Comp 248 Assignment 2

Object-Oriented Programming I (Concordia University)

Concordia University
Computer Science & Software Engineering
Faculty of Engineering and Computer Science

Concordia University
COMP 248 – Winter 2022
Assignment 2

Due Date:	By 11:59pm, February 11, 2022
Evaluation:	3% of final mark (see marking rubric at the end of handout)
Late Submission:	none accepted
Purpose:	The purpose of this assignment is to help you learn Java Identifiers, Assignments, Input/Output, Selection, and Flow of Control statements: `if`, `if/else`, `switch`, `etc`.
CEAB/CIPS Attributes:	Design/Problem Analysis/Communication Skills

General Guidelines When Writing Programs:

- Include the following comments at the top of your source codes

```
// -----------------------------------------------------
// Assignment (include number)
// Written by: (include your name and student ID)
// For COMP 248 Section (your section) – Winter 2022
// -----------------------------------------------------
```

- In a comment, give a general explanation of what your program does. As the programming questions get more complex, the explanations will get lengthier.
- Include comments in your program describing the main steps in your program. Focus in your comments rather on the why than the how.
- Display a welcome message.
- Display clear prompts for users when you are expecting the user to enter data from the keyboard.
- All output should be displayed with clear messages and in an easy-to-read format.
- End your program with a closing message so that the user knows that the program has terminated.

Question 1 (*6pts*) – Simple COVID-19 Diagnostics Expert System

With regard to the ravaging impact of the COVID-19 pandemic which is caused by the SARS-CoV-2; the World Health Organization (WHO) has long made public some symptoms, which the general populace can employ as a basic first-aid reference/guide, to diagnose the severity of a patient's symptom(s). Thus, the table below illustrates the severity of these symptoms in patients, based on clinical records, since February 2020 till date.

Symptom Code	Symptom Category	Symptom Description
10	**Most Common Symptoms**	Fever
11		Cough
12		Tiredness
13		Loss of Taste and/or Smell
14	**Less Common Symptoms**	Sore Throat
15		Headache
16		Body Aches and/or Pains
17		Diarrhoea
18		Skin Rash

19		Fingers/Toes Discoloration
20		Red and/or Irritated Eyes
21	**Critical Symptoms**	Shortness of Breath
22		Confusion and/or Loss of Speech
23		Chest Pains
24 to 127	**No Obvious Symptoms**	
-128 to 9		

Therefore, write a Java class/program such that your source code will accomplish the following:

1. Name of the class/program = `A2_Q1`.
2. Display all the `Symptom Codes` (from 10 – 23 only) and the corresponding `Symptom Descriptions` to the user using the following format:
   `Symptom Code` **=>** `Symptom Description`.
   Do not include the `Symptom Category` in your screen display to the user.
3. Display a prompt message for the user to enter a `Symptom Code`.
4. The `Symptom Codes`: 10 – 13, 14 – 20, and 21 – 23 indicate the `Most Common Symptoms`, the `Less Common Symptoms`, and the `Critical Symptoms` of COVID-19, respectively.
5. Validate the user's input to ensure that a valid (`numeric value` or `Symptom Code` has been entered. If otherwise, display the respective error message and end the program with a note to the user to retry again.
6. If a user enters a valid `numeric value` or `Symptom Code`, process the input within your code and return the respective `Symptom Category` alongside some corresponding advice note as shown below:

Symptom Category	**Advice Note**
Most Common Symptoms	You are experiencing a common symptom with regard to either COVID-19 or a respiratory infection (e.g. flu). Kindly isolate yourself as soon as possible, and endeavor to perform a PCR (Polymerase Chain Reaction) test to confirm your COVID-19 status.
Less Common Symptoms	
Critical Symptoms	You are experiencing a CRITICAL/SEVERE symptom with regard to either COVID-19 or a respiratory infection (e.g. flu). Kindly isolate yourself as soon as possible and call 911, immediately.
No Obvious Symptoms	You are currently experiencing no observable symptom with regard to either COVID-19 or a respiratory infection (e.g. flu). Although, you may be asymptomatic. Thus, kindly adhere to all the COVID-19 safety regulations within your city and province.

