

10. Area of different shapes using overloaded functions**Program:**

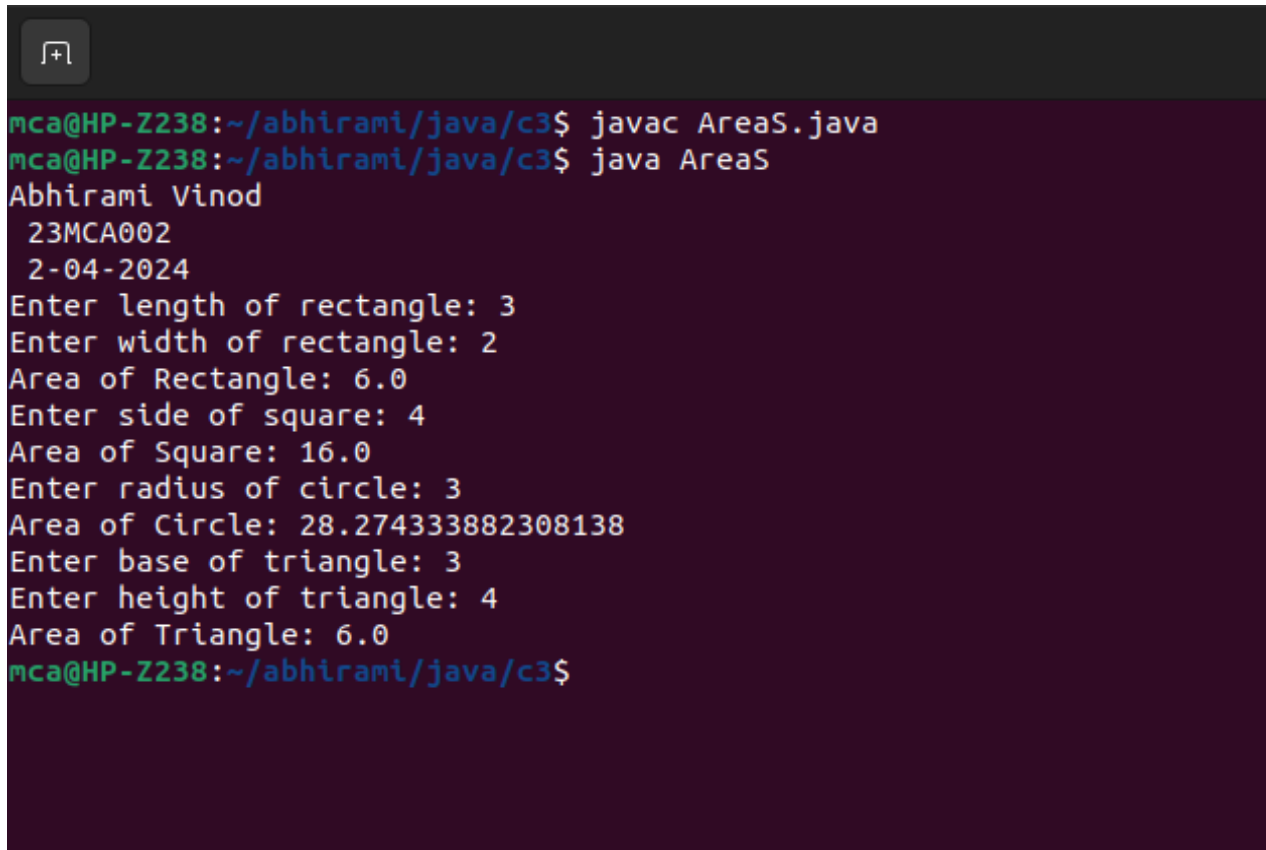
```
import java.util.Scanner;
public class AreaS{
    public static double calculateArea(double length, double width) {
        return length * width;
    }
    public static double calculateArea(double side) {
        return side * side;
    }
    public static double calculateArea(float radius) {
        return Math.PI * radius * radius;
    }
    public static double calculateArea(float base, double height) {
        return 0.5 * base * height;
    }
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        // Rectangle
        System.out.println("Abhirami Vinod \n 23MCA002 \n 2-04-2024");
        System.out.print("Enter length of rectangle: ");
        double length = scanner.nextDouble();
        System.out.print("Enter width of rectangle: ");
        double width = scanner.nextDouble();
        double rectangleArea = calculateArea(length, width);
        System.out.println("Area of Rectangle: " + rectangleArea);

        // Square
        System.out.print("Enter side of square: ");
        double side = scanner.nextDouble();
        double squareArea = calculateArea(side);
        System.out.println("Area of Square: " + squareArea);

        // Circle
        System.out.print("Enter radius of circle: ");
        float radius = scanner.nextFloat();
        double circleArea = calculateArea(radius);
```

```
System.out.println("Area of Circle: " + circleArea);

// Triangle
System.out.print("Enter base of triangle: ");
float base = scanner.nextFloat();
System.out.print("Enter height of triangle: ");
double height = scanner.nextDouble();
double triangleArea = calculateArea(base, height);
System.out.println("Area of Triangle: " + triangleArea);
scanner.close();
}
}
```

