|  |  |
| --- | --- |
| File:COMSATS new logo.jpg - Wikimedia Commons  OBJECT ORIENTED PROGRAMMING  *Lab Task 06*  *COMPOSTION OF CLASSES*  *HAS A RELATIONSHIP* | **submitted by:**  **Shahzaneer Ahmed**  **registration number:**  **sp21-bcs-087**  **submitted to:**  **mA’M sANEEHA aMIR**  **date of submission:**  **mARCH 30, 2022** |

Composition

**# Composition**

*> supports `HAS-A-RELATIONSHIP`*

**\*\*\***

*> Using one class type as a data member in some other class type*

- It should not be confused with `Inheritance Concepts`

- Both the classes are independent in nature.

**\*\*\***

**# Benefits**

1. Reusability

2. Better Code Structure

3. Easy Debugging

4. Simplification of tasks

**\*\*\***

QUESTION 1

## Address Class:

public class Address{

    private int home;

    private String street;

    private String city;

    public int getHome(){

        return home;

    }

    public String getStreet(){

        return street;

    }

    public String getCity(){

        return city;

    }

    public void setHome(int h){

*this*.home = h;

    }

    public void setStreet(String s){

*this*.street = s;

    }

    public void setCity(String c){

*this*.city = c;

    }

    public Address(){

*// is see Address k non primitive data members ki by default values set hojayengi.*

    }

    public Address(int h , String s, String c){

*this*.home = h;

*this*.street = s;

*this*.city = c;

    }

}

## Book Class:

public class Book {

    private Person author;

    private String bookName;

    private String publisher;

*// default constructor*

    public Book(){

        author = new Person();

*// to get the rid of null pointer exception*

    }

*// overloaded constructor.*

    public Book(Person author , String bookName , String publisher){

*this*.author = author;

*this*.bookName = bookName;

*this*.publisher = publisher;

    }

    public void display(){

*this*.author.display();

        System.out.println(*this*.bookName);

        System.out.println(*this*.publisher);

    }

    public void getDisplay(){

        System.out.println(*this*.author.getFirstName());

        System.out.println(*this*.author.getLastName());

        System.out.println(*this*.author.getAddress().getHome());

        System.out.println(*this*.author.getAddress().getStreet());

        System.out.println(*this*.author.getAddress().getCity());

        System.out.println(*this*.bookName);

        System.out.println(*this*.publisher);

    }

    public boolean homeNumber(){

        if(*this*.author.getAddress().getHome() == 10){

            return true;

        }

        return false;

    }

}

## Person Class:

public class Person {

    private String firstName;

    private String lastName;

    private Address address;

    public Person(){

*// no Args Constructor*

*this*.address = new Address();

    }

    public Person(String fname ,String lname,Address address){

*this*.firstName = fname;

*this*.lastName = lname;

*this*.address = address;

    }

    public String getFirstName(){

        return firstName;

    }

    public String getLastName(){

        return lastName;

    }

    public Address getAddress(){

        return address;

    }

    public void setFirstName(String fname){

*this*.firstName = fname;

    }

    public void setLastName(String lname){

*this*.lastName = lname;

    }

    public void setAddress(Address address){

*this*.address = address;

    }

    public void display(){

        System.out.println(*this*.firstName);

        System.out.println(*this*.lastName);

        System.out.println(*this*.address.getHome() + " " + *this*.address.getStreet() + " " + *this*.address.getCity());

    }

    public boolean checkCapital(){

        if(*this*.address.getCity().equalsIgnoreCase("Islamabad")){

            return true;

        }

        return false;

    }

}

## Runner:

public class Runner{

    public static void main(String[] args) {

        Address a1 = new Address(34,"NIH Colony","Islamabad");

        Person p1 = new Person("Shahzaneer", "Ahmed", a1);

*// p1.display();*

*// System.out.println(p1.checkCapital());*

        Book b1 = new Book(p1, "Raah e Zeest", "Dogar publishers");

        b1.display();

