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DATA STRUCTURES & ALGORITHMS

#02

Object Oriented Programming

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| Roll Number: 22SP-017-SE Section: A |
| Work submitted on: MS Teams |

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| --- | --- | --- | --- |
| **Maximum Marks** | **Performance** | **Viva** | **Total** |
| **Marks Obtained** |  |  |  |
| **Remarks (if any)** |  | | |
|  | | | |
| **Experiment evaluated by** | | | |
| Instructor Name: | | | |
| Signature: | | | |

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| --- |
| OOP Concepts Related Tasks |

**Task 1**

Write a program to print the area of a rectangle by creating a class named 'Area' having two methods. First method named as 'setDim' takes length and breadth of rectangle as parameters and the second method named as 'getArea' returns the area of the rectangle. Length and breadth of rectangle are entered through keyboard.

import java.util.Scanner;

public class Area

{

    int length, breadth;

    void setDim(int l, int b)

    {

        length = l;

        breadth = b;

    }

    int getArea()

    {

        return length\*breadth;

    }

    public static void main(String args[])

    {

        int l,b;

        Scanner obj = new Scanner(System.in);

        System.out.println("Enter the length of rectangle: ");

        l = obj.nextInt();

        System.out.println("Enter the breadth of rectangle: ");

        b = obj.nextInt();

        Area a = new Area();

        a.setDim(l,b);

        int area = a.getArea();

        System.out.println("The area of the rectangle will be: " + area);

        obj.close();

    }

}

**Task 2:**

Print the average of three numbers entered by user by creating a class named 'Average' having a method to calculate and print the average.

import java.util.Scanner;

public class Average {

    static void display(int[] a)

    {

        float sum = 0f;

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

            sum += a[i];

        }

        float avg = sum/3;

        System.out.println("The average of three numbers is: " + avg);

    }

    public static void main(String[] args) {

        Scanner obj = new Scanner(System.in);

        System.out.println("Enter three numbers to find their average: ");

        int n[] = new int[3];

        for(int i=0; i<3; ++i )

        {

            n[i] = obj.nextInt();

        }

        display(n);

        obj.close();

    }

}

**Task 3:**

Create a class named 'Member' having the following members:

Data members

1 - Name

2 - Age

3 - Phone number

4 - Address

5 - Salary

It also has a method named 'printSalary' which prints the salary of the members.

Two classes 'Employee' and 'Manager' inherits the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same.

public class Member {

    String name, phone, address;

    int age;

    float salary;

    Member(String name, int age, String phone, String address, float salary)

    {

        this.name = name;

        this.age = age;

        this.phone = phone;

        this.address = address;

        this.salary = salary;

    }

    void printSalary()

    {

        System.out.println("Member Salary: " + salary);

        System.out.println();

    }

}

public class Manager extends Member {

    String specialization; String department;

    Manager(String name, int age, String phone, String address, float salary,String specialization, String department)

    {

        super( name, age, phone, address, salary);

        this.specialization = specialization;

        this.department = department;

    }

    void printDetails()

    {

        System.out.println("Name: " + name);

        System.out.println("Age: " + age);

        System.out.println("Phone: " + phone);

        System.out.println("Address: " + address);

        System.out.println("Name: " + salary);

        System.out.println("Name: " + specialization);

        System.out.println("Name: " + department);

        System.out.println();

    }

}

public class Employee extends Member {

    String specialization; String department;

    Employee(String name, int age, String phone, String address, float salary,String specialization, String department)

    {

        super( name, age, phone, address, salary);

        this.specialization = specialization;

        this.department = department;

    }

    void printDetails()

    {

        System.out.println("Name: " + name);

        System.out.println("Age: " + age);

        System.out.println("Phone: " + phone);

        System.out.println("Address: " + address);

        System.out.println("Name: " + salary);

        System.out.println("Name: " + specialization);

        System.out.println("Name: " + department);

        System.out.println();

    }

}

public class Main\_Member {

    public static void main(String[] args) {

        Member m = new Member("SAAD", 21, "03030128372", "Malir", 75000);

