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| File:COMSATS new logo.jpg - Wikimedia Commons  OBJECT ORIENTED PROGRAMMING  *Lab Task 05*  *PASSING OBJECTS | COPY CONSTRUCTORS | EQUAL METHODS* | **submitted by:**  **Shahzaneer Ahmed**  **registration number:**  **sp21-bcs-087**  **submitted to:**  **mA’M sANEEHA aMIR**  **date of submission:**  **mARCH 14, 2022** |

Question 1

## Program Class

public class Rectangle{

    private int length;

    private int width;

    public void setLength(int l){

        if(l>0){

            length = l;

        }

    }

    public void setWidth(int w){

        if(w>0){

            width = w;

        }

    }

    public int getLength(){

        return length;

    }

    public int getWidth(){

        return width;

    }

    public Rectangle(){}

*// One argument Constructor aik hi bn skta hai.*

*// ! multiple contructor method overloading k through hotay hain!!*

    public Rectangle(int l){

        if(l>0){

            length = l;

        }

    }

*// yeh error isliay derha hai k yeh isse duplicate method smjh rha hai*

*// Recalling concept of method overloading.*

*// public Rectangle(int w){*

*//     if(w>0){*

*//         width = w;*

*//     }*

*// }*

    public Rectangle(int l ,int w){

        if(l>0 && w>0){

            length = l;

            width= w;

        }

    }

    public double CalculateArea(){

        double area = length\*width;

        return area;

    }

*// copy contructor for copying the content of a object in a new object*

    public Rectangle(Rectangle obj){

*// copy constructor*

*// jo object argument main dia jaye us k hisaab se new object banalia jaye.*

*this*.length = obj.length;

*this*.width = obj.width;

    }

    public Rectangle compareArea(Rectangle a){

        if(a.CalculateArea()<*this*.CalculateArea()){

*// ager object a ka area kam ho crrentObject k area se tou*

*// return krdo bara area*

            return *this*;

        }

        return a;

    }

*// Equals Function for checking if the content is equal or not.*

    public boolean equals(Rectangle a){

        if(*this*.length == a.length && *this*.width == a.width){

            return true;

        }

        return false;

    }

}

## Runner Class

public class RectangleRunner {

    public static void main(String[] args) {

*// object  1*

        Rectangle r1 = new Rectangle();

        r1.setLength(2);

        r1.setWidth(4);

*// object 2*

        Rectangle r2 = new Rectangle(4,6);

*//Dono alag alag areas hain tou inka address bhi alag hi hoga*

        System.out.println(r1);

        System.out.println(r2);

        Rectangle r3 = new Rectangle(r1.compareArea(r2));

        System.out.println("The area of rec 1 is "+r1.CalculateArea());

        System.out.println("The area of rec 2 is "+r2.CalculateArea());

        System.out.println("The area of rec 3 is "+r3.CalculateArea());

*// r3.CalculateArea();*

    }

}

Question 2

## Program Class

public class Account {

    private double balance;

    private int yearOfOpening;

    private String cnic;

    public void setBalance(double balance){

        if(balance>=0){

*this*.balance = balance;

        }

    }

    public double getBalance(){

        return balance;

    }

    public void setCnic(String cnic){

*this*.cnic = cnic;

    }

    public String getCnic(){

        return *this*.cnic;

    }

    public void setYearOfOpening(int yearOfOpening){

*this*.yearOfOpening = yearOfOpening;

    }

    public int getYearOfOpening(){

        return *this*.yearOfOpening;

    }

    public Account(){

    }

    public Account(double balance){

        if(balance>=0){

*this*.balance = balance;

        }

    }

*// Three Arguments Constructor*

    public Account(double balance , int yearOfOpening , String cnic){

        if(balance>=0){

*this*.balance = balance;

        }

        if(yearOfOpening>0){

*this*.yearOfOpening = yearOfOpening;

        }

*this*.cnic = cnic;

    }

    public double withdrawMoney( double withdrawingMoney){

        if(withdrawingMoney>=0 && (balance>=withdrawingMoney)){

            System.out.println("The current Balance after withdrawal is "+(balance-withdrawingMoney));

            balance = balance - withdrawingMoney;

            return withdrawingMoney;

        }

        System.out.println("The withdrawal amount cannot be negative or greater than the balance");

        return 0;

    }

    public double depositMoney(double depositAmount){

        if(depositAmount>0){

            System.out.println("The current Balance after Deposit is "+(balance+depositAmount));

            balance = balance + depositAmount;

            return depositAmount;

        }

        System.out.println("The deposited amount cannot be negative");

        return 0;

    }

*//! this is wrong approach as hamain kisi dusre object uska cnic check nhi krna*

*//! hamara saara kaam current object se related hona chahiay*

*// boolean checkValidCnic(Account a){*

*//     if(a.cnic.length()==13){*

*//         return true;*

*//     }*

*//     return false;*

*// }*

*// new work for today's lab*

    public Account(Account a){

*this*.balance = a.balance;

