CIS2111 (Introduction to Object Oriented Programming) Assignment

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Faculty of ICT

Deadline: 6th January 2023

All questions should be answered using C++ code. This assignment contributes towards 50% of your final mark. You are required to submit your answer files as three separate files compressed in an archive (ZIP) file. Upload your answer file on VLE.

This assignment contains three questions. Answer all questions.

QUESTION 1

Write a class named Cylinder that consists of two attributes, **baseRadius** and **height** respectively.

Implement the following constructors:

- An empty and parameter-less constructor
- A constructor that accepts as parameters the base and the height
- Getter and setters for the two attributes

Implement class functions that:

- Allow the user to enter the values of the baseRadius and the height
- Calculate and return the volume of the cylinder (HINT: volume = Π * baseRadius^2 * height].
- Display all the information related to the cylinder including the dimensions and volume.

Implement a main function that instantiate an instance of class Cylinder having the base radius 4.5cm and the height 9.7cm. Then display all the cylinder information on the screen including its dimensions and volume.

[15 Marks]

QUESTION 2

Figure 1 illustrates a class diagram of part of a software solution that is going to be used by a stock management system of an electronics shop. Class **Component** is a super class. Classes **LogicGate** and **Capacitor** are both inheriting from the class Component.

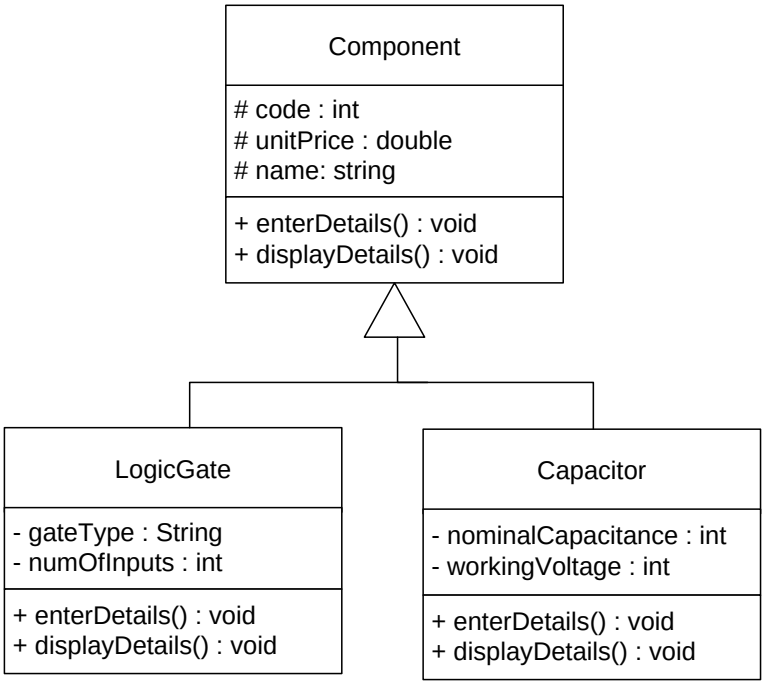

Figure 1

Answer the following questions:

1. Using the appropriate encapsulation, inheritance, and polymorphism techniques, implement the three classes illustrated in Figure 1. In your answer you must include the implementation of all the functions included in the class diagram.

2. Implement a main function and include an array of type **Component** that can store three components as shown in the code snippet below:

```
Component * components [3];
```

   Then, write the required code to instantiate the first element of the array as an object of type **Capacitor** and the two other array elements as instances of class **LogicGate**.

3. Using a *for* loop, write in the main function the required code to ask the user to enter the required details for every instance element of array **components**. Make sure to use the appropriate function(s).

[25 Marks]

QUESTION 3

You are required to implement a simple **Blackjack Casino Game** using C++ and object-oriented techniques. Blackjack is a card game that can be played between several players. In this assignment you are only required to implement a one player (command line) version of this game - the player playing against the computer (the dealer).

A pack of cards (deck) is made up of 52 cards - 4 sets of cards (hearts, diamonds, spades, and clubs) with each set having 13 cards: the numbers from 1 to 10, a King, a Jack, and a Queen. The game is played as follows:

> First the deck of cards is shuffled and then the dealer and the player take a card from the deck in turns. A player can win the game either if he/she obtains a blackjack or else if the other player loses. A blackjack is obtained when the player obtains a total of 21 points from the cards that he/she have taken from the deck. A *King*, a *Jack,* and a *Queen* count 10 points while the other cards count the number that they have on the card itself (for example a *5 of spades* counts 5 points).
>
> A player can decide to *stay*, i.e., if for instance he/she have 18 points he/she can decide to stop taking more cards. The player will win either if the dealer has lost or else if the dealer is also in a *stay* and have less points than the player. The dealer will stay if it reaches 17 points.

In this assignment a considerable number of marks are going to be given on how well the program is designed from an object-oriented perspective.

[60 Marks]

[Total of 100 marks]