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University of Khartoum

Faculty of Mathematical Sciences and Informatics

Programming Fundamentals 2 (C2013)

Midterm Project

(Multiply Test Application)

The content:

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Introduction:

This is the midterm project of Programming Fundamentals 2 about a simple Java application that demonstrates a fully functioning Java program with placeholders.

Program Description and Solution:

The project solves the problem of generating multiply problems and checks answers automatically what will help you to save your teachers time what was lost in generating questions and correct students' answers.

This program also will be a big motivation for the students to get the full mark using different motivation massage with each answer (Look Outputs).

Now, students can test themselves, if any student has a problem it will be known early and it will be solved faster because he\she can repeat the test in anytime without any human interference, what will high the education level of this primary school.

Code Explanation:

- MultiplyTest.java:

This class contains the main method which contains just the calling statement for the (quiz()) method from Multiply class.

```
public class MultiplyTest
{
	// main method
	public static void main( String args[] )
	{
		Multiply application = new Multiply(); // creating an object from Multiply class
		application.quiz();     // calling quiz method from Multiply class.
	} // end main
} // end class MultiplyTest
```

- Multiply.java:

This class contains creating of randomNumbers object form Random class at java.util, also it contains 3 globule variables type of byte and 5 void methods.

a) Variables:

1- **answer:** The correct answer.
2- **numOfQuestion:** The questions counter**.**
3- **score:** The correct answers counter.

b) Methods:

1- Quiz:

This is a void method without arguments that manages and calls the other methods and we can say that it is the main test.

It contains the creating of the Scanner object input, one local variable (guess //the user's guess) m and a while loop that repeats the test ales getting (-1) from the user.

2- createQuestion:

This is a void method without arguments that generates two one-digit numbers randomly say (a and b) then asks the student "How mach a times b?"

Also, it make the globule variable answer equals a*b.

This method is called invokes quiz (case the first question in the programe) and invokes checkResponse (case a correct guess is guessed).

3- checkResponse:

This is a void method with an integer argument (guess) that gets the student's answer and checks is his\her answer equal the correct answer or not and calls (createResponse()) method to give the student a motivation massage with each answer (correct or incorrect).

The questions counter (numOfQuestion) and score will be added by one each time.

a) If the student's answer is correct:

1. Calling createResponse method with argument true (createResponse(true)) to display a motivation massage for correct answer.
2. If the question counter (numOfQuestion) reached 10, it will call calculatePercentage to display the result and reset numOfQuestion and score to zero (start a new test).
3. Ask another question.

b) Else if the student's answer is incorrect:

1. Calling createResponse method with argument false (createResponse(false)) to display a motivation massage for incorrect answers.
2. If the question counter (numOfQuestion) reached 10, it will call calculatePercentage to display the result and reset numOfQuestion and score to zero and call (createQuestion) to start a new test.
   Else, the same question will be asked even entered the correct answer.

This method is called invokes quiz method.

4- createResponse:

This is a void method with a boolean argument (Is the student's guess correct?) and displaying the motivation massage as:

a) **If the student's answer is correct,** the motivation massage will be randomly chosen from:

- Very good!
- Excellent!
- Nice work!
- Keep up the good work!

b) **if the student's answer is incorrect,** the motivation massage will be randomly chosen from:

- No. Please try again.
- Wrong. Try once more.
- Don't give up!
- No. Keep trying.

This method is called invokes checkResponse method.