    System.out.println(b1.homeNumber()); *// home number 34 hai tou false dega*

*// a1.setHome(10); // now home is 10!*

    b1.getDisplay();

    b1.display();  *// info is modified!*

    System.out.println(b1.homeNumber());

    }

}

Question 2

## Address Class:

public class Address{

    private int home;

    private String street;

    private String city;

    public int getHome(){

        return home;

    }

    public String getStreet(){

        return street;

    }

    public String getCity(){

        return city;

    }

    public void setHome(int h){

*this*.home = h;

    }

    public void setStreet(String s){

*this*.street = s;

    }

    public void setCity(String c){

*this*.city = c;

    }

    public Address(){

*// is see Address k non primitive data members ki by default values set hojayengi.*

    }

    public Address(int h , String s, String c){

*this*.home = h;

*this*.street = s;

*this*.city = c;

    }

}

## Person Class:

public class Person {

    private String firstName;

    private String lastName;

    private Address address;

    public Person(){

*// no Args Constructor*

*this*.address = new Address();

    }

    public Person(String fname ,String lname,Address address){

*this*.firstName = fname;

*this*.lastName = lname;

*this*.address = address;

    }

    public String getFirstName(){

        return firstName;

    }

    public String getLastName(){

        return lastName;

    }

    public Address getAddress(){

        return address;

    }

    public void setFirstName(String fname){

*this*.firstName = fname;

    }

    public void setLastName(String lname){

*this*.lastName = lname;

    }

    public void setAddress(Address address){

*this*.address = address;

    }

    public void display(){

        System.out.println(*this*.firstName);

        System.out.println(*this*.lastName);

        System.out.println(*this*.address.getHome() + " " + *this*.address.getStreet() + " " + *this*.address.getCity());

    }

    public boolean checkCapital(){

        if(*this*.address.getCity().equalsIgnoreCase("Islamabad")){

            return true;

        }

        return false;

    }

}

## Runner:

public class RunnerCompAddress {

    public static void main(String[] args) {

        Address a1 = new Address(34,"NIH Colony","Islamabad");

        Person p1 = new Person("Shahzaneer", "Ahmed", a1);

        p1.display();

        System.out.println(p1.checkCapital());

    }

}

Question 3

## Employee Class:

public class Employee {

    private String firstName;

    private String lastName;

    private My\_Date birthDate;

    private My\_Date hireDate;

    private Job job;

    Employee()

    {

        birthDate = new My\_Date();

        hireDate = new My\_Date();

        this.job = new Job();

    }

    Employee( String f, String l, My\_Date b, My\_Date h , Job job)

    {

        firstName = f;

        lastName =l;

        birthDate =b;

        hireDate =h;

*this*.job = job;

    }

    public void setBirthDate(My\_Date b)

    {

        birthDate = b;

    }

    public My\_Date getBirthDate()

    {

        return birthDate;

    }

    public void setHireDate(My\_Date b)

    {

        hireDate = b;

    }

    public My\_Date getHireDate()

    {

        return hireDate;

    }

    public Job getJob(){

        return *this*.job;

    }

    public void setJob(Job job){

*this*.job = job;

    }

    public void display()

    {

        System.out.println(firstName);

        System.out.println(lastName);

    hireDate.display();

    birthDate.display();

    job.display();

    }

    public boolean isExperienced(int currentYear){

        if (currentYear - *this*.getHireDate().getYear() >= 5){

            return true;

        }

        return false;

    }

    public boolean checkSalary(){

        if(*this*.job.setSalary() >= 50000){

            return true;

        }

        return false;

    }

}

## Job Class:

public class Job {

    private String designation;

    private double salary;

    private int id;

*// Constructors*

    public Job(){}

    public Job(String d, double s , int i){

*this*.designation = d;

*this*.salary = s;

*this*.id = i;

    }

*// getters*

    public String setDesignation(){

        return *this*.designation;

    }

    public double setSalary(){

        return *this*.salary;

    }

    public int setId(){

        return *this*.id;

    }

*// setters*

    public void setDesignation(String d){

*this*.designation = d;

    }

    public void setId(int i){

*this*.id = i;

    }

    public void setSalary(double s){

*this*.salary = s;

