VIT - Vellore

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BCSE102P_Structured and Object Oriented Programming Lab_VL2024250502365

VIT V_Structured and OOP_Lab 6_COD_Hard_Hierachical Inheritance

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Write a program that calculates the total calories burned during different types of exercises. It includes three types of exercises: Cardio, Weightlifting, and Cycling. These exercises are organized in a hierarchy of classes. The Exercise class serves as the base class, and the specific exercise types are derived from it.

The Exercise class has two protected member variables: duration and weight. It also contains a constructor that initializes these variables and a pure virtual function calculateCaloriesBurned(), which must be implemented by the derived classes.

The derived classes in the hierarchy are as follows:

Cardio class: This class represents a cardio exercise. It inherits from the Exercise class and has an additional private member variable called intensity. The Cardio class implements the calculateCaloriesBurned() function to calculate the total calories burned during the cardio exercise based on the duration, weight, and intensity of the exercise.

Weightlifting class: This class represents a weightlifting exercise. It also inherits from the Exercise class and has an additional private member variable called repetitions. The Weightlifting class implements the calculateCaloriesBurned() function to calculate the total calories burned during the weightlifting exercise based on the duration, weight, and number of repetitions.

Cycling class: This class represents a cycling exercise. It also inherits from the Exercise class and has an additional private member variable called speed. The Cycling class implements the calculateCaloriesBurned() function to calculate the total calories burned during the cycling exercise based on the duration, weight, and cycling speed.

Note: The formula for calculating calories burned in Cardio exercise is:

caloriesPerMinute = 8 * intensity * weight / 200

totalCaloriesBurned = caloriesPerMinute * duration

The formula for calculating calories burned in Weightlifting exercise is:

caloriesPerRep = 5 * weight / 100

totalCaloriesBurned = caloriesPerRep * repetitions * duration

The formula for calculating calories burned in Cycling exercise is:

caloriesPerMinute = 10 * speed * weight / 500

totalCaloriesBurned = caloriesPerMinute * duration

Answer

```
// You are using GCC
#include <iostream>
#include <iomanip>
using namespace std;
```

```
class Exercise {
protected:
    int duration;
    int weight;

public:
    Exercise(int d, int w) : duration(d), weight(w) {}
    virtual int calculateCaloriesBurned() = 0;
    virtual ~Exercise() {}
};

class Cardio : public Exercise {
private:
    int intensity;

public:
    Cardio(int d, int w, int i) : Exercise(d, w), intensity(i) {}
    int calculateCaloriesBurned() override {
        int caloriesPerMinute = (8* intensity * weight) / 200;
        return (caloriesPerMinute * duration);
    }
};

class Weightlifting : public Exercise {
private:
    int repetitions;

public:
    Weightlifting(int d, int w, int r) : Exercise(d, w), repetitions(r) {}
    int calculateCaloriesBurned() override {
        int caloriesPerRep = (5 * weight) / 100;
        return (caloriesPerRep * repetitions * duration);
    }
};

class Cycling : public Exercise {
private:
    int speed;

public:
    Cycling(int d, int w, int s) : Exercise(d, w), speed(s) {}
```

```
    int calculateCaloriesBurned() override {
        int caloriesPerMinute = (10 * speed * weight) / 500;
        return (caloriesPerMinute * duration);
    }
};

int main() {
    int duration, weight, exerciseType;
    cin >> duration >> weight >> exerciseType;

    Exercise* exercise = nullptr;

    if (exerciseType == 1) {
        int intensity;
        cin >> intensity;
        exercise = new Cardio(duration, weight, intensity);
    } else if (exerciseType == 2) {
        int repetitions;
        cin >> repetitions;
        exercise = new Weightlifting(duration, weight, repetitions);
    } else if (exerciseType == 3) {
        int speed;
        cin >> speed;
        exercise = new Cycling(duration, weight, speed);
    }

    if (exercise) {
        cout << "Total calories burned: " << exercise->calculateCaloriesBurned() << "
calories" << endl;
        delete exercise;
    }

    return 0;
}
```

Status : Correct ***Marks : 10/10***