CS-1004 Object Oriented Programming Spring-2024
ASSIGNMENT-03

CASE STUDY

In this question, you need to write a host of classes, and place them in a reasonable

hierarchy. Description:

==========

Design a class ALU which include the following attributes:

1. NoOfAdders: an integer
2. NoOfSubtractor: an integer
3. NoOfRegisters: an integer
4. sizeOfRegisters: an integer

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Design a class ControlUnit which includes the following:

1. clock: a float

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Design a class CPU which is composed of ALU and CU. Data members are:

1. alu: a ALU
2. cu: a Control Unit

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

Intel/AMD CPUs or AppleSilicon is a CPU, with a difference of architecture (x86 for Intel/AMD and AppleSilicon being ARM64). Furthermore, AppleSilicon will have an integrated GPU (AppleGPU)

==========

Design a class MainMemory which includes the following:

1. capacity: an int
2. technologyType: a string (Possible values: Semiconductor, Silicon)

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Design a class Port which includes the following:

1. type: a string (Possible values: VGA Port,I/O Port,USB Port,HDMI Port etc)
2. baud_rate: an int

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Design a class MotherBoard which is composed of Ports (IO ports, VGI ports etc) and aggregated with MainMemory:

1. mm: A MainMemory
2. ports: ports array

The class has the following member functions.

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Design a class PhysicalMemory which includes the following:

1. capacity: an int

The class has the following member functions.

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

DDR4/5 or LPDDR4/5 (LowPower DDR) is a PhysicalMemory. Intel and AMD systems use DDR4/5 while AppleSilicon based systems use LPDDR4/5.

==========

Design a class Computer which is aggregated of PhysicalMemory, CPU and MotherBoard, includes the following:

1. pm: A PhysicalMemory
2. mb: A MotherBoard
3. cpu: A CPU

The class has the following member functions.
1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

GraphicsCard Class, with the following attributes:
1. brand: a string
2. memorySize: an int
3. price: a double

The class has the following member functions:
1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

Nvidia, AMD or AppleGPU is a type of GPU. Nvidia and AMD GPUs are discrete, while AppleGPU is integrated in the CPU.

==========

StorageDevice Class, with the following attributes:
1. type: a string (e.g., HDD, SSD)
2. capacity: an int
3. price: a double

The class has the following member functions:
1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

Consumer HDD or NAS HDD is a type of HDD.

==========

NetworkCard Class, with the following attributes:
1. type: a string (e.g., Ethernet, Wi-Fi)
2. speed: an int
3. price: a double

The class has the following member functions:
1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

PowerSupply Class with the following attributes:

1. wattage: an int
2. efficiencyRating: a string (e.g., 80 Plus Bronze, 80 Plus Gold)
3. price: a double

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Battery Class with the following attributes:

1. capacity: an int

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

==========

Case Class with the following attributes:

1. formFactor: a string (e.g., ATX, Micro ATX)
2. color: a string

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

Please note that a computer/PC case will have a price attached to it, while for laptops and tablets, there is no price for the case.

==========

ComputerAssembly Class with the attributes based on the objects of the aforementioned classes, and additionally:

1. totalPrice: a double.

The class has the following member functions:

1. A constructor initializing the attributes with default parameters.
2. A constructor initializing the attributes with Overloaded Constructors.
3. Getters and Setters of the class data members.

Note: PC and Macs are a type of ComputerAssembly in the context of this assignment. Hence, they will consist of the necessary correct components that are relevant to their type (e.g. Mac will have an AppleSilicon CPU, and not AMD CPU). ***Hence, all components required to create a complete PC or Mac must be present.***

To check the scenario, ***in the main function, create a new Computer Object (PC or Mac) by taking all necessary***

specifications from the user. In case of an incorrect input, your code must provide the error to the user and restart the process. Finally, you would need to display the specifications and the price of the computer.

==========

Furthermore, provide a detailed UML diagram in the following manner:

1. The UML diagram must consist of all classes as used in your code.
2. Illustrate the relationships between classes (Composition, Aggregation or Inheritance).
3. In your UML diagram, the class names must correspond to the class names you have used in your code.
4. The attributes and methods names must also correspond to the same names as used in your classes.