VIT - Vellore

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BCSE102P_Structured and Object Oriented Programming Lab_VL2024250502365

VIT V_Structured and OOP_Lab 7_COD_Easy_Virtual Functions

Attempt : 1
Total Mark : 20
Marks Obtained : 20

Section 1 : Coding

1. Problem Statement

Renu works for a retail store that sells two types of items: wooden items and electronics. The store needs a program to calculate the total amount for a customer's purchase based on their choice of item type and the quantity or cost of the item(s).

Create a base class, ItemType, with one virtual function.

virtual double calculateAmount()

Create a class called wooden that extends ItemType with a number of items and cost as its private attributes. Obtain the data members and override the virtual function.

amount = number of items * cost

Create a class for electronics that extends ItemType with cost as its private attribute. Obtain the data member and override the virtual function.

amount = 80% of the amount (20% discount)

In the main method, obtain a choice.

If the choice is 1, create an object for the wooden class and call the method.

If the choice is 2, create an object for the electronics class and call the method.

Answer

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

class wodden{
   protected:
      int num;
      double cost;
   public:
      void set(int a, double b){
      num=a;
      cost=b;
      }
      virtual double calculateAmount(){
         return num*cost;
      }
};

class electronics{
   protected:
      double cost;
   public:
      void set(double b){
         cost=b;
      }
```

```
    virtual double calculateAmount(){
        return cost*0.8;
    }
};

int main(){
    int ch;
    int num;
    double price;
    cin>>ch;

    if(ch==1){
        cin>>num>>price;
        wodden w;
        w.set(num,price);
        cout<<fixed<<setprecision(2)<<w.calculateAmount();
    }
    else if(ch==2){
        cin>>price;
        electronics e;
        e.set(price);
        cout<<fixed<<setprecision(2)<<e.calculateAmount();
    }
    else{
        cout<<"Invalid choice.";
    }
    return 0;
}
```

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

2. Problem Statement

Imagine you are creating a SleepTracker program that demonstrates the use of inheritance and virtual functions. The program helps users analyze their sleep patterns, distinguishing between weekday and weekend sleep durations.

Implement a base class called SleepTracker with attributes for bedtime

and wakeup times and virtual functions for input and duration calculation.

Derive two subclasses, WeekdaySleep and WeekendSleep, inheriting from SleepTracker. Override the virtual functions for specific behavior on weekdays and weekends.

Answer

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

class SleepTracker{
   public:
      int bedtime,minbed,wakeuptime,minup;
      SleepTracker(int x,int y,int z,int s){
         bedtime=x;
         minbed=y;
         wakeuptime=z;
         minup=s;
      }
      virtual void duration()=0;
};

class WeekdaySleep: public SleepTracker{
   public:
      using SleepTracker::SleepTracker;
      int hours,mins;
      void duration() {
         if(bedtime>wakeuptime || (bedtime==wakeuptime && minbed>minup)){
            hours=(24-bedtime)+wakeuptime;
         }
         else{
            hours=wakeuptime-bedtime;
         }
         if(minbed>minup){
            mins=(60-minbed)+minup;
            hours--;
         }
         else{
            mins=minup-minbed;
         }
```

```
        cout<<"Weekday: "<<hours<<"h "<<mins<<"m"<<endl;
    }
    int send1(){
        return hours;
    }
    int send2(){
        return mins;
    }
};

class WeekendSleep: public SleepTracker{
    public:
    using SleepTracker::SleepTracker;
    int hours,mins;
    void duration() {
        if(bedtime>wakeuptime || (bedtime==wakeuptime && minbed>minup)){
            hours=(24-bedtime)+wakeuptime;
        }
        else{
            hours=wakeuptime-bedtime;
        }
        if(minbed>minup){
            mins=(60-minbed)+minup;
            hours=hours-1;
        }
        else{
            mins=minup-minbed;
        }
        cout<<"Weekend: "<<hours<<"h "<<mins<<"m"<<endl;
    }
    int send1(){
        return hours;
    }
    int send2(){
        return mins;
    }
};

int main(){
    int a,b,c,d,e,f,g,h;
    cin>>a>>b>>c>>d;
    cin>>e>>f>>g>>h;
```

```
    WeekdaySleep wkd(a,b,c,d);
    WeekendSleep wed(e,f,g,h);
    wkd.duration();
    wed.duration();
    int w,x,y,z;
    w=wkd.send1();
    x=wkd.send2();
    y=wed.send1();
    z=wed.send2();
    if(w==y && x==z){
       cout<<"User slept the same amount on weekdays and weekend.";
    }
    else if((w==y && x>z)||w>y){
       cout<<"User slept more on weekdays.";
    }
    else if((y==w && z>x)||(y>w) ){
       cout<<"User slept more on the weekend.";
    }
    return 0;
}
```

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