Middle East Technical University **Department of Computer Engineering**

CENG 305

Object Oriented Programming with Java

Spring 2023-2024

Programming Assignment 2

Due Date: 13th April 2024, 23:59, via ODTUCLASS

1. Questions

1. **Textbook: E5.20, *page 268***
   Write a program that prompts the user to provide a single character from the alphabet. Print Vowel or Consonant, depending on the user input. If the user input is not a letter (between a and z or A and Z), or is a string of length > 1, print an error message.

2. Write a java program that prompts the user to enter two characters and displays the major and status represented in the characters. The first character indicates the major and the second is number character 1,2,3,4, which indicates whether a student is a freshman, sophomore, junior or senior. Suppose the following characters are used to denote the majors:

   ```
   M: Mathematics
   C: Computer Science
   I: Information Technology
   ```

3. **Textbook: E6.18, *page 337***
   Write a java program that prompts the user to enter an integer and displays, using asterisks, a filled diamond of the given side length as given in Figure 6.

4. **Textbook: P6.4, *page 339***
   Write a program that prompts the user for an integer and then prints out all prime numbers up to that integer.

2. Project Structure

You can see the final BlueJ project structure in Figure 1.

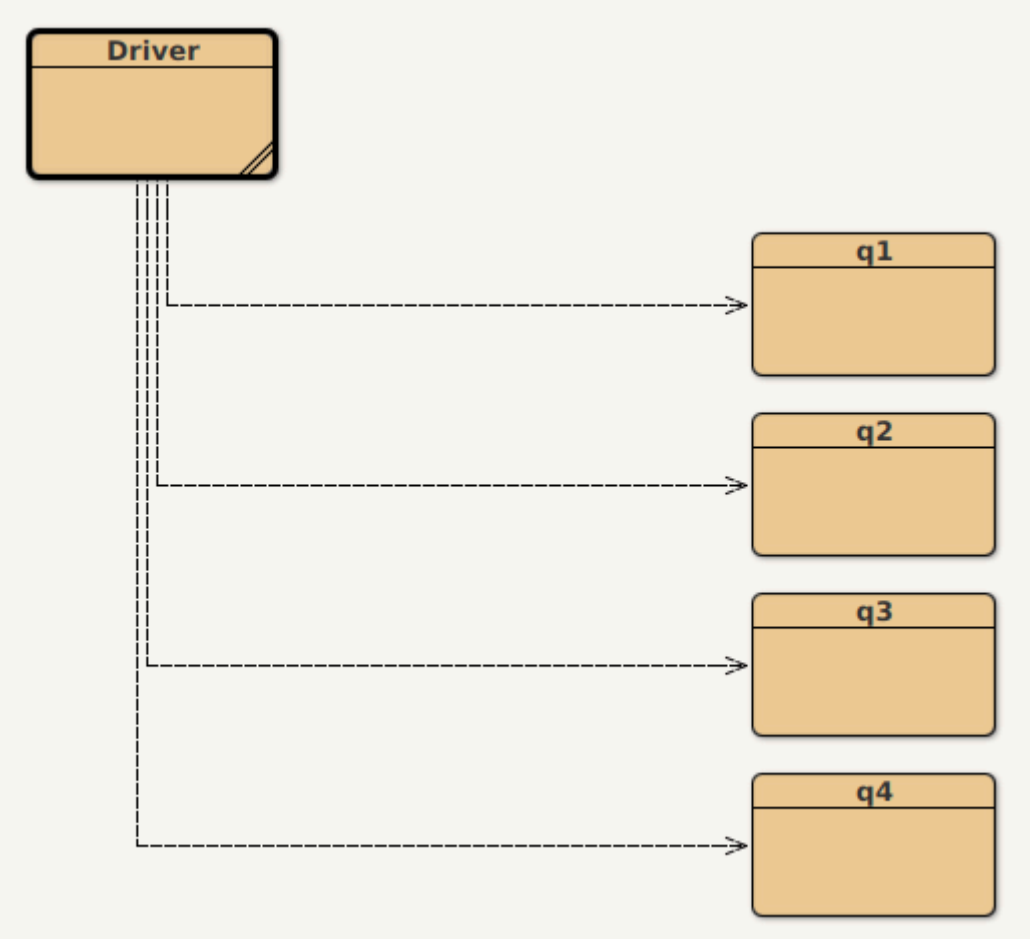


Figure 1: Project Structure

- You can run the project via running the main method of the `Driver` class.
- The context of the Driver class will be provided to you. You can edit the `Driver` class as you like for testing purposes. It will not be graded.

3. Specifications

- **Programming Language:** Java. You should use **BlueJ IDE** to write and implement your solutions. You can download it from www.bluej.org
- **Using javadoc Utility:** You should generate an HTML documentation which explains your classes and their members (variables and methods) using *javadoc*. For reference, you can see **Chapter 3.2.4** of the textbook.
- **Usage of *this* keyword:** The reference variable *this* should be used in your code whenever it is applicable.
- **Code and UML Diagram Consistency:** The variables and the methods defined in the classes and their access modifiers should be consistent with the UML diagram provided in Figure 3. The - and + symbols before the names denote private and public access to the members, respectively. Additionally, note that underlined methods denote static methods.