Output:

```
mca@HP-Z238:~/abhiraami/java/c3$ javac AreaS.java
mca@HP-Z238:~/abhiraami/java/c3$ java AreaS
Abhiraami Vinod
23MCA002
2-04-2024
Enter length of rectangle: 3
Enter width of rectangle: 2
Area of Rectangle: 6.0
Enter side of square: 4
Area of Square: 16.0
Enter radius of circle: 3
Area of Circle: 28.274333882308138
Enter base of triangle: 3
Enter height of triangle: 4
Area of Triangle: 6.0
mca@HP-Z238:~/abhiraami/java/c3$
```

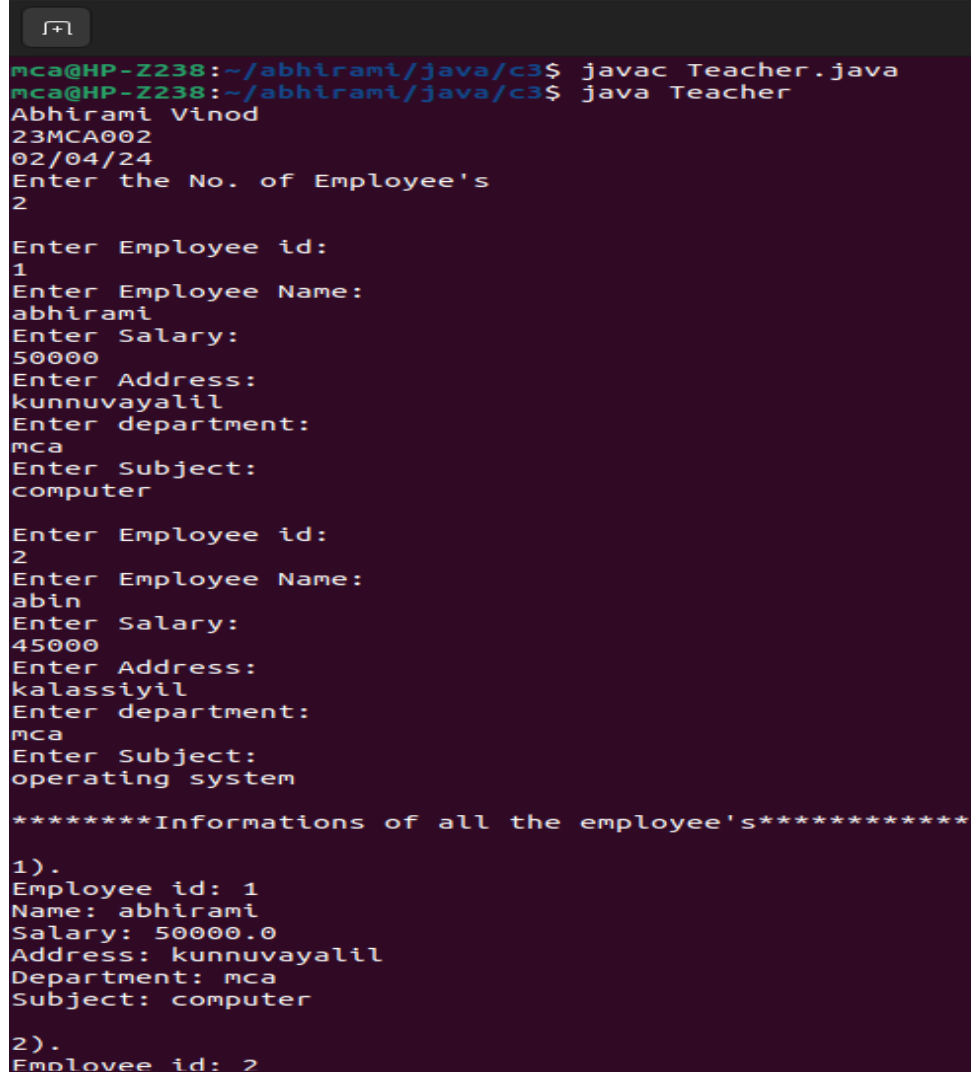
11. Create a class 'Employee' with data members Empid, Name, Salary, Address and constructors to initialize the data members. Create another class 'Teacher' that inherit the properties of class employee and contain its own data members department, Subjects taught and constructors to initialize these data members and also include display function to display all the data members. Use array of objects to display details of N teachers.