7. Finally, display a complimentary-close message as follows:
   `Thank you! Please stay safe and healthy`.

The following are sample screen shots to illustrate the expected behavior of your program. Your program must display the same information with the same format.

```
Welcome to the Simple COVID-19 Diagnostics Expert System:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Symptom Code => Symptom Description
-----------------------------------
10 => Fever
11 => Cough
12 => Tiredness
13 => Loss of Taste and/or Smell
14 => Sore Throat
15 => Headache
16 => Body Aches and/or Pains
17 => Diarrhoea
18 => Skin Rash
19 => Fingers/Toes Discoloration
20 => Red and/or Irritated Eyes
21 => Shortness of Breath
22 => Confusion and/or Loss of Speech
23 => Chest Pains

Please enter the Symptom Code, from the aforementioned, that corresponds to your current health symptoms: 21
Symptom Status: CRITICAL SYMPTOM
You are experiencing a CRITICAL/SEVERE symptom with regard to either COVID-19 or a respiratory infection (e.g. flu).
Kindly isolate yourself as soon as possible and call 911, immediately.

Thank you! Please stay safe and healthy.
```

Figure 1. Sample1 output of Question1

```
Welcome to the Simple COVID-19 Diagnostics Expert System:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Symptom Code => Symptom Description
-----------------------------------
10 => Fever
11 => Cough
12 => Tiredness
13 => Loss of Taste and/or Smell
14 => Sore Throat
15 => Headache
16 => Body Aches and/or Pains
17 => Diarrhoea
18 => Skin Rash
19 => Fingers/Toes Discoloration
20 => Red and/or Irritated Eyes
21 => Shortness of Breath
22 => Confusion and/or Loss of Speech
23 => Chest Pains

Please enter the Symptom Code, from the aforementioned, that corresponds to your current health symptoms: 127
Symptom Status: NO OBVIOUS SYMPTOM
You are currently experiencing no observable symptom with regard to either COVID-19 or a respiratory infection (e.g. flu).
Although, you may be asymptomatic. Thus, kindly adhere to all the COVID-19 safety regulations within your city and province.

Thank you! Please stay safe and healthy.
```

Figure 2. Sample2 output of Question1

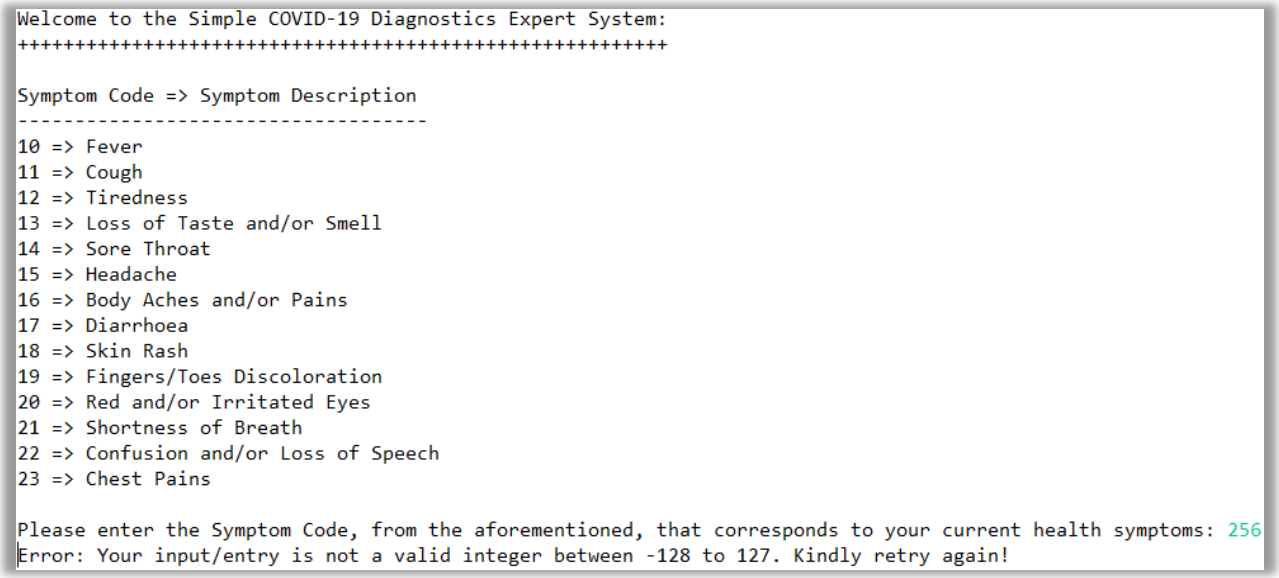

Figure 3. Sample3 output of Question1

Question 2 (*8pts*) – Simple Machine-Learning Function Program

A Learning Function is an empirical formula which is responsible for regulating the training of an agent with respect to Machine Learning and Artificial Intelligence (AI). In this regard, given below is our prototype Learning Function, Z, which tunes and regulates the training as well as learning in our AI agents. This is defined such that:

$$Z = y * \Omega$$

Given that $\Omega = 0.567143$ and y is a dynamic variable, which is defined with respect to the day of the week and the time of the day, as illustrated in the table below:

