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**Task 1**

#include <iostream>

using namespace std;

class Employee {

protected:

string name;

float salary;

public:

Employee(string empName, float empSalary) {

name = empName;

salary = empSalary;

}

virtual void displayDetails() {

cout << "Employee Name: " << name << endl;

cout << "Salary: $" << salary << endl;

}

};

class Manager : public Employee {

private:

float bonus;

public:

Manager(string empName, float empSalary, float empBonus) : Employee(empName, empSalary) {

bonus = empBonus;

}

void displayDetails() override {

cout << "Manager Name: " << name << endl;

cout << "Salary: $" << salary << endl;

cout << "Bonus: $" << bonus << endl;

}

};

int main() {

string name;

float salary, bonus;

cout << "Enter manager name: ";

getline(cin, name);

cout << "Enter salary: ";

cin >> salary;

cout << "Enter bonus: ";

cin >> bonus;

Manager manager(name, salary, bonus);

cout << "\nManager Details:\n";

manager.displayDetails();

return 0;

}

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**Task 2**

#include <iostream>

using namespace std;

class Vehicle {

protected:

string brand;

int speed;

public:

Vehicle(string vBrand, int vSpeed) {

brand = vBrand;

speed = vSpeed;

}

virtual void displayDetails() {

cout << "Brand: " << brand << endl;

cout << "Speed: " << speed << " km/h" << endl;

}

};

class Car : public Vehicle {

protected:

int seats;

public:

Car(string vBrand, int vSpeed, int vSeats) : Vehicle(vBrand, vSpeed) {

seats = vSeats;

}

void displayDetails() override {

Vehicle::displayDetails();

cout << "Seating Capacity: " << seats << " seats" << endl;

}

};

class ElectricCar : public Car {

private:

int batteryLife;

public:

ElectricCar(string vBrand, int vSpeed, int vSeats, int vBatteryLife) : Car(vBrand, vSpeed, vSeats) {

batteryLife = vBatteryLife;

}

void displayDetails() override {

Car::displayDetails();

cout << "Battery Life: " << batteryLife << " km" << endl;

}

};

int main() {

string brand;

int speed, seats, batteryLife;

cout << "Enter brand: ";

getline(cin, brand);

cout << "Enter speed: ";

cin >> speed;

cout << "Enter seating capacity: ";

cin >> seats;

cout << "Enter battery life (in km): ";

cin >> batteryLife;

ElectricCar eCar(brand, speed, seats, batteryLife);

cout << "\nElectric Car Details:\n";

eCar.displayDetails();

return 0;

}

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**Task 3**

#include <iostream>

using namespace std;

class Person {

protected:

string name;

int age;

public:

Person(string pName, int pAge) {

name = pName;

age = pAge;

}

virtual void displayDetails() {

cout << "Name: " << name << endl;

cout << "Age: " << age << endl;

}

};

class Teacher : virtual public Person {

protected:

string subject;

public:

Teacher(string pName, int pAge, string pSubject) : Person(pName, pAge) {

subject = pSubject;

}

void displayDetails() override {

Person::displayDetails();

cout << "Subject Expertise: " << subject << endl;

}

};

class Researcher : virtual public Person {

protected:

string researchArea;

public:

Researcher(string pName, int pAge, string pResearchArea) : Person(pName, pAge) {

researchArea = pResearchArea;

}

void displayDetails() override {

cout << "Research Area: " << researchArea << endl;

}

};

class Professor : public Teacher, public Researcher {

private:

int publications;

public:

Professor(string pName, int pAge, string pSubject, string pResearchArea, int pPublications)

: Person(pName, pAge), Teacher(pName, pAge, pSubject), Researcher(pName, pAge, pResearchArea) {

publications = pPublications;

}

void displayDetails() override {

Person::displayDetails();

cout << "Subject Expertise: " << subject << endl;

cout << "Research Area: " << researchArea << endl;

cout << "Publications: " << publications << endl;

}

};

int main() {

string name, subject, researchArea;

int age, publications;

cout << "Enter professor's name: ";

getline(cin, name);

cout << "Enter age: ";

cin >> age;

cin.ignore();

cout << "Enter subject expertise: ";

getline(cin, subject);

cout << "Enter research area: ";

getline(cin, researchArea);

cout << "Enter number of publications: ";

cin >> publications;

Professor professor(name, age, subject, researchArea, publications);

cout << "\nProfessor Details:\n";

professor.displayDetails();

return 0;