Program:

```
import java.util.Scanner;
class Employee
{
    int Empid;
    String Name;
    double Salary;
    String Address;
    Employee(int no, String na, double sal, String add)
    {
        this.Empid = no;
        this.Name = na;
        this.Salary = sal;
        this.Address = add;
    }
}
public class Teacher extends Employee
{
    String dept;
    String subject;
    Teacher(int no, String na, double sal, String add, String dep, String sub)
    {
        super(no,na,sal,add);
        this.dept= dep;
        this.subject=sub;
    }
}
```

```
void display()
{
    System.out.println("Employee id: "+Empid);
    System.out.println("Name: "+Name);
    System.out.println("Salary: "+Salary);
    System.out.println("Address: "+Address);
    System.out.println("Department: "+dept);
    System.out.println("Subject: "+subject);
}
public static void main(String[] args)
{
    System.out.println("Abhirami Vinod");
    System.out.println("23MCA002");
    System.out.println("02/04/24");
    System.out.println("Enter the No. of Employee's");
    Scanner sc1 = new Scanner(System.in);
    int num = sc1.nextInt();
    Teacher arr[]=new Teacher[num];
    for(int i =0;i<num;i++)
    {
        Scanner sc =new Scanner(System.in);
        System.out.println("\nEnter Employee id: ");
        int Empid=sc.nextInt();
        System.out.println("Enter Employee Name: ");
        String Name=sc.next();
        System.out.println("Enter Salary: ");
        double Salary=sc.nextDouble();
        System.out.println("Enter Address: ");
        String Address=sc.next();
        System.out.println("Enter department: ");
        String dept=sc.next();
        System.out.println("Enter Subject: ");
        String subject=sc.next();
        arr[i]=new Teacher(Empid,Name,Salary,Address,dept,subject);
    }
}
```

```
    }  
    System.out.println("\n*****Informations of all the employee's*****");  
    for(int i=0;i<num;i++)  
    {  
        int j=i+1;  
        System.out.println("\n"+j+").");  
        arr[i].display();  
    }  
    sc1.close();  
}  
}
```

Output:

```
mca@HP-Z238:~/abhirami/java/c3$ javac Teacher.java  
mca@HP-Z238:~/abhirami/java/c3$ java Teacher  
Abhirami Vinod  
23MCA002  
02/04/24  
Enter the No. of Employee's  
2  
  
Enter Employee id:  
1  
Enter Employee Name:  
abhirami  
Enter Salary:  
50000  
Enter Address:  
kunnuvayalil  
Enter department:  
mca  
Enter Subject:  
computer  
  
Enter Employee id:  
2  
Enter Employee Name:  
abin  
Enter Salary:  
45000  
Enter Address:  
kalassiyil  
Enter department:  
mca  
Enter Subject:  
operating system  
  
*****Informations of all the employee's*****  
  
1).  
Employee id: 1  
Name: abhirami  
Salary: 50000.0  
Address: kunnuvayalil  
Department: mca  
Subject: computer  
  
2).  
Employee id: 2
```

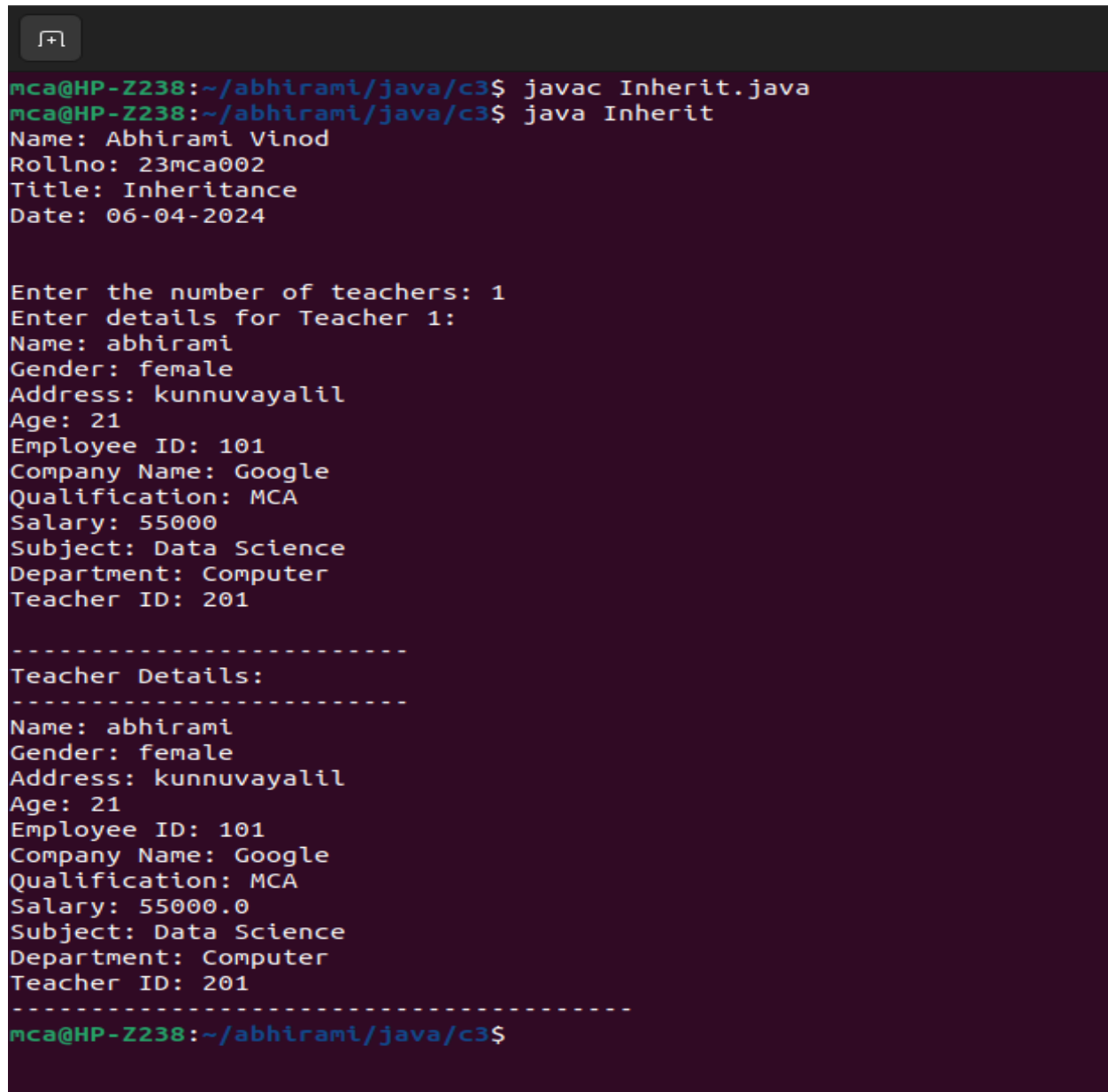
12. Create a class 'Person' with data members Name, Gender, Address, Age and a constructor to initialize the data members and another class 'Employee' that inherits the properties of class Person and also contains its own data members like Empid, Company_name, Qualification, Salary and its own constructor. Create another class 'Teacher' that inherits the properties of class Employee and contains its own data members like Subject, Department, Teacherid and also contain constructors and methods to display the data members. Use array of objects to display details of N teachers.

