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| File:COMSATS new logo.jpg - Wikimedia Commons  OBJECT ORIENTED PROGRAMMING  *Class Assignment 2*  *Abstraction + Polymorphism* | **submitted by:**  **Shahzaneer Ahmed**  **registration number:**  **sp21-bcs-087**  **submitted to:**  **mA’M sANEEHA aMIR**  **date of submission:**  **APRIL 23, 2022** |

Question 1

# Source Code

## Exam

import java.util.Scanner;

public class Exam {

    private Question[] question = new Question[10];

    private Student student;

    private double score;

    public Exam(Question[] question, Student student) {

*this*.question = question;

*this*.student = student;

    }

    public void takeExam() {

        Scanner input = new Scanner(System.in);

        for (int i = 0; i < *this*.question.length; i++) {

            if (question[i].getQuestionStatement() != null) {

                System.out.println("Question " + i + " : " + question[i].getQuestionStatement());

                String ans = input.nextLine();

                question[i].setAnswer(ans);

                if (question[i].getAnswer() != null && question[i].getAnswer() != "") {

                    score += 10;

                }

            }

        }

    }

    public void displayStatus() {

        if (score >= 50) {

            System.out.println("Pass ");

        } else {

            System.out.println("fail ");

        }

    }

    public String getQuestion() {

        String toReturn = "";

        for (int i = 0; i < question.length; i++) {

            toReturn += question[i].getQuestionStatement() + "\n";

        }

        return toReturn;

    }

    public void setQuestion(Question[] question) {

*this*.question = question;

    }

    public Student getStudent() {

        return *this*.student;

    }

    public void setStudent(Student student) {

*this*.student = student;

    }

    public double getScore() {

        return *this*.score;

    }

    public void setScore(double score) {

*this*.score = score;

    }

    @Override

    public String toString() {

        return "{" +

            ", student='" + getStudent().toString() + "'" +

            ", score='" + getScore() + "'" +

            "}";

    }

}

## Person

public class Person {

    private String name;

    private int age;

    public Person() {

    }

    public Person(String name, int age) {

*this*.name = name;

*this*.age = age;

    }

    public String getName() {

        return *this*.name;

    }

    public void setName(String name) {

*this*.name = name;

    }

    public int getAge() {

        return *this*.age;

    }

    public void setAge(int age) {

*this*.age = age;

    }

    @Override

    public String toString() {

        return "{" +

            " name='" + getName() + "'" +

            ", age='" + getAge() + "'" +

            "}";

    }

}

## Question

public class Question {

    private int id;

    private String questionStatement;

    private String answer;

    public Question() {

    }

    public Question(int id, String questionStatement) {

*this*.id = id;

*this*.questionStatement = questionStatement;

    }

    @Override

    public String toString() {

        return "{" +

            " id='" + getId() + "'" +

            ", questionStatement='" + getQuestionStatement() + "'" +

            ", answer='" + getAnswer() + "'" +

            "}";

    }

    public int getId() {

        return *this*.id;

    }

    public void setId(int id) {

*this*.id = id;

    }

    public String getQuestionStatement() {

        return *this*.questionStatement;

    }

    public void setQuestionStatement(String questionStatement) {

*this*.questionStatement = questionStatement;

    }

    public String getAnswer() {

        return *this*.answer;

    }

    public void setAnswer(String answer) {

*this*.answer = answer;

    }

}

## Student

public class Student extends Person {

    private String regID;

    private String password;

    public Student() {

    }

    public Student(String name, int age, String regID, String password) {

*super*(name, age);

*this*.regID = regID;

*this*.password = password;

    }

    public String getRegID() {

        return *this*.regID;

    }

    public void setRegID(String regID) {

*this*.regID = regID;

    }

    public String getPassword() {

        return *this*.password;

    }

    public void setPassword(String password) {

*this*.password = password;

    }

    @Override

    public String toString() {

        return *super*.toString() +"{" +

            " regID='" + getRegID() + "'" +

            ", password='" + getPassword() + "'" +

            "}";

    }

}

## Runner

public class Runner {

    public static void main(String[] args) {

        Student s1 = new Student("Shahzaneer Ahmed", 19, "0579", "pakistan123");

        int id = 1;

        Question q1 = new Question(id, "Religious views  ? ");

        Question q2 = new Question(++id, "Political views  ? ");

        Question q3 = new Question(++id, " Best Friend ?");

        Question q4 = new Question(++id, "Biggest inspiration ?");

        Question q5 = new Question(++id, "Favourite Personality from Past ?");

        Question q6 = new Question(++id, "Favourite personality Current  ?");

        Question q7 = new Question(++id, "Your Mentor ? ");

        Question q8 = new Question(++id, "your life goals ?");

        Question q9 = new Question(++id, "One thing you feels nostalgic about ? ");

        Question q10 = new Question(++id, "biggest Strength ? ");

        Exam e1 = new Exam(new Question[] { q1, q2, q3, q4, q5, q6, q7, q8, q9, q10 }, s1);

        e1.takeExam();

        e1.displayStatus();

