

## VIT - Vellore

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### BCSE102P\_Structured and Object Oriented Programming Lab\_VL2024250502365

#### VIT V\_Structured and OOP\_Lab 6\_COD\_Easy\_Hierachical Inheritance

Attempt : 1

Total Mark : 20

Marks Obtained : 20

#### Section 1 : Coding

##### 1. Problem Statement

You are a sales representative at an electronics store. A customer is interested in purchasing a new television and refrigerator. You can input and display information about the devices and calculate the following relevant metrics:

Class Descriptions:

Device Class:

Contains brand and price as attributes.Provides a display method to show device brand and price.

Television Class (Inherits from Device):

Inherits attributes brand and price from the Device class. Has an additional attribute screenSize to store the screen size. Contains a calculatePixelDensity method to calculate the pixel density.

Refrigerator Class (Inherits from Device):

Inherits attributes brand and price from the Device class. Includes an extra attribute capacity to represent the storage capacity. Provides the calculateEnergyEfficiency method to calculate the energy efficiency.

Formulas used:

For Television:

Screen size in cm = screen size in inches \* 2.54

Pixel Density = (resolution width \* resolution height) / (screen size in cm \* screen size in cm)

For Refrigerator:

Capacity in Cubic Feet = capacity in liters \* 0.0353

Energy Efficiency = Energy consumption in KWh / capacity cubic feet

### **Answer**

```
#include <iostream>
#include <iomanip>
using namespace std;

// Base class Device
class Device {
protected:
    string brand;
    double price;
public:
    Device(string b, double p) : brand(b), price(p) {}
    void display() {
        cout << "Device: " << brand << ", Price: $" << price << endl;
    }
};

// Derived class Television
```

```

class Television : public Device {
private:
    int screenSize;
    int resolutionWidth;
    int resolutionHeight;
public:
    Television(string b, double p, int s, int w, int h) : Device(b, p), screenSize(s),
    resolutionWidth(w), resolutionHeight(h) {}
    double calculatePixelDensity() {
        double screenSizeCM = screenSize * 2.54;
        return (resolutionWidth * resolutionHeight) / (screenSizeCM *
    screenSizeCM);
    }
    void displayInfo() {
        cout << "Television Information:" << endl;
        display();
        cout << "Screen Size: " << screenSize << " inches (" << fixed <<
    setprecision(1) << screenSize * 2.54 << " cm)" << endl;
        cout << "Pixel Density: " << fixed << setprecision(1) <<
    calculatePixelDensity() << " pixels per square centimeter" << endl << endl;
    }
};

```

// Derived class Refrigerator

```

class Refrigerator : public Device {
private:
    int capacity;
    double energyConsumption;
public:
    Refrigerator(string b, double p, int c, double e) : Device(b, p), capacity(c),
    energyConsumption(e) {}
    double calculateEnergyEfficiency() {
        double capacityCubicFeet = capacity * 0.0353;
        return energyConsumption / capacityCubicFeet;
    }
    void displayInfo() {
        cout << "Refrigerator Information:" << endl;
        display();
        cout << "Capacity: " << capacity << " liters (" << fixed << setprecision(1) <<
    capacity * 0.0353 << " cubic feet)" << endl;
        cout << "Energy Efficiency: " << fixed << setprecision(1) <<
    calculateEnergyEfficiency() << " kWh per cubic foot" << endl;
    }
};

```

```

    }
}

int main() {
    string tvBrand, fridgeBrand;
    double tvPrice, fridgePrice;
    int screenSize, fridgeCapacity;
    int resolutionWidth, resolutionHeight;
    double energyConsumption;

    // Reading input values
    cin >> tvBrand >> tvPrice >> screenSize;
    cin >> fridgeBrand >> fridgePrice >> fridgeCapacity;
    cin >> resolutionWidth >> resolutionHeight;
    cin >> energyConsumption;

    // Creating objects
    Television tv(tvBrand, tvPrice, screenSize, resolutionWidth, resolutionHeight);
    Refrigerator fridge(fridgeBrand, fridgePrice, fridgeCapacity,
energyConsumption);

    // Displaying information
    tv.displayInfo();
    fridge.displayInfo();

    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement

Stiles is teaching about the concept of circumference through Hierarchical Inheritance.

He has created a base class called Circle that contains radius as an attribute. From this base class, he has derived two classes: Class1 and Class2. Each of these derived classes has a method to calculate the circumference of a circle.

Help him write the program and display the calculated circumferences using two classes.

Formulas

Circumference using class 1 =  $2 * 3.14159 * \text{radius}$   
Circumference using class 2 =  $23.14 * \text{radius}$

Refer to the below class diagram:

**Answer**

```
#include <iostream>
#include <iomanip>
using namespace std;
```

```
class Circle {
protected:
    double radius;
public:
    Circle(double r) : radius(r) {}
};
```

```
class Class1 : public Circle {
public:
    Class1(double r) : Circle(r) {}
    double calculateCircumference() {
        return 2 * 3.14159 * radius;
    }
};
```

```
class Class2 : public Circle {
public:
    Class2(double r) : Circle(r) {}
    double calculateCircumference() {
        return 23.14 * radius;
    }
};
```

```
int main() {
```

```
double radius;  
cin >> radius;  
  
// Creating objects  
Class1 obj1(radius);  
Class2 obj2(radius);  
  
// Displaying circumferences  
cout << "Class 1: " << fixed << setprecision(2) << obj1.calculateCircumference()  
<< endl;  
cout << "Class 2: " << fixed << setprecision(2) << obj2.calculateCircumference()  
<< endl;  
  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10