

Object Oriented Paradigm

Lab 12

Topic(s): Abstract Classes, Multiple Inheritance, Diamond Problem and Virtual Functions.

IMPORTANT INSTRUCTIONS:

Please keep in mind the following points while coding. Violating any of these will result in credit deduction.

- There should be no memory leakage in your class.
- Make functions, objects, variables as constant wherever possible.
- Create Default, Parameterized and Copy Constructor whether mentioned or not.
- Implement destructor for each class.
- Create Setters and Getters for all attributes.
- Follow the appropriate naming conventions as explained in class.

Task 1:

Governments and companies worldwide are becoming increasingly concerned with carbon footprints (annual releases of carbon dioxide into the atmosphere) from buildings burning various types of fuels for heat, vehicles burning fuels for power, and the like. Many scientists blame these greenhouse gases for the phenomenon called global warming.

Write an abstract class CarbonFootprint with only a pure virtual getCarbonFootprint method. Have each of your classes inherit from that abstract class and implement the getCarbonFootprint method to calculate an appropriate carbon footprint for that class. For the calculation purposes, you can use the following formulas.

Write a function display(carbonFootprint *) to display carbon footprints of each object.

Formulas:

Electricity

$\text{CO}_2 \text{ emissions in pounds} = (\text{average amount of electric bill per month} \div \text{price per kwh}) \times \text{electricity emissions factor} \times \text{months in a year}$

Price per kwh average for Pakistan = Rs 8.00

Electricity emissions factor = 1.37

Natural Gas

$\text{CO}_2 \text{ emissions in pounds} = (\text{average amount of natural gas bill per month} \div \text{price per thousand cubic feet}) \times \text{natural gas emissions factor} \times \text{months in a year}$

Price per thousand cubic feet average for Pakistan = RS 3.00

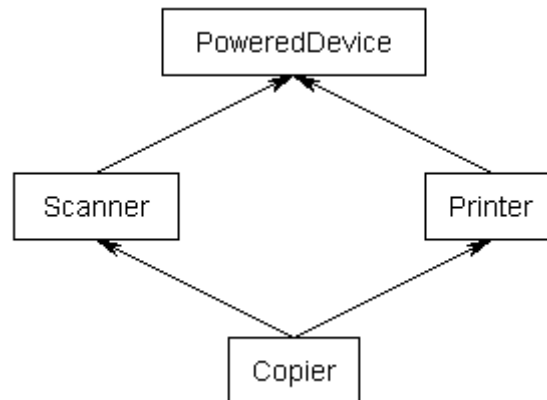
Natural Gas emissions factor = 120.61

Vehicles

$\text{CO}_2 \text{ emissions in pounds} = ((\text{number of miles driven per week} \times \text{weeks in a year}) \div \text{fuel efficiency per vehicle}) \times \text{pounds of CO}_2 \text{ emitted per gallon} \times \text{emissions of greenhouse gases other than CO}_2$

Task 2:

Provide the C++ implementation of following scenario



Solve the above diamond problem. The PowerDevice has attribute PDID. While the Scanner and Printer classes has attributes SID and PID respectively. Provide overloaded constructors for the PowerDevice, Scanner and Copier Classes which displays the attributes values. Create only copier class object and pass values to the constructor.