- **Provided Code Files:** For simplicity, the "*Driver*" class is provided in such a way that the main function will properly invoke the methods of the classes above in a loop in accordance with the menu shown in the sample output (Figure 3).
- **Code Clarity:** You should also consider the clarity of your code. Even if your code runs perfectly, obscure code will cause you to lose points.
- **Grading:** Your submission will be graded as follows:
    - Question 1: 20 points.
    - Question 2: 20 points.
    - Question 3: 20 points.
    - Question 4: 20 points.
    - Documentation: 15 points.
    - Coding Style: 5 points.
- In the Driver class's main method, utilize the "javax.swing.JOptionPane" library to obtain inputs for all classes except the first question, as demonstrated in the figures below. Similarly, display all outputs of the classes using "javax.swing.JOptionPane".
- An example on the use of javax.swing.JOptionPane was provided in ODTUCLASS and here are the sample outputs shown below Figures 4 - 7.

5. Regulations

1. **Submission type:** You will submit a zip file named as **e1234567_ceng305_pa2.zip** which includes all of your BlueJ project files and generated javadoc files. e1234567 should be your student identification number. Submission will be done via **ODTUClass**. Only your last submission will be graded. If your submission fails to follow the specifications or does not compile, there will be a significant penalty in points.
2. **Late submission:** In case of late submission your score will be calculated as follows:

   SCORE-(5*day*day)
3. **Cheating: We have zero tolerance policy for cheating.** People involved in cheating will be punished according to the university regulations and will get 0 from the assignment. You can discuss algorithmic choices, but sharing code between students is strictly forbidden. Your code will be compared with those of your friends both semantically and visually. Please be aware that there are "very advanced tools" that detect if twho codes are similar.
4. **No grouping:** The assignment has to be done individually.
5. **Communication:** You can use the 'discussion forum' on ODTUClass for your questions and share your ideas. Check the 'news forum' for announcements regularly. Also, you can contact with 'atakan@ceng.metu.edu.tr' for your problems or questions.