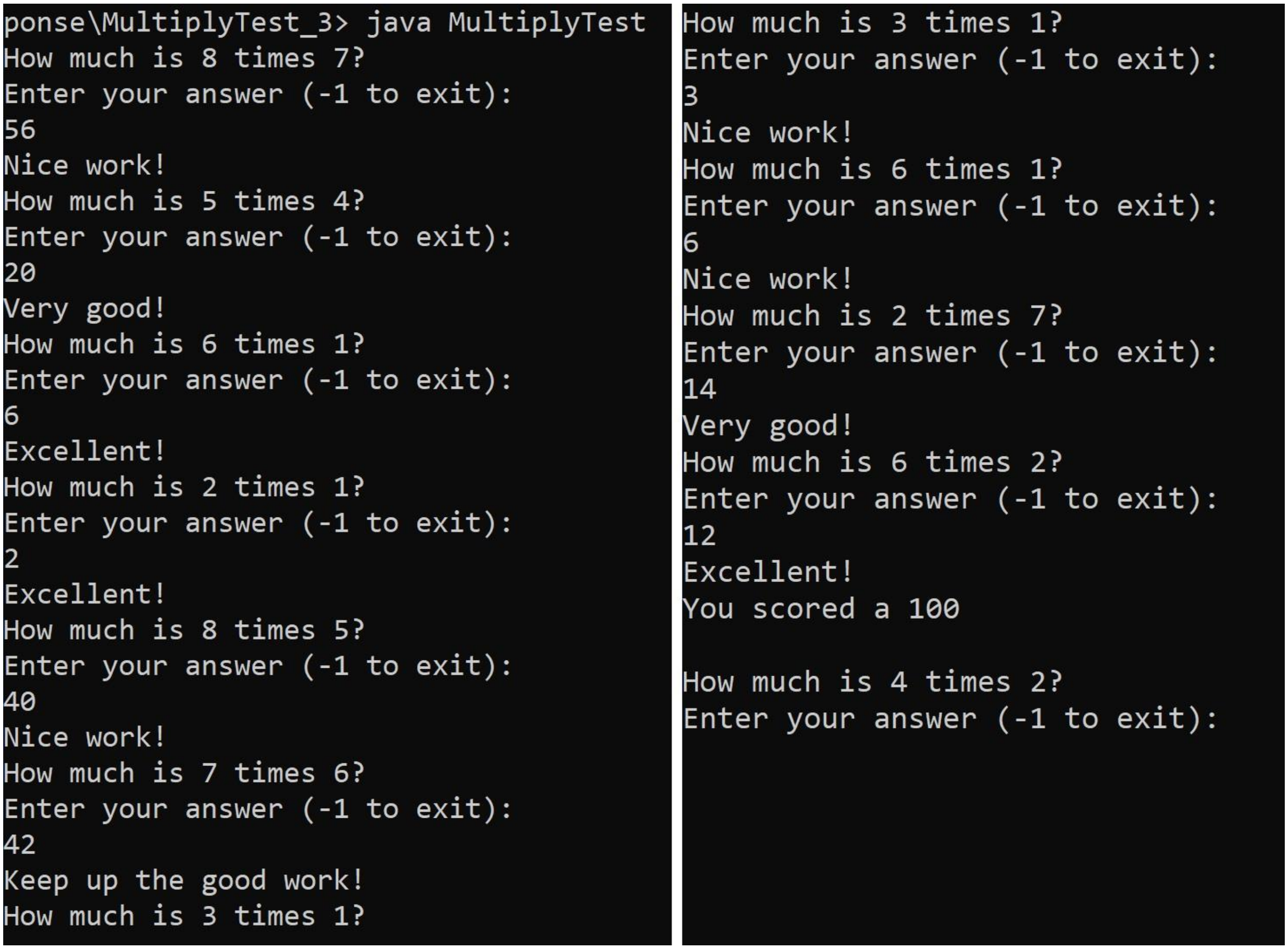
5- calculatePercentage :

This is a void method without any arguments that calculates and displays the percentage of the correct answers using the globule variable score, then reset the counters (questions counter and the correct answers counter).

If the student scored less than 75%, he\she will be notified to ask for his\her instructor help by display the massage: "Please ask your instructor for extra help."

This is called invokes checkResponse method.

Outputs:

