UE19CS353 – OOADJ
Lab Assignment – 2

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Question:

Write a Java program to implement the following.

1. Define an abstract class **TestQuestion** that has a String data variable called question and a readQuestion abstract method.
2. Define three subclasses **ShortAnswer**, **LongAnswer** and **MCQ**. The subclasses should have the following data variables in addition to the question, ShortAnswer (numLines – by default set to 1), LongAnswer (numLines) and MCQ(numChoices, array of String for the choices)
3. The three subclasses define the readQuestion method as follows:
    a. ShortAnswer would read the question from standard input (keyboard) and also sets the numLines to 1 by default.
    b. LongAnswer would read the question and numLines from standard input (keyboard)
    c. MCQ would read the question, numChoices and choices from standard input (keyboard)
4. Write the toString method for each of the subclasses to display the details
5. The main method in **TQManager** class should contain an array of TestQuestions that references any type of subclasses. In the main function, the user chooses to create a question of a specific type and accordingly an instance is created and a reference is assigned in the array and the readQuestion method is invoked. Thereafter, display all the questions by implicitly invoking the toString method.

Code:

```
/*
    - Arvind Krishna
    - 31/01/2022 04:13 PM
    - path - /mnt/d/pesu/Sem 6/java/OOAD-Labs/week-2
*/
// define an class TestQuestion that has a String variable called question, and a
readQuestion method


import java.util.Scanner;

class TestQuestion {
```

```
    protected String question;

    public void readQuestion(Scanner scan){}
}

// define 3 subclasses,
// shortAnswer - numLines - by default 1
// LongAnswer - numLines
// MCQ - must have numChoices, and array of string for choices

class ShortAnswer extends TestQuestion {
    private int numLines = 1;
    public void readQuestion(Scanner scan) {
        System.out.print("Enter the question: ");
        question = scan.nextLine();
        System.out.print("Enter the number of lines: ");
        String nextIntString = scan.nextLine();
        numLines = Integer.parseInt(nextIntString);

    }

    //toString method
    public String toString() {
        return "Question: " + question + "\n\tNumber of Lines: " + numLines;
    }


}

class LongAnswer extends TestQuestion {
    private int numLines = -1;

    public void readQuestion(Scanner scan) {
        System.out.print("Enter the question: ");
        question = scan.nextLine();
        System.out.print("Enter the number of lines: ");
        String nextIntString = scan.nextLine();
        numLines = Integer.parseInt(nextIntString);

    }
    //toString method
    public String toString() {
        return "Question: " + question + "\n\tNumber of Lines: " + numLines;
    }
}
```

```java
class MCQ extends TestQuestion {
    private int numChoices = -1;
    private String[] choices;// = new String[numChoices];

    public void readQuestion(Scanner scan) {
        System.out.print("Enter the question: ");
        question = scan.nextLine();
        System.out.print("Enter the number of choices: ");
        String nextIntString = scan.nextLine(); //get the number as a single line
        numChoices = Integer.parseInt(nextIntString);
        choices = new String[numChoices];
        for (int i = 0; i < numChoices; i++) {
            System.out.print("Enter choice " + (i + 1) + ": ");
            choices[i] = scan.nextLine();
        }
    }
    //toString method
    public String toString() {
        String str = question + "\nThe options are: ";
        for (int i = 0; i < numChoices; i++) {
            str += "\n\t" + (i + 1) +". "+ choices[i];
        }
        return str;
    }
}


//the main method in TQManager class should contain an array of TestQuestion
references of any of the 3 subclasses.
// In the main function, the user should be able to add a question of any of the
3 subclasses, and accordingly add it to the array and readQuestion method is
invoked
// Thereafter, display all the questions by implicitly invoking the toString
method.
public class TQManager {
    public static void main(String[] args) {
        TestQuestion[] questions = new TestQuestion[10];
        Scanner scan = new Scanner(System.in);
        int choice = -1;
        int numQuestions = 0;

        do {
            System.out.println("1. Short Answer");
            System.out.println("2. Long Answer");
```

```
            System.out.println("3. Multiple Choice");
            System.out.println("4. Exit");
            System.out.print("Enter your choice: ");

            String nextIntString = scan.nextLine(); //get the number as a single
line
            choice = Integer.parseInt(nextIntString);

            switch (choice) {

            case 1:
                questions[numQuestions] = new ShortAnswer();
                questions[numQuestions].readQuestion(scan);
                numQuestions++;
                break;
            case 2:
                questions[numQuestions] = new LongAnswer();
                questions[numQuestions].readQuestion(scan);
                numQuestions++;
                break;
            case 3:
                questions[numQuestions] = new MCQ();
                questions[numQuestions].readQuestion(scan);
                numQuestions++;
                break;
            case 4:
                break;
            default:
                System.out.println("Invalid choice!");
                break;
            }


        } while (choice != 4);
        scan.close();
        System.out.println("\nThe questions are: ");
        for (int j = 0; j < numQuestions; j++) {
            System.out.println(j + 1 + ") " + questions[j].toString() + "\n");
        }
    }
}
```

Output Screenshots:

```
/mnt/d/pesu/Sem 6/java/OOAD-Labs/week 2 on main ?2
javac TQManager.java

/mnt/d/pesu/Sem 6/java/OOAD-Labs/week 2 on main ?2
java TQManager
1. Short Answer
2. Long Answer
3. Multiple Choice
4. Exit
Enter your choice: 1
Enter the question: Which is your facorite book?
Enter the number of lines: 1
1. Short Answer
2. Long Answer
3. Multiple Choice
4. Exit
Enter your choice: 2
Enter the question: How do you call a function in java?
Enter the number of lines: 5
```

```
1. Short Answer
2. Long Answer
3. Multiple Choice
4. Exit
Enter your choice: 3
Enter the question: Number of primes below 10 is ____.
Enter the number of choices: 4
Enter choice 1: 3
Enter choice 2: 4
Enter choice 3: 5
Enter choice 4: 6
1. Short Answer
2. Long Answer
3. Multiple Choice
4. Exit
Enter your choice: 1
Enter the question: Explain the concept of looping.
Enter the number of lines: 2
```

Printing all of the saved questions:

```
1. Short Answer
2. Long Answer
3. Multiple Choice
4. Exit
Enter your choice: 4

The questions are:
1) Question: Which is your facorite book?
        Number of Lines: 1

2) Question: How do you call a function in java?
        Number of Lines: 5

3) Number of primes below 10 is ____.
The options are:
        1. 3
        2. 4
        3. 5
        4. 6

4) Question: Explain the concept of looping.
        Number of Lines: 2
```