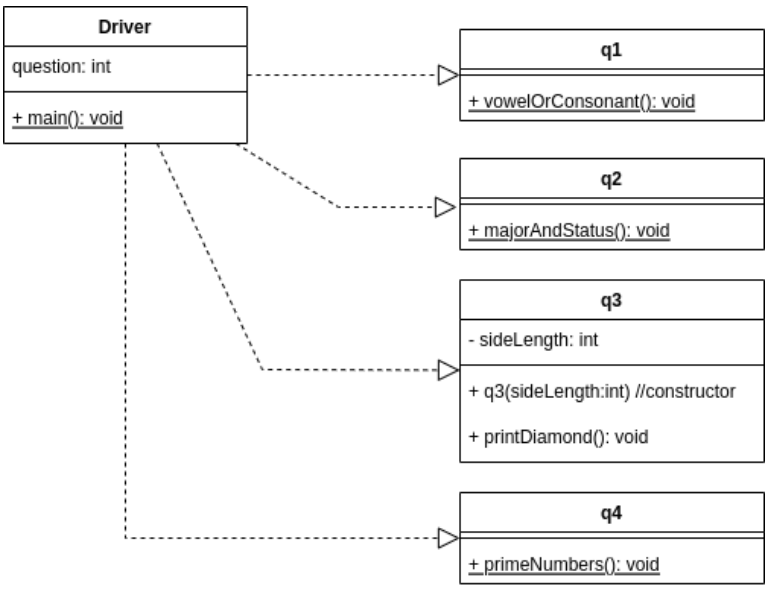


Figure 2: Class Diagram

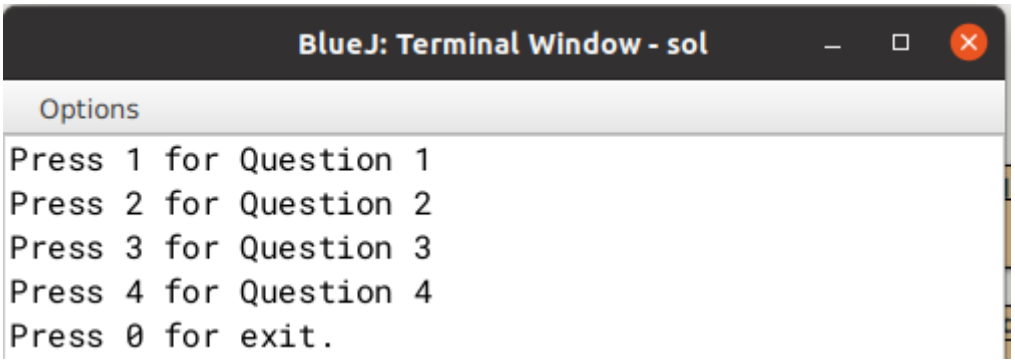


Figure 3: Sample Menu

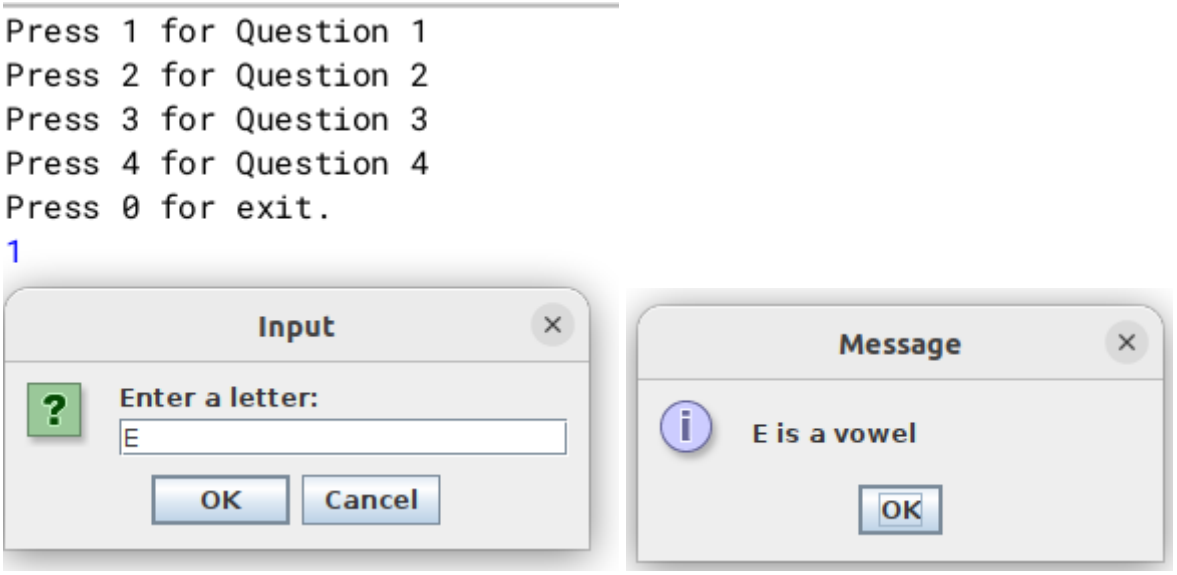


Figure 4: Sample run of question 1

```
Press 1 for Question 1
Press 2 for Question 2
Press 3 for Question 3
Press 4 for Question 4
Press 0 for exit.
2
```

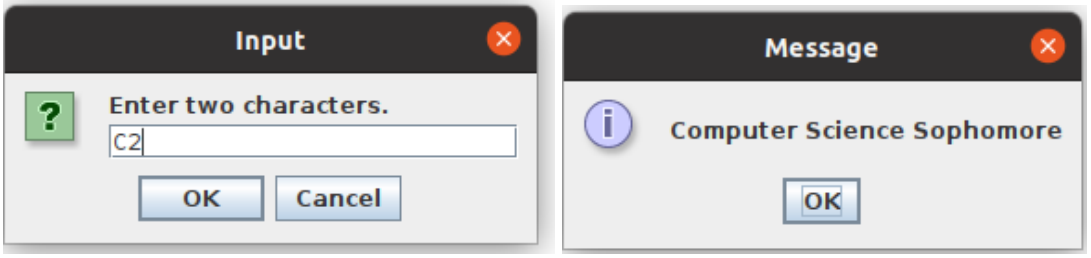
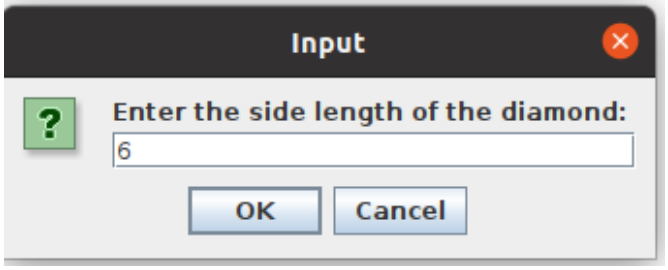


Figure 5: Sample run of question 2

```
Press 1 for Question 1
Press 2 for Question 2