Program:

```
import java.util.Scanner;
class Person {
    String name;
    String gender;
    String address;
    int age;
    public Person(String name, String gender, String address, int age) {
        this.name = name;
        this.gender = gender;
        this.address = address;
        this.age = age;
    }
}
class Employee extends Person {
    int empId;
    String companyName;
    String qualification;
    double salary;
    public Employee(String name, String gender, String address, int age, int empId, String
companyName, String qualification, double salary) {
        super(name, gender, address, age);
        this.empId = empId;
        this.companyName = companyName;
        this.qualification = qualification;
        this.salary = salary;
    }
}
```

```
}  
class Teacher extends Employee {  
  
    String subject;  
    String department;  
    int teacherId;  
    public Teacher(String name, String gender, String address, int age, int empId, String  
companyName, String qualification, double salary, String subject, String department, int  
teacherId) {  
        super(name, gender, address, age, empId, companyName, qualification, salary);  
        this.subject = subject;  
        this.department = department;  
        this.teacherId = teacherId;  
    }  
    public void displayDetails() {  
        System.out.println("Name: " + name);  
        System.out.println("Gender: " + gender);  
        System.out.println("Address: " + address);  
        System.out.println("Age: " + age);  
        System.out.println("Employee ID: " + empId);  
        System.out.println("Company Name: " + companyName);  
        System.out.println("Qualification: " + qualification);  
        System.out.println("Salary: " + salary);  
        System.out.println("Subject: " + subject);  
        System.out.println("Department: " + department);  
        System.out.println("Teacher ID: " + teacherId);  
        System.out.println("-----");  
    }  
}  
  
public class Inherit {  
    public static void main(String[] args) {  
        System.out.println("Name: Abhirami Vinod\nRollno: 23mca002\nTitle: Inheritance\n  
        Date: 06-04-2024\n");  
        System.out.println();  
        Scanner scanner = new Scanner(System.in);  
        System.out.print("Enter the number of teachers: ");  
        int N = scanner.nextInt(); // Number of teachers  
  
        Teacher[] teachers = new Teacher[N];
```

```
for (int i = 0; i < N; i++) {
    scanner.nextLine(); // Consume the newline character
    System.out.println("Enter details for Teacher " + (i + 1) + ":");
    System.out.print("Name: ");
    String teacherName = scanner.nextLine();
    System.out.print("Gender: ");
    String gender = scanner.nextLine();
    System.out.print("Address: ");
    String address = scanner.nextLine();
    System.out.print("Age: ");
    int age = scanner.nextInt();
    System.out.print("Employee ID: ");
    int empId = scanner.nextInt();
    scanner.nextLine(); // Consume the newline character
    System.out.print("Company Name: ");
    String companyName = scanner.nextLine();
    System.out.print("Qualification: ");
    String qualification = scanner.nextLine();
    System.out.print("Salary: ");
    double salary = scanner.nextDouble();
    scanner.nextLine(); // Consume the newline character
    System.out.print("Subject: ");
    String subject = scanner.nextLine();
    System.out.print("Department: ");
    String department = scanner.nextLine();
    System.out.print("Teacher ID: ");
    int teacherId = scanner.nextInt();
    teachers[i] = new Teacher(teacherName, gender, address, age, empId,
    companyName, qualification, salary, subject, department, teacherId);
    System.out.println();
}
System.out.println("-----");
System.out.println("Teacher Details:");
System.out.println("-----"); for
(Teacher teacher : teachers) {
    teacher.displayDetails();
}
}
}
```


Output:

```
mca@HP-Z238:~/abhirami/java/c3$ javac Inherit.java
mca@HP-Z238:~/abhirami/java/c3$ java Inherit
Name: Abhirami Vinod
Rollno: 23mca002
Title: Inheritance
Date: 06-04-2024

Enter the number of teachers: 1
Enter details for Teacher 1:
Name: abhirami
Gender: female
Address: kunnuvayalil
Age: 21
Employee ID: 101
Company Name: Google
Qualification: MCA
Salary: 55000
Subject: Data Science
Department: Computer
Teacher ID: 201

-----
Teacher Details:
-----
Name: abhirami
Gender: female
Address: kunnuvayalil
Age: 21
Employee ID: 101
Company Name: Google
Qualification: MCA
Salary: 55000.0
Subject: Data Science
Department: Computer
Teacher ID: 201
-----
mca@HP-Z238:~/abhirami/java/c3$
```

13. Write a program has class Publisher, Book, Literature and Fiction. Read the information and print the details of books from either the category, using inheritance.

