswer(): It computes the answer using operand1, operand2, and operator, and then uses it to initialize answerString by converting it to String. So if the questionString is 3+5 then answerString is 8.
  - checkAnswer(): It increments Quiz count and MathQuiz count. If answer matches the answerString, it increments MathQuiz score as well as Quiz score. It returns true if the answer is correct, else it returns false.

- **EnglishQuiz**:
  - The constructor reads the data from filename into wordStrings array which is then used by createQuestion() and createAnswer() methods.
  - createQuestion(): generates a random number questionIndex into wordStrings[] array to pick the question. It initializes questionString with the meaning of the word to be displayed
  - createAnswer(): initializes answerString with the word from wordString[questionIndex] picked in createQuestion()
  - checkAnswer(): It increments Quiz count and EnglishQuiz count. If answer matches the answerString, it increments EnglishQuiz score as well as Quiz score. It returns true if the answer is correct, else it returns false.
  - Note that the quiz is case -insensitive

```
┌─────────────────────────────┐        ┌─────────────────────────────────────┐
│ (C)  QuizTime               │        │        (A)  Quiz                    │
├─────────────────────────────┤        ├─────────────────────────────────────┤
│ quizzes: Quiz[]             │        │ score: int                          │
│ input: Scanner              │◇───────│ count: int                          │
├─────────────────────────────┤        │ questionString: String              │
│ main(args: String[]): void  │        │ answerString: String                │
│ startQuiz(): void           │        ├─────────────────────────────────────┤
│ runQuiz(): void             │        │ createQuestion(): void              │
└─────────────────────────────┘        │ createAnswer(): void                │
                                        │ checkAnswer(answer: String): boolean│
                                        └─────────────────────────────────────┘
```

```
┌─────────────────────────────────────┐     ┌─────────────────────────────────────┐
│ (C)   MathQuiz                      │     │ (C)   EnglishQuiz                   │
├─────────────────────────────────────┤     ├─────────────────────────────────────┤
│ score: int                          │     │ score: int                          │
│ count: int                          │     │ count: int                          │
│ operand1: int                       │     │ wordStrings: String[]               │
│ operand2: int                       │     │ questionIndex: int                  │
│ operator: char                      │     ├─────────────────────────────────────┤
├─────────────────────────────────────┤     │ EnglishQuiz(filename: String)       │
│ createQuestion(): void              │     │ createQuestion(): void              │
│ createAnswer(): void                │     │ createAnswer(): void                │
│ checkAnswer(answer: String): boolean│     │ checkAnswer(answer: String): boolean│
└─────────────────────────────────────┘     └─────────────────────────────────────┘
```

Design constraint:

- Use of collection classes is not allowed in this lab.
- Each class must be created in its own .java file

Instructions

- Download
  - **QuizTime.java** ↓ **(https://canvas.cmu.edu/courses/25253/files/7037031/download?download_frd=1)**
  - **Quiz.java** ↓ **(https://canvas.cmu.edu/courses/25253/files/7025107/download?download_frd=1)**
  - **TestQuizTime.java** ↓ **(https://canvas.cmu.edu/courses/25253/files/7042182/download?download_frd=1)**
  - **EnglishQuizWords.txt** ↓ **(https://canvas.cmu.edu/courses/25253/files/7025115/download?download_frd=1)**
- Copy/import java files in a package named lab4 and txt file in your project folder.
- Complete your code as needed

- Write you name and Andrew ID at the top in three files to be submitted - QuizTime.java, MathQuiz.java, EnglishQuiz.java
- Zip these three files in Andrewid-lab4.zip and submit the zip file
- Only last submission will be graded

Rubric:

- Test cases: 8 x 0.5: 4 points
- Console output: 4 points
- Correct use of polymorphism, abstract class, static/final variables etc.: 2 points
- Any submission issues may cost you up to 2 points
- Please note that the data file will be changed to detect hardcoding