        Employee e1 = new Employee("SAAD", 21, "03419238746", "Malir",

        95000, "Java Developer", "Software Engineering");

        Manager m1 = new Manager("SAAD", 21, "03223238746", "Malir",

        85000, "Project Manager", "Software Engineering");

        m.printSalary();

        e1.printDetails();

        m1.printDetails();

    }

}

**Task 4:**

Create a class to print an integer and a character with two methods having the same name but different sequence of the integer and the character parameters.  
For example, if the parameters of the first method are of the form (int n, char c), then that of the second method will be of the form (char c, int n).

import java.util.Scanner;

public class Overloading {

    void Display(int a, char b)

    {

        System.out.println("First Number: "+a+" Then Character: "+b);

    }

    void Display(char a, int b)

    {

        System.out.println("First Character: "+a+" Then Number: "+b);

    }

    public static void main(String[] args) {

        Scanner obj = new Scanner(System.in);

        System.out.println("Enter a number");

        int n = obj.nextInt();

        System.out.println("Enter a number");

        char c = obj.next().charAt(0);

        Overloading a1 = new Overloading();

        a1.Display(n, c);

        a1.Display(c, n);

        obj.close();

    }

}

**Task 5:**

Suppose a class 'A' has a static method to print "Parent". Its subclass 'B' also has a static method with the same name to print "Child". Now call this method by the objects of the two classes. Also, call this method by an object of the parent class refering to the child class i.e. A obj = new B()

public class A {

    static void display()

    {

        System.out.println("Parent");

    }

}

public class B extends A {

    static void display()

    {

        System.out.println("Child");

    }

    public static void main(String args[])

    {

        A p1 = new A();

        B c1 = new B();

        A p2 = new B();

        A.display();

        B.display();

        B.display();

    }

}

**Task 6:**

We have to calculate the percentage of marks obtained in three subjects (each out of 100) by student A and in four subjects (each out of 100) by student B. Create an abstract class 'Marks' with an abstract method 'getPercentage'. It is inherited by two other classes 'A' and 'B' each having a method with the same name which returns the percentage of the students. The constructor of student A takes the marks in three subjects as its parameters and the marks in four subjects as its parameters for student B. Create an object for eac of the two classes and print the percentage of marks for both the students.

package Task6;

public abstract class Marks {

    abstract double getPercentage();

}

package Task6;

public class A extends Marks {

    double sub1,sub2,sub3;

    A(double sub1, double sub2, double sub3){

        this.sub1 = sub1;

        this.sub2 = sub2;

        this.sub3 = sub3;

    }

    double getPercentage(){

        double percent = (sub1 + sub2 + sub3) \* 100/ 300;

        return percent;

    }

}

package Task6;

import java.util.Scanner;

public class B extends Marks{

    double sub1,sub2,sub3,sub4;

    B(double sub1, double sub2, double sub3,double sub4){

        this.sub1 = sub1;

        this.sub2 = sub2;

        this.sub3 = sub3;

        this.sub4 = sub4;

    }

    double getPercentage()

    {

        double percent = (sub1 + sub2 + sub3 + sub4) \* 100/ 400;

        return percent;

    }

    public static void main(String[] args) {

        Scanner ob = new Scanner(System.in);

        System.out.println("Student A, give the marks of 3 subjects out of 100 ");

        double s1 = ob.nextDouble();

        double s2 = ob.nextDouble();

        double s3 = ob.nextDouble();

        A a1 = new A(s1, s2, s3);

        System.out.println("The % of Student A is: "+a1.getPercentage());

        System.out.println("Student B, give the marks of 4 subjects out of 100 ");

        s1 = ob.nextDouble();

        s2 = ob.nextDouble();

        s3 = ob.nextDouble();

        double s4 = ob.nextDouble();

        B b1 = new B(s1, s2, s3, s4);

        System.out.println("The % of Student B is: "+b1.getPercentage());

        ob.close();

    }

}