Program:

```
import java.util.Scanner;

class Publisher {
    String name;
    Publisher(String name) {
        this.name = name;
    }
}

class Book extends Publisher {
    String title;
    String author;
    Book(String title, String author, String publisher) {
        super(publisher);
        this.title = title;
        this.author = author;
    }
    void display() {
        System.out.println("Title: " + title);
        System.out.println("Author: " + author);
        System.out.println("Publisher: " + name);
    }
}

class Literature extends Book {
    Literature(String title, String author, String publisher) {
        super(title, author, publisher);
    }
}

class Fiction extends Book {
    Fiction(String title, String author, String publisher) {
        super(title, author, publisher);
    }
}

public class Books {
```

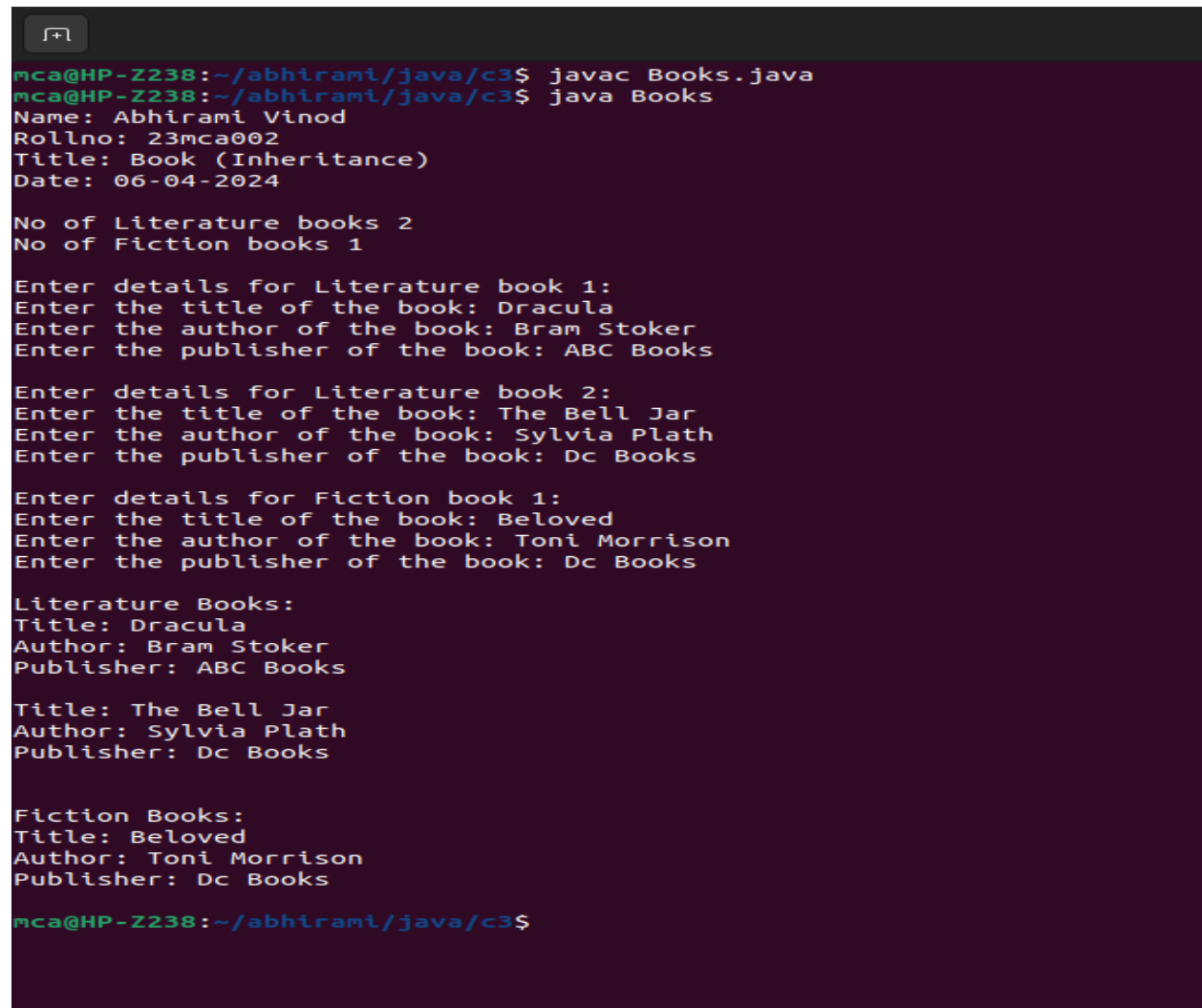
```
public static void main(String[] args) {
    System.out.println("Name: Abhirami Vinod\nRollno: 23mca002\nTitle:book (Inheritance)\n
        Date: 06-04-2024\n");
    Scanner scanner = new Scanner(System.in);
    System.out.print("No of Literature books ");
    int numLiteratureBooks = scanner.nextInt();
    scanner.nextLine();
    System.out.print("No of Fiction books ");
    int numFictionBooks = scanner.nextInt();
    scanner.nextLine();
    Book[] literatureBooks = new Book[numLiteratureBooks];
    Book[] fictionBooks = new Book[numFictionBooks];
    for (int i = 0; i < numLiteratureBooks; i++) {
        System.out.println("\nEnter details for Literature book " + (i + 1) + ":");
        literatureBooks[i] = createBook(scanner, "Literature");
    }
    for (int i = 0; i < numFictionBooks; i++) {
        System.out.println("\nEnter details for Fiction book " + (i + 1) + ":");
        fictionBooks[i] = createBook(scanner, "Fiction");
    }
    System.out.println("\nLiterature Books:");
    displayBooks(literatureBooks);
    System.out.println("\nFiction Books:");
    displayBooks(fictionBooks);
    scanner.close();
}

private static Book createBook(Scanner scanner, String type) {
    System.out.print("Enter the title of the book: ");
    String title = scanner.nextLine();
    System.out.print("Enter the author of the book: ");
    String author = scanner.nextLine();
    System.out.print("Enter the publisher of the book: ");
    String publisher = scanner.nextLine();
    if (type.equals("Literature")) {
        return new Literature(title, author, publisher);
    } else if (type.equals("Fiction")) {
        return new Fiction(title, author, publisher);
    } else {