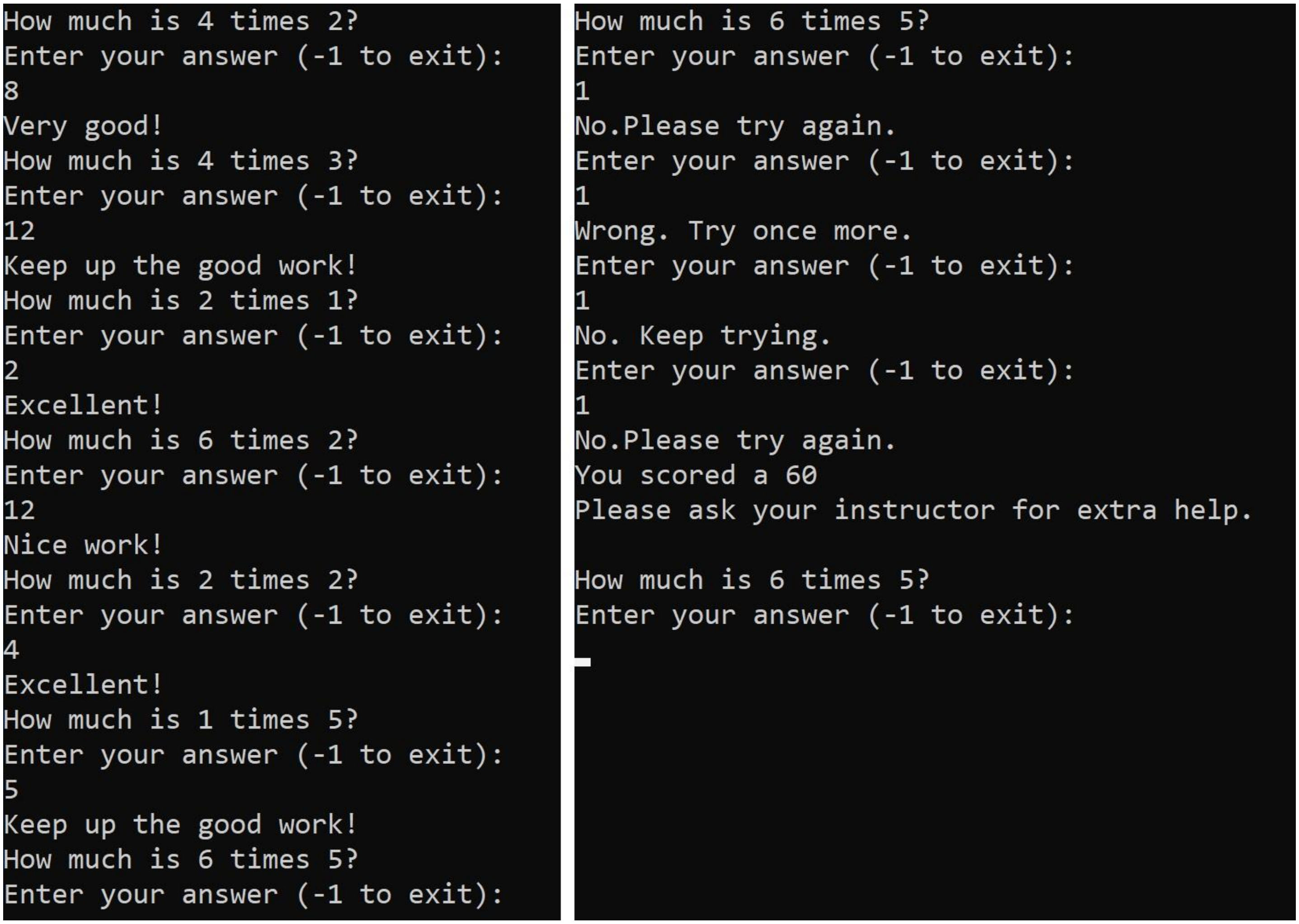


```
ponse\MultiplyTest_3> java MultiplyTest
How much is 8 times 7?
Enter your answer (-1 to exit):
56
Nice work!
How much is 5 times 4?
Enter your answer (-1 to exit):
20
Very good!
How much is 6 times 1?
Enter your answer (-1 to exit):
6
Excellent!
How much is 2 times 1?
Enter your answer (-1 to exit):
2
Excellent!
How much is 8 times 5?
Enter your answer (-1 to exit):
40
Nice work!
How much is 7 times 6?
Enter your answer (-1 to exit):
42
Keep up the good work!
How much is 3 times 1?
```

```
How much is 3 times 1?
Enter your answer (-1 to exit):
3
Nice work!
How much is 6 times 1?
Enter your answer (-1 to exit):
6
Nice work!
How much is 2 times 7?
Enter your answer (-1 to exit):
14
Very good!
How much is 6 times 2?
Enter your answer (-1 to exit):
12
Excellent!
You scored a 100

How much is 4 times 2?
Enter your answer (-1 to exit):
```

Figer 1: all answers is correct.