*this*.cnic = a.cnic;

*this*.yearOfOpening = a.yearOfOpening;

    }

    public boolean checkValidCnic(){

        if(cnic.length()==13){

            return true;

        }

        return false;

    }

    public boolean equalContents(Account a){

        if((*this*.balance == a.balance) && (*this*.yearOfOpening == a.yearOfOpening) && (*this*.cnic.equals(a.cnic))){

            return true;

        }

        return false;

    }

}

## Runner Class

public class AccountRunner {

    public static void main(String[] args) {

        Account a1 = new Account();

        a1.setBalance(12000);

        a1.setYearOfOpening(2022);

        a1.setCnic("3520274698181");

        Account a2 = new Account();

        a2.setBalance(12000);

        a2.setYearOfOpening(2022);

        a2.setCnic("352027469818");

*// !this is wrong approach as koi bhi method aik object k liay chalta hai*

*// System.out.println(a1.checkValidCnic(a2));*

        System.out.println(a1.checkValidCnic());

    }

}

Question 3

## Program Class

public class Book {

    private String author;

    private String [] chapters = new String [5];

    public void setauthor(String author){

*this*.author = author;

    }

    public void setChapters(String [] chapters){

        for(int i=0;i<5;i++){

*this*.chapters[i] = chapters[i];

        }

    }

    public String getauthor(){

        return author;

    }

    public String [] getchapters(){

        return chapters;

    }

    public Book(){

    }

    public Book(String author , String [] chapters){

*this*.author = author;

        for(int i=0;i<5;i++){

*this*.chapters[i] = chapters[i];

        }

    }

    public Book(Book b){

*this*.author = b.author;

        for(int i=0;i<5;i++){

*this*.chapters[i] = b.chapters[i];

        }

    }

    public boolean compareAuthors(Book b){

        if(b.author.equals(*this*.author)){

            return true;

        }

        return false;

    }

    public boolean compareChapters(Book b){

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

            if(b.chapters[i]!=*this*.chapters[i]){

                return false;

            }

        }

        return true;

    }

    public boolean equalContents(Book b){

        boolean chapterE = false,AuthorE = false;

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

            if(b.chapters[i]!=*this*.chapters[i]){

                chapterE = false;

            }

            else chapterE = true;

        }

        if(*this*.author == b.author){

            AuthorE = true;

        }

        if(chapterE && AuthorE){

            return true;

        }

        return false;

    }

}

## Runner Class

public class BookRunner {

    public static void main(String[] args) {

        Book b1 = new Book("Shahzaneer Ahmed",new String [] {"Languages","primitives","paradigms","ABC","ABC"});

        Book b2 = new Book("Shahzaneer Ahmed",new String [] {"Languages","primitives","paradigms","ABC","ABC"});

        System.out.println(b1.equalContents(b2));

    }

}

Question 4

## Program Class

public class Point {

    private int x;

    private int y;

    public void setX(int x){

*this*.x = x;

    }

    public void setY(int y){

*this*.y = y;

    }

    public int getX(){

        return x;

    }

    public int getY(){

        return y;

    }

    public Point(){

    }

    public Point(int x , int y){

*this*.x = x;

*this*.y = y;

    }

    public Point(int x){

*this*.x = x;

    }

    public Point(Point p){

*this*.x = p.x;

*this*.y = p.y;

    }

    public boolean equalContents(Point p){

        if(*this*.x == p.x && *this*.y == p.y){

            return true;

        }

        return false;

    }

    public Point addTwopoints(Point p ){

        Point p1 = new Point();

        p1.x = *this*.x + p.x;

        p1.y = *this*.y + p.y;

        return p1;

    }

    public Point addThreepoints(Point p , Point q ){

        Point p1 = new Point();

        p1.x = *this*.x + p.x + q.x;

        p1.y = *this*.y + p.y + q.y;

        return p1;

    }

    public void move(){

        System.out.println("The Point is Moving. . .");

    }

}

## Runner Class

public class PointRunner {

    public static void main(String[] args) {

        Point p1 = new Point(2,5);

        Point p2 = new Point(3,7);

        Point p3 = new Point(2,2);

*// this is basically pointer for the object!*

        Point a = p3.addThreepoints(p1, p2);

        System.out.println(a.getX());

        System.out.println(a.getY());

    }

}

Question 5

## Program Class

import java.util.Arrays;

public class University{

    private String uniName;

    private String location;

    private  String rectorName;

    private String departments [] = new  String [20];

    public University(){} *//Default Constructor*

    public University(String UniName, String RectorName){

*// constructor with two parameters*

        uniName = UniName;

        rectorName = RectorName;

    }

    public University(String UniName, String RectorName,String Location,String [] depart){

*// constructor with all the parameters*

        uniName = UniName;

        location = Location;

        rectorName = RectorName;

        if(depart.length<=departments.length){

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

                departments[i] = depart[i];

            }

        }

        else{

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

                departments[i] = depart[i];