```

```
        return null;
    }
}

private static void displayBooks(Book[] books) {
    for (Book book : books) {
        book.display();
        System.out.println();
    }
}
}
```

Output:

```
mca@HP-Z238:~/abhirami/java/c3$ javac Books.java
mca@HP-Z238:~/abhirami/java/c3$ java Books
Name: Abhirami Vinod
Rollno: 23mca002
Title: Book (Inheritance)
Date: 06-04-2024

No of Literature books 2
No of Fiction books 1

Enter details for Literature book 1:
Enter the title of the book: Dracula
Enter the author of the book: Bram Stoker
Enter the publisher of the book: ABC Books

Enter details for Literature book 2:
Enter the title of the book: The Bell Jar
Enter the author of the book: Sylvia Plath
Enter the publisher of the book: Dc Books

Enter details for Fiction book 1:
Enter the title of the book: Beloved
Enter the author of the book: Toni Morrison
Enter the publisher of the book: Dc Books

Literature Books:
Title: Dracula
Author: Bram Stoker
Publisher: ABC Books

Title: The Bell Jar
Author: Sylvia Plath
Publisher: Dc Books

Fiction Books:
Title: Beloved
Author: Toni Morrison
Publisher: Dc Books

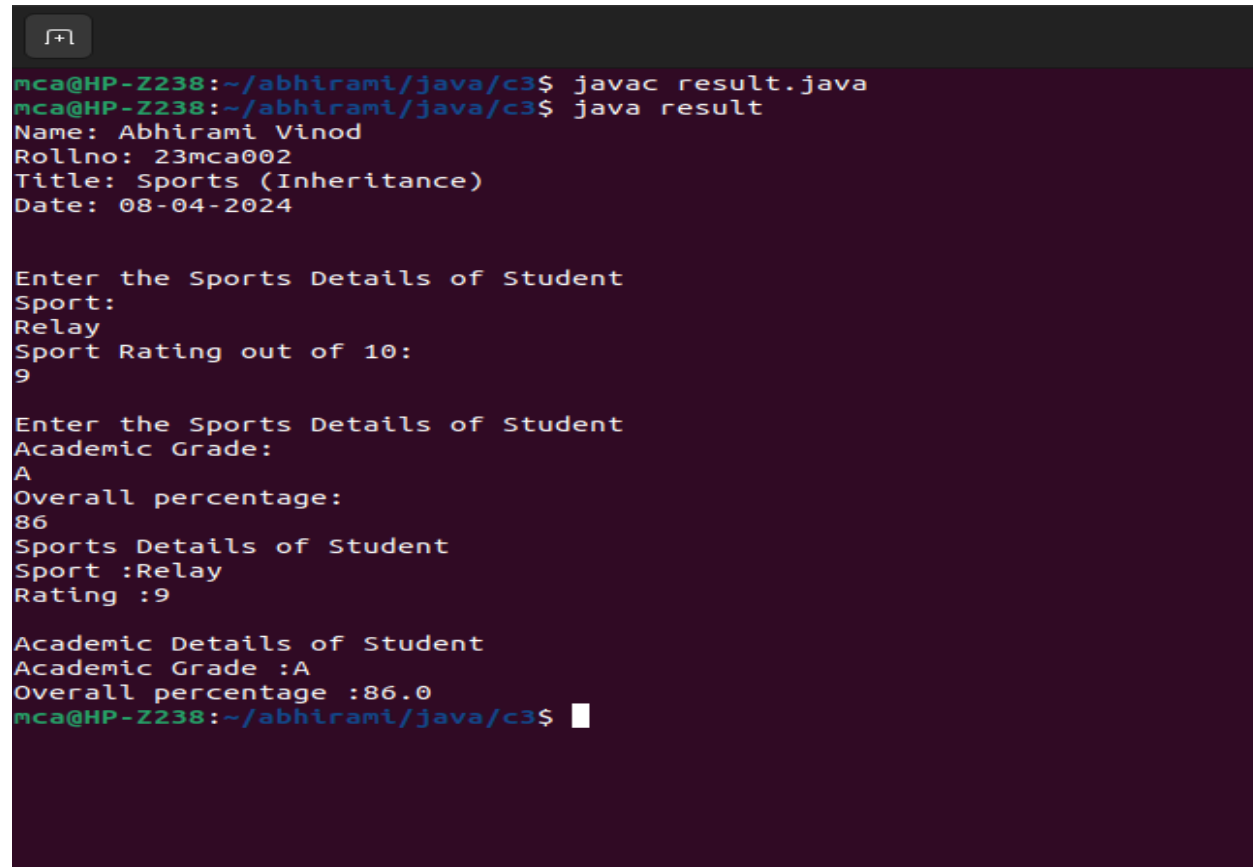
mca@HP-Z238:~/abhirami/java/c3$
```