Press 3 for Question 3
Press 4 for Question 4
Press 0 for exit.
3
```




```
Press 2 for Question 2
Press 3 for Question 3
Press 4 for Question 4
Press 0 for exit.
3
     *
    ***
   *****
  *******
 *********
***********
 *********
  *******
   *****
    ***
     *
```

Figure 6: Sample run of question 3

```
Press 1 for Question 1
Press 2 for Question 2
Press 3 for Question 3
Press 4 for Question 4
Press 0 for exit.
4
```

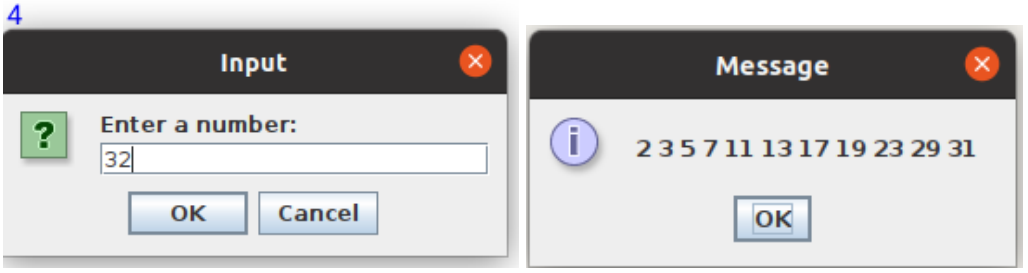


Figure 7: Sample run of question 4