}

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**Task 4**

#include <iostream>

using namespace std;

class Account {

protected:

int accountNumber;

float balance;

public:

Account(int accNum, float accBalance) {

accountNumber = accNum;

balance = accBalance;

}

virtual void displayDetails() {

cout << "Account Number: " << accountNumber << endl;

cout << "Balance: $" << balance << endl;

}

};

class SavingsAccount : public Account {

private:

float interestRate;

public:

SavingsAccount(int accNum, float accBalance, float accInterestRate) : Account(accNum, accBalance) {

interestRate = accInterestRate;

}

void displayDetails() override {

Account::displayDetails();

cout << "Interest Rate: " << interestRate << "%" << endl;

}

};

class CheckingAccount : public Account {

private:

float overdraftLimit;

public:

CheckingAccount(int accNum, float accBalance, float accOverdraftLimit) : Account(accNum, accBalance) {

overdraftLimit = accOverdraftLimit;

}

void displayDetails() override {

Account::displayDetails();

cout << "Overdraft Limit: $" << overdraftLimit << endl;

}

};

int main() {

int accountNumber;

float balance, interestRate, overdraftLimit;

cout << "Enter savings account number: ";

cin >> accountNumber;

cout << "Enter balance: ";

cin >> balance;

cout << "Enter interest rate: ";

cin >> interestRate;

SavingsAccount savings(accountNumber, balance, interestRate);

cout << "\nEnter checking account number: ";

cin >> accountNumber;

cout << "Enter balance: ";

cin >> balance;

cout << "Enter overdraft limit: ";

cin >> overdraftLimit;

CheckingAccount checking(accountNumber, balance, overdraftLimit);

cout << "\nSavings Account Details:\n";

savings.displayDetails();

cout << "\nChecking Account Details:\n";

checking.displayDetails();

return 0;

}

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**Task 5**

#include <iostream>

using namespace std;

class Device {

protected:

int deviceID;

bool status;

public:

Device(int dID, bool dStatus) {

deviceID = dID;

status = dStatus;

}

virtual void displayDetails() {

cout << "Device ID: " << deviceID << endl;

cout << "Status: " << (status ? "On" : "Off") << endl;

}

};

class SmartPhone : virtual public Device {

protected:

float screenSize;

public:

SmartPhone(int dID, bool dStatus, float dScreenSize) : Device(dID, dStatus) {

screenSize = dScreenSize;

}

void displayDetails() override {

Device::displayDetails();

cout << "Screen Size: " << screenSize << " inches" << endl;

}

};

class SmartWatch : virtual public Device {

protected:

bool heartRateMonitor;

public:

SmartWatch(int dID, bool dStatus, bool dHeartRateMonitor) : Device(dID, dStatus) {

heartRateMonitor = dHeartRateMonitor;

}

void displayDetails() override {

cout << "Heart Rate Monitor: " << (heartRateMonitor ? "Yes" : "No") << endl;

}

};

class SmartWearable : public SmartPhone, public SmartWatch {

private:

int stepCounter;

public:

SmartWearable(int dID, bool dStatus, float dScreenSize, bool dHeartRateMonitor, int dStepCounter)

: Device(dID, dStatus), SmartPhone(dID, dStatus, dScreenSize), SmartWatch(dID, dStatus, dHeartRateMonitor) {

stepCounter = dStepCounter;

}

void displayDetails() override {

Device::displayDetails();

cout << "Screen Size: " << screenSize << " inches" << endl;

cout << "Heart Rate Monitor: " << (heartRateMonitor ? "Yes" : "No") << endl;

cout << "Step Counter: " << stepCounter << " steps" << endl;

}

};

int main() {

int deviceID, stepCounter;

bool status, heartRateMonitor;

float screenSize;

cout << "Enter Device ID: ";

cin >> deviceID;

cout << "Enter status (1 for On, 0 for Off): ";

cin >> status;

cout << "Enter screen size (in inches): ";

cin >> screenSize;

cout << "Does it have a heart rate monitor? (1 for Yes, 0 for No): ";

cin >> heartRateMonitor;

cout << "Enter step counter value: ";

cin >> stepCounter;

SmartWearable wearable(deviceID, status, screenSize, heartRateMonitor, stepCounter);

cout << "\nSmart Wearable Details:\n";

wearable.displayDetails();

return 0;

}

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