14. Create classes Student and Sports. Create another class Result inherited from Student and Sports. Display the academic and sports score of a student.

Program:

```
import java.util.Scanner;
class sports{
String sport;
int Rating;
sports(String spo, int ra){
sport = spo;
Rating = ra;
}
}
class student extends sports{
String Grade;
double Overall_per;
student(String spo, int ra,String gd, double per ){
super(spo, ra);
Grade = gd;
Overall_per = per;
}
}
public class result extends student {
result(String spo, int ra,String gd, double per ){
super(spo, ra, gd, per);
}
void display(){
System.out.println("Sports Details of Student");
System.out.println("Sport :"+sport);
System.out.println("Rating :"+Rating);
System.out.println("\nAcademic Details of Student");
System.out.println("Academic Grade :"+Grade);
System.out.println("Overall percentage :"+Overall_per);
}
public static void main(String[] args) {
Scanner sc =new Scanner(System.in);
System.out.println();
```

```
System.out.println("Name: Abhirami Vinod\nRollno: 23mca002\nTitle:Sports (Inheritance)\n
    Date: 08-04-2024\n");
System.out.println("Enter the Sports Details of Student");
System.out.println("Sport: ");
String a =sc.next();
System.out.println("Sport Rating out of 10: "); int
b =sc.nextInt();
System.out.println("\nEnter the Sports Details of Student");
System.out.println("Academic Grade: ");
String c =sc.next();
System.out.println("Overall percentage: ");
double d =sc.nextDouble();
sc.close();
result obj= new result(a,b,c,d);
obj.display();
}
}
```

Output:

```
mca@HP-Z238:~/abhirami/java/c3$ javac result.java
mca@HP-Z238:~/abhirami/java/c3$ java result
Name: Abhirami Vinod
Rollno: 23mca002
Title: Sports (Inheritance)
Date: 08-04-2024

Enter the Sports Details of Student
Sport:
Relay
Sport Rating out of 10:
9

Enter the Sports Details of Student
Academic Grade:
A
Overall percentage:
86
Sports Details of Student
Sport :Relay
Rating :9

Academic Details of Student
Academic Grade :A
Overall percentage :86.0
mca@HP-Z238:~/abhirami/java/c3$
```

15. Create an interface having prototypes of functions area() and perimeter(). Create two classes Circle and Rectangle which implements the above interface. Create a menu driven program to find area and perimeter of objects.