Weekday/Time	**Day-Light**	**Night-Time**
Monday	2.53	3.25
Tuesday	3.15	2.99
Wednesday	3.00	3.99
Thursday	2.41	2.68
Friday	1.99	3.73
Saturday	3.59	2.86
Sunday	2.00	2.59

Therefore, write a Java class/program such that your source code will accomplish the following:

1. Name of the class/program = `A2_Q2`.
2. Display a prompt message for the user to enter the `Weekday` and the `Time` as a single input separated via the space character. Thus, valid inputs for `Weekday` and `Time` variables are: `Monday – Sunday` and `Day-Light` as well as `Night-Time`, respectively. Also, these inputs MUST be case-insensitive.
3. Validate the user's inputs to ensure that only valid values were entered for `Weekday` and `Time` inputs. If an invalid input was received; display the respective error message, and end the program with a note to the user to retry again.

4. If the user has entered a valid input with respect to `Weekday` and `Time`, process the user's inputs to determine the corresponding value for variable, y.
5. Thereafter, compute the resultant value for our prototype learning function, Z, using the aforementioned empiric formula.
6. You MUST use the `switch()` statement to implement all your decision/selection logic with respect to the value for variable y in the `Weekday/Time` table given herein. In this regard, using an `if()` statement in lieu of `switch()` statement will be assumed as a logical failure.
7. After processing, display a confirmation message to the user in the form below:
   `Value of the prototype Learning Function, Z, is: X.XX`
8. Finally, display a complimentary-close message as follows:
   `Thank you for contributing to this Machine Learning project!`

The following are sample screen shots to illustrate the expected behavior of your program. Your program must display the same information with the same format.

```
Welcome to the Simple Machine-Learning Function Program:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Please enter a Weekday and Time, respectively: suNDaY NiGHT-tiMe

Value of the prototype Learning Function, Z, is: 1.47
Thank you for contributing to this Machine Learning project!
```

Figure 4. Sample1 output of Question2

```
Welcome to the Simple Machine-Learning Function Program:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Please enter a Weekday and Time, respectively: nIGHt-TiMe FriDAy
Error: An invalid value has been entered for the 'Time' variable. Kindly retry again!

Value of the prototype Learning Function, Z, is: 0.00
Thank you for contributing to this Machine Learning project!
```

Figure 5. Sample2 output of Question2

```
Welcome to the Simple Machine-Learning Function Program:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Please enter a Weekday and Time, respectively: SunDAYs night-time
Error: An invalid value has been entered for the 'Weekday' variable. Kindly retry again!

Value of the prototype Learning Function, Z, is: 0.00
Thank you for contributing to this Machine Learning project!
```

Figure 6. Sample3 output of Question2

Submitting Assignment 2

- Zip the source code (the .java file only please) of this assignment.
- Naming convention for zip file: Create one zip file, containing the source files for your assignment using the following naming convention:
  - The zip file should be called *a#_studentID*, where # is the number of the assignment and *studentID* is your student ID number.
    For example: for the second assignment, student 123456 would submit a zip file named a2_123456.zip
- Submit your zip via Moodle or e-Concordia webpage.
- **Be sure to keep your submission confirmation email.**

Evaluation Criteria for Assignment 2 (20 points)

Source Code	
Comments for both questions (3 pts.)	
Description of the program (authors, date, purpose)	1 pt.
Description of variables and constants	1 pt.
Description of the algorithm	1 pt.
Programming Style for all 3 questions (3 pts.)	
Use of significant names for identifiers	1 pt.
Indentation and readability	1 pt.
Welcome Banner/Closing message	1 pt.
Question 1 (6 pts.)	
Prompt user and read data	1 pt.
Detect the most appropriate data-type for `Symptom Codes`	1 pt.
Data processing based on user's input	2.5 pts.
Display results	1.5 pts.
Question 2 (8 pts.)	
Prompt user and read data	1 pt.
Process user's inputs in a case-insensitive format	1 pt.
Validate user's inputs for appropriateness based on data-type	1.5 pts.
Data processing for `Weekday/Time` table using only `switch()` statement	3 pts.
Display correct results for the prototype Learning Function	1.5 pts.
TOTAL	**20 pts.**