            }

        }

    }

    public void setValues(String UniName, String RectorName,String Location,String [] depart){

        uniName = UniName;

        location = Location;

        rectorName = RectorName;

        if(depart.length<=departments.length){

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

                departments[i] = depart[i];

            }

        }

        else{

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

                departments[i] = depart[i];

            }

        }

    }

*// setters*

    public void setUniName(String UniName){

*this*.uniName = UniName;

    }

    public void setLocation(String Location){

*this*.location = Location;

    }

    public void setRectorName(String RectorName){

*this*.rectorName = RectorName;

    }

    public void setDepartment(String [] depart){

        if(depart.length<=departments.length){

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

                departments[i] = depart[i];

            }

        }

        else{

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

                departments[i] = depart[i];

            }

        }

    }

    public void addDepartment(String depName){

        if(departments[departments.length-1]!=null){

            System.out.println("The department list is already filled! we cannot add "+depName);

            System.out.println("It Includes the following departments");

            System.out.println(Arrays.toString(departments));

        }

        else{

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

            if(departments[i]==null){

                departments[i] = depName;

                break;

            }

        }

    }

    }

*// getters*

    public String getUniversityName(){

        return uniName;

    }

    public String getLocation(){

        return location;

    }

    public String getRectorName(){

        return rectorName;

    }

    public String [] getDepartments(){

        return departments;

    }

    public void display(){

        System.out.println("The name is "+uniName);

        System.out.println("The location is "+location);

        System.out.println("The Rector Name is "+rectorName);

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

                if(departments[i]!=null){

                    System.out.println(departments[i]);

                    }

                }

                }

    public boolean capitalCheck(){

        if(location.equalsIgnoreCase("islamabad")){

            return true;

        }

        return false;

    }

    public boolean locationCheck(String location){

        if(*this*.location.equalsIgnoreCase(location)){

            return true;

        }

        return false;

    }

*// Copy Constructor*

    public University( University U){

*this*.uniName = U.uniName;

*this*.location = U.location;

*this*.rectorName = U.rectorName;

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

*this*.departments[i] = U.departments[i];

        }

    }

*// Equal Contents*

    public boolean equals(University U){

        boolean uni = false, loc= false , rector = false, depart = false;

        if(U.uniName == *this*.uniName){

            uni = true;

        }

        if(U.location == *this*.location){

            loc = true;

        }

        if(U.rectorName == *this*.rectorName){

            rector = true;

        }

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

            if(departments[i]!=null){

                if(U.departments[i]!=*this*.departments[i]){

                    depart = false;

                    break;

                }

                depart = true;

            }

        }

        if(uni && depart && loc && rector) return true;

        return false;

    }

    public University compareDepartments(University U){

        int counterThis = 0;

        int counterArg = 0;

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

            if(*this*.departments[i]!=null){

                counterThis++;

            }

            if(U.departments[i]!=null){

                counterArg++;

            }

        }

        if(counterArg>counterThis) return U;

        return *this*;

    }

}

## Runner Class

import java.util.Arrays;

public class UniversityRunner {

    public static void main(String[] args) {

        University u1 = new University("CUI ISB", "Dr Afzal");

        u1.setLocation("Islamabad");

        u1.addDepartment("CS");

        u1.addDepartment("Cyber");

        u1.addDepartment("AI");

        u1.addDepartment("DS");

        u1.addDepartment("SE");

        University u2 = new University("FAST Lahore", "Dr Abrar");

        u2.setLocation("Lahore");

        u2.addDepartment("CS");

        u2.addDepartment("SE");

        University u3 = new University(u1.compareDepartments(u2));

*// System.out.println(u1.equals(u3));*

        System.out.println(Arrays.toString(u3.getDepartments()));

        System.out.println(u3.getLocation());

*// u1.display();*

*// u2.display();*

    }

}

Question 6

## Program Class

public class Student {

    private String name;

    private int [] Result = new int [5];

    public void setName(String name){

*this*.name = name;

    }

    public void setResult(int [] result){

        for(int i=0;i<5;i++){

            if(Result[i]>=0){

*this*.Result[i] = result[i];

            }

        }

    }

    public String getName(){

        return name;

    }

    public int [] getResult(){

        return Result;

    }

    public Student(){

    }

    public Student(String name , int [] result){

*this*.name = name;

        for(int i=0;i<5;i++){

*this*.Result[i] = result[i];

        }

    }

    public double CalculateAverage(){

        double sum = 0;

        for(int i=0;i<5;i++){

            sum+=Result[i];

        }

        double average = sum/5;

        return average;

    }

}

## Runner Class

public class StudentRunner {

    public static void main(String[] args) {

        Student s1 = new Student("Shahzaneer Ahmed", new int [] {10,20,20,15,18});

        Student s2 = new Student("Fatima Mahsud", new int [] {13,20,20,15,18});

        Student s3 = new Student(s1.CompareAverage(s2));

        System.out.println(s3.getName());

    }

}