*// System.out.println(e1.getStudent());*

*// System.out.println(e1.getQuestion());*

    }

}

Question 2

# Source Code

## Person

public abstract class Person {

    private String firstName;

    private My\_Date HireData;

    private boolean hasCompanyCar;

    public Person(String firstName, My\_Date HireData, boolean hasCompanyCar) {

*this*.firstName = firstName;

*this*.HireData = HireData;

*this*.hasCompanyCar = hasCompanyCar;

    }

    public String getFirstName() {

        return *this*.firstName;

    }

    public void setFirstName(String firstName) {

*this*.firstName = firstName;

    }

    public My\_Date getHireData() {

        return *this*.HireData;

    }

    public void setHireData(My\_Date HireData) {

*this*.HireData = HireData;

    }

    public boolean isHasCompanyCar() {

        return *this*.hasCompanyCar;

    }

    public boolean getHasCompanyCar() {

        return *this*.hasCompanyCar;

    }

    public void setHasCompanyCar(boolean hasCompanyCar) {

*this*.hasCompanyCar = hasCompanyCar;

    }

    public abstract double earning();

    @Override

    public String toString() {

        return "{" +

            " firstName='" + getFirstName() + "'" +

            ", HireData='" + getHireData().toString() + "'" +

            ", hasCompanyCar='" + isHasCompanyCar() + "'" +

            "}";

    }

}

## Employee

public class Employee extends Person{

    private String designation;

    private int wage;

    private int workingHours;

    public Employee(String firstName, My\_Date HireData, boolean hasCompanyCar, String designation, int wage,

            int workingHours) {

*super*(firstName, HireData, hasCompanyCar);

*this*.designation = designation;

*this*.wage = wage;

*this*.workingHours = workingHours;

    }

    public String getDesignation() {

        return *this*.designation;

    }

    public void setDesignation(String designation) {

*this*.designation = designation;

    }

    public int getWage() {

        return *this*.wage;

    }

    public void setWage(int wage) {

*this*.wage = wage;

    }

    public int getWorkingHours() {

        return *this*.workingHours;

    }

    public void setWorkingHours(int workingHours) {

*this*.workingHours = workingHours;

    }

    @Override

    public double earning() {

        return wage \* workingHours;

    }

    @Override

    public String toString() {

        return *super*.toString() +  "{" +

            " designation='" + getDesignation() + "'" +

            ", wage='" + getWage() + "'" +

            ", workingHours='" + getWorkingHours() + "'" +

                "}"

            + "Earnings " +  earning();

    }

}

## Manager

import java.util.Arrays;

public class Manager extends Person {

    private Employee[] e = new Employee [3];

    private int noOfProjects;

    private int projectPay;

    public Manager(String firstName, My\_Date HireData, boolean hasCompanyCar, Employee[] e, int noOfProjects,

            int projectPay) {

*super*(firstName, HireData, hasCompanyCar);

*this*.e = e;

*this*.noOfProjects = noOfProjects;

*this*.projectPay = projectPay;

    }

    public Employee[] getE() {

        return *this*.e;

    }

    public void setE(Employee[] e) {

*this*.e = e;

    }

    public int getNoOfProjects() {

        return *this*.noOfProjects;

    }

    public void setNoOfProjects(int noOfProjects) {

*this*.noOfProjects = noOfProjects;

    }

    public int getProjectPay() {

        return *this*.projectPay;

    }

    public void setProjectPay(int projectPay) {

*this*.projectPay = projectPay;

    }

    @Override

    public String toString() {

        return *super*.toString() + "{" +

            " e='" +Arrays.toString(getE())  + "'" +

            ", noOfProjects='" + getNoOfProjects() + "'" +

            ", projectPay='" + getProjectPay() + "'" +

                "}" + "earnings " + earning();

    }

    @Override

    public double earning() {

        return getNoOfProjects() \* getProjectPay();

    }

}

## Date

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;

    }

    @Override

    public String toString() {

        return day + " " + month + " " + year;

    }

}

## Runner

public class Runner {

    public static void main(String[] args) {

        Person persons[] = new Person[2];

        My\_Date d1 = new My\_Date(12,2,2022);

        persons[0] = new Employee("Laiba Imran", d1, false, "Cyber Analyst", 2500, 6);

*// Employes array*

        Employee e1 = new Employee("Laiba Imran", d1, false, "Cyber Analyst", 2500, 6);

        Employee e2 = new Employee("Rabbiya Tabassum", d1, false, "Networking intern", 2500, 6);

        Employee e3 = new Employee("Abdur Rehman", d1, false, "Penetrating tester", 2500, 6);

        Employee eArr [] = {e1,e2,e3};

        persons[1] = new Manager("Raheem Arif", d1, true, eArr, 3, 50000);

*// now calling them polymorphically*

        for (int i = 0; i < persons.length; i++) {

            System.out.println(persons[i].toString());

        }

    }

}