VIT - Vellore

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BCSE102P_Structured and Object Oriented Programming Lab_VL2024250502365

VIT V_Structured and OOP_Lab 6_COD_Easy_Multipath Inheritance

Attempt : 1
Total Mark : 20
Marks Obtained : 20

Section 1 : Coding

1. Problem Statement

Robin wants to create a program to manage an individual's dual roles as a student and an employee. The monthly income is calculated based on her age. As a student, a stipend of age * 100 is received, and as an employee, a salary of age * 500 is received.

The program consists of four classes:

Person - Contains individual's name and age as attributes.Student - Inherits from Person class and calculates the stipend using calculateStipend() method.Employee - Inherits from Person class and calculates the salary using calculateSalary() method.TeachingAssistant - Inherits from Student and Employee classes. It calculates and displays the individual's total monthly income by calling Student or Employee class based on role.

Refer to the below Class diagram:

Answer

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

class Person {
protected:
    string name;
    int age;
public:
    Person(string n, int a) : name(n), age(a) {}
};

class Student : virtual public Person {
public:
    Student(string n, int a) : Person(n, a) {}
    double calculateStipend() { return age * 100.0; }
};

class Employee : virtual public Person {
public:
    Employee(string n, int a) : Person(n, a) {}
    double calculateSalary() { return age * 500.0; }
};

class TeachingAssistant : public Student, public Employee {
public:
    TeachingAssistant(string n, int a) : Person(n, a), Student(n, a), Employee(n, a)
{}
    void displayIncome(char type) {
        if (type == 'S') {
            cout << name << "'s Income: Rs. " << fixed << setprecision(2) <<
calculateStipend() << endl;
        } else if (type == 'E') {
            cout << name << "'s Income: Rs. " << fixed << setprecision(2) <<
calculateSalary() << endl;
```

```
        } else {
            cout << "Invalid status!" << endl;
        }
    }
};

int main() {
    string name;
    int age;
    char type;

    cin >> name >> age >> type;

    TeachingAssistant person(name, age);
    person.displayIncome(type);

    return 0;
}
```

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

2. Problem Statement

Create a class Parent that has a method "add" which prints the addition of two integers.

Create a class child1 that is a child class of the Parent class. It has a method "sub" that prints the subtraction of two integers.

Create a class child2 that is a child class of the Parent class. It has a method "mul" that prints the multiplication of two integers.

Create a class child3 that is a child class of the Parent class. It has a method "div" that prints the division of two integers.

Create an object of the child3 class. Then, from this object, call the four methods add, sub, mul, and div inherited from the child1 class and display the results.

Answer

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

class Parent {
public:
    void add(int a, int b) {
        cout << (a + b) << endl;
    }
};

class Child1 : virtual public Parent {
public:
    void sub(int a, int b) {
        cout << (a - b) << endl;
    }
};

class Child2 : virtual public Parent {
public:
    void mul(int a, int b) {
        cout << (a * b) << endl;
    }
};

class Child3 : public Child1, public Child2 {
public:
    void div(int a, int b) {
        if (b != 0) {
            cout << fixed << setprecision(2) << (static_cast<double>(a) / b) << endl;
        } else {
            cout << "Division by zero error!" << endl;
        }
    }
};

int main() {
    int a, b;
    cin >> a >> b;

    Child3 obj;
```

```
    obj.add(a, b);
    obj.sub(a, b);
    obj.mul(a, b);
    obj.div(a, b);
    return 0;
}
```

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