    }

    public void display(){

        System.out.println(*this*.id);

        System.out.println(*this*.salary);

        System.out.println(*this*.designation);

    }

}

## Date Class:

public class My\_Date {

    private int day;

    private int month;

    private int year;

    public My\_Date(int day, int month, int year) {

*this*.day = day;

*this*.month = month;

*this*.year = year;

    }

    public My\_Date() {

    }

    public int getDay() {

        return day;

    }

    public void setDay(int day) {

*this*.day = day;

    }

    public int getMonth() {

        return month;

    }

    public void setMonth(int month) {

*this*.month = month;

    }

    public int getYear() {

        return year;

    }

    public void setYear(int year) {

*this*.year = year;

    }

    public void display() {

        System.out.println(day + "  " + month + "  " + year);

    }

}

## Runner:

public class Runner {

    public static void main(String[] args) {

        My\_Date d1 = new My\_Date(25, 11, 2002);

        My\_Date d2 = new My\_Date(1, 1, 2022);

        Job j1 = new Job("Associate Software Engineer", 100000, 1);

        Employee e1 = new Employee("Shahzaneer", "Ahmed",d1 , d2, j1);

        e1.display();

        System.out.println(e1.checkSalary());  *//should return true!*

    }

}

Question 4:

Employee Class:

public class Employee {

    private String firstName;

    private String lastName;

    private My\_Date birthDate;

    private My\_Date hireDate;

    Employee()   *//deafault*

    {

        birthDate = new My\_Date();

        hireDate = new My\_Date();

    }

    Employee( String f, String l, My\_Date b, My\_Date h)

    {

        firstName = f;

        lastName =l;

        birthDate =b;

        hireDate =h;

    }

    public void setBirthDate(My\_Date b)

    {

        birthDate = b;

    }

    public My\_Date getBirthDate()

    {

        return birthDate;

    }

    public void setHireDate(My\_Date b)

    {

        hireDate = b;

    }

    public My\_Date getHireDate()

    {

        return hireDate;

    }

    public void display()

    {

        System.out.println(firstName);

        System.out.println(lastName);

*//  System.out.println(hireDate);*

    hireDate.display();

    birthDate.display();

    }

*//assume Date class doesnot have a display function*

    public void display2()

    {

        System.out.println(firstName);

        System.out.println(lastName);

        System.out.println(hireDate.getDay() + "  "+ hireDate.getMonth() + "  "+ hireDate.getYear());

        System.out.println(birthDate.getDay() + "  "+ birthDate.getMonth() + "  "+ birthDate.getYear());

    }

    public boolean isExperienced(int currentYear){

        if (currentYear - *this*.getHireDate().getYear() >= 5){

            return true;

        }

        return false;

    }

}

Date Class:

public class My\_Date {

    private int day;

    private int month;

    private int year;

    public My\_Date(int day, int month, int year) {

*this*.day = day;

*this*.month = month;

*this*.year = year;

    }

    public My\_Date() {

    }

    public int getDay() {

        return day;

    }

    public void setDay(int day) {

*this*.day = day;

    }

    public int getMonth() {

        return month;

    }

    public void setMonth(int month) {

*this*.month = month;

    }

    public int getYear() {

        return year;

    }

    public void setYear(int year) {

*this*.year = year;

    }

    public void display() {

        System.out.println(day + "  " + month + "  " + year);

    }

}

Runner:

public class Runner {

    public static void main(String[] args) {

*// Employee e1 = new Employee();*

    My\_Date d1 = new My\_Date (6,5, 1987);

    My\_Date d2 = new My\_Date (14,1,2014);

    Employee e2 = new Employee("Saneeha", "Aamir", d1 , d2);

    e2.display();

    System.out.println(e2.isExperienced(2022));  *//should have to return true!*

*// My\_Date d3 = new My\_Date(5,2,1990);*

*// e1.setHireDate(d3);*

*// My\_Date temp = e2.getBirthDate();*

*// System.out.println(temp.getDay() + " " + temp.getMonth());*

*// temp.display();*

}

}