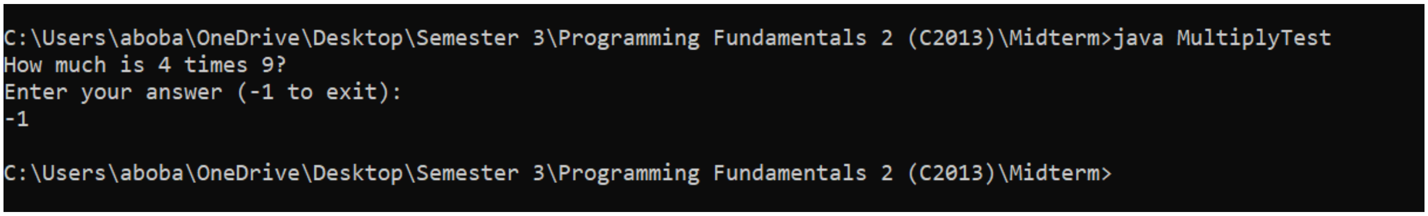


```
How much is 4 times 2?
Enter your answer (-1 to exit):
8
Very good!
How much is 4 times 3?
Enter your answer (-1 to exit):
12
Keep up the good work!
How much is 2 times 1?
Enter your answer (-1 to exit):
2
Excellent!
How much is 6 times 2?
Enter your answer (-1 to exit):
12
Nice work!
How much is 2 times 2?
Enter your answer (-1 to exit):
4
Excellent!
How much is 1 times 5?
Enter your answer (-1 to exit):
5
Keep up the good work!
How much is 6 times 5?
Enter your answer (-1 to exit):
```

```
How much is 6 times 5?
Enter your answer (-1 to exit):
1
No.Please try again.
Enter your answer (-1 to exit):
1
Wrong. Try once more.
Enter your answer (-1 to exit):
1
No. Keep trying.
Enter your answer (-1 to exit):
1
No.Please try again.
You scored a 60
Please ask your instructor for extra help.

How much is 6 times 5?
Enter your answer (-1 to exit):
```

Figer 2 : a student wants to help



```
C:\Users\aboba\OneDrive\Desktop\Semester 3\Programming Fundamentals 2 (C2013)\Midterm>java MultiplyTest
How much is 4 times 9?
Enter your answer (-1 to exit):
-1

C:\Users\aboba\OneDrive\Desktop\Semester 3\Programming Fundamentals 2 (C2013)\Midterm>
```

Figer 3 : How to exit from the program .

Challenges and Solutions:

- One challenge faced was the line 18 in section 4 (Program Template)

  You asked me to call checkResponse to display a question.

  But if I pass the guess to checkResponse as what in the template, an error will be happened because guess doesn't have a value yet.

  After this calling statement the guess will be entered for the first time in the program so there is nothing to check it yet.

- It was solved by calling createQuestion because In this line exactly we don't need anything except displaying a question.

- Another solution I have reached to it, to make the program in the template that you asked was giving the guess an initial value and create the questions counter (**numOfQuestion**) from the first version and edit checkResponse by creating the red condition inside it:

```
//checks user's answers is correct or not?
public void checkResponse(int guess)
{
            numOfQuestion++; // because before this step, the user mast be answered a question.

            if (numOfQuestion == 1){  createQuestion(); } // in the first time just create a new question.

            //if the user's guess is incorrect
            else if(guess != -1 && guess != answer){
                        creatResponse(false); // calling creatResponse to display a motivation massages for an incorrect guess

                        if (numOfQuestion == 10) {calculatePercentage(); createQuestion();} // display the result and start a new test
                        // else the same question will be asked so there is no creating of a new question here
            }// end else if

            //the answer is correct
            else
            {
                        score++; // add one to the counter of the correct guesses
                        creatResponse(true); // calling creatResponse to display a motivation massages for a correct guess
                        if (numOfQuestion == 10) {calculatePercentage();} // display the result and start a new test
                        createQuestion(); // ask another question
            } // end else
} // end method checkResponse
```

But this solution will cost the program adding a new variable from the first version and more 9 steps in each test, because it will checks the red condition in each time so if that was the 2nd question or the 3rd question …. the 10th question, it will checks and find that the condition doesn't mach.

- Another solution was using the methods overloading by create the following method:

```
//a method named checkResponse but doesn't take any arguments
public void checkResponse()
{
        createQuestion(); // Just call createQustion

} // end method checkResponse
```

# I Think they are not the best way to display a question and the first solution (just call createQuestion) seems to be more correctness to display the first question and that what I made.

Conclusion:

The project successfully demonstrates a multiply test program to the school's students. Overall, the project provided a good learning experience in finishing the students' problems in multiplication and saves the teachers' time what will give them a free time to use it in something more useful.

The End

Written in: 20th - June - 2024