Program:

```
import java.util.Scanner;
interface Shape {
    double area();
    double perimeter();
}

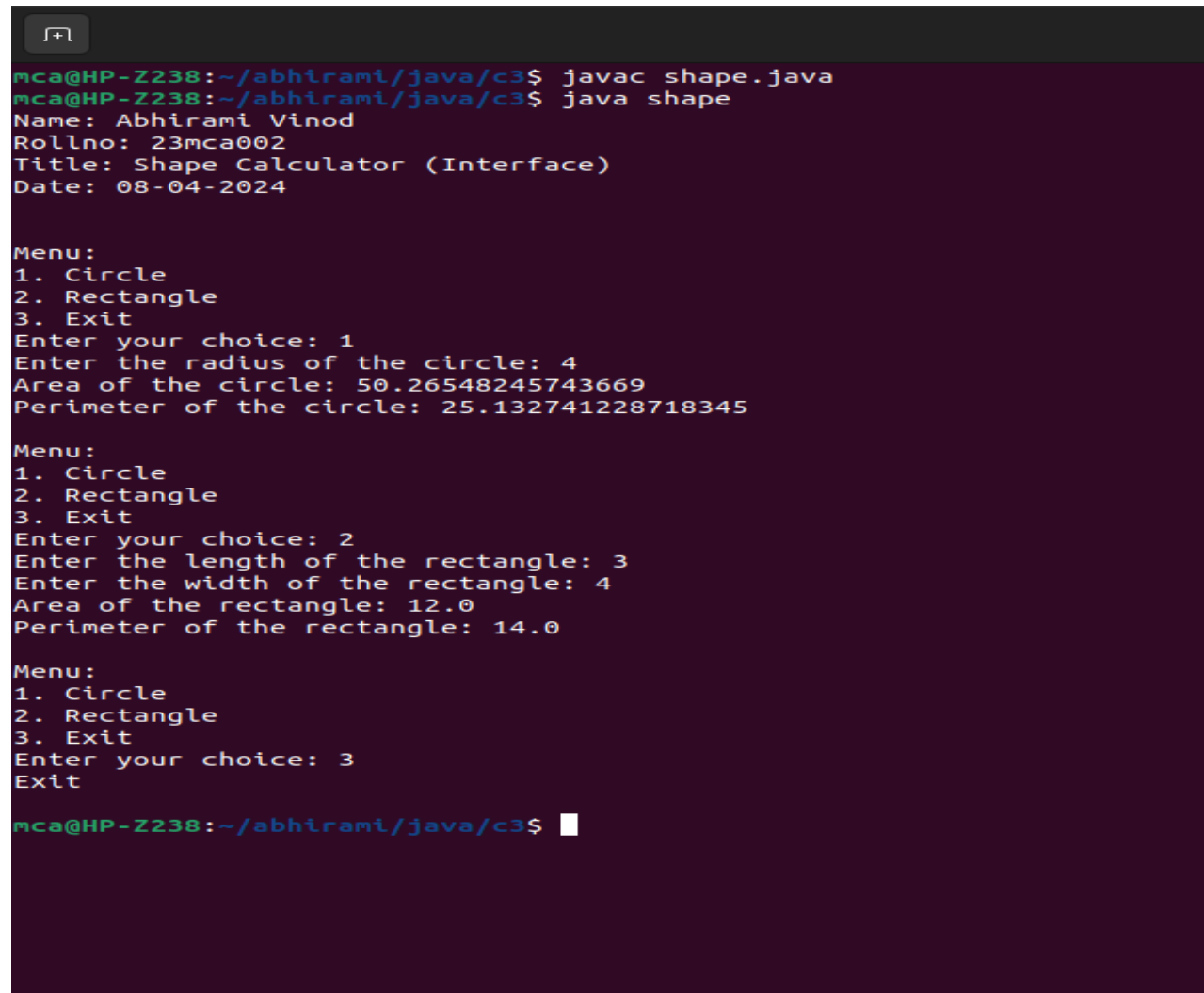
class Circle implements Shape {
    private double radius;
    public Circle(double radius) {
        this.radius = radius;
    }
    public double area() {
        return Math.PI * radius * radius;
    }
    public double perimeter() {
        return 2 * Math.PI * radius;
    }
}

class Rectangle implements Shape {
    private double length;
    private double width;
    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }
    public double area() {
        return length * width;
    }
    public double perimeter() {
        return 2 * (length + width);
    }
}
```

```
}  
public class shape {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.println("Name: Abhirami Vinod\nRollno: 23mca002\nTitle: Shape Calculator  
(Interface)\nDate: 08-04-2024\n");  
        System.out.println();  
        int choice;  
        do {  
            System.out.println("Menu:");  
            System.out.println("1. Circle");  
            System.out.println("2. Rectangle");  
            System.out.println("3. Exit");  
            System.out.print("Enter your choice: ");  
            choice = scanner.nextInt();  
            switch (choice) {  
                case 1:  
                    System.out.print("Enter the radius of the circle: ");  
                    double radius = scanner.nextDouble();  
                    Circle circle = new Circle(radius);  
                    System.out.println("Area of the circle: " + circle.area());  
                    System.out.println("Perimeter of the circle: " + circle.perimeter());  
                    break;  
                case 2:  
                    System.out.print("Enter the length of the rectangle: ");  
                    double length = scanner.nextDouble();  
                    System.out.print("Enter the width of the rectangle: ");  
                    double width = scanner.nextDouble();  
                    Rectangle rectangle = new Rectangle(length, width);  
                    System.out.println("Area of the rectangle: " + rectangle.area());  
                    System.out.println("Perimeter of the rectangle: " + rectangle.perimeter());  
                    break;  
  
                case 3:  
                    System.out.println("Exit");  
                    break;  
                default:  
                    System.out.println("Invalid choice! Please try again.");  
                    break;  
            }  
        }  
    }  
}
```



```
}  
System.out.println();  
} while (choice != 3);  
scanner.close();  
}  
}
```

Output:

```
mca@HP-Z238:~/abhiraami/java/c3$ javac shape.java  
mca@HP-Z238:~/abhiraami/java/c3$ java shape  
Name: Abhirami Vinod  
Rollno: 23mca002  
Title: Shape Calculator (Interface)  
Date: 08-04-2024  
  
Menu:  
1. Circle  
2. Rectangle  
3. Exit  
Enter your choice: 1  
Enter the radius of the circle: 4  
Area of the circle: 50.26548245743669  
Perimeter of the circle: 25.132741228718345  
  
Menu:  
1. Circle  
2. Rectangle  
3. Exit  
Enter your choice: 2  
Enter the length of the rectangle: 3  
Enter the width of the rectangle: 4  
Area of the rectangle: 12.0  
Perimeter of the rectangle: 14.0  
  
Menu:  
1. Circle  
2. Rectangle  
3. Exit  
Enter your choice: 3  
Exit  
  
mca@HP-Z238:~/abhiraami/java/c3$
```

16. Prepare bill with the given format using calculate method from interface.**Program:**

```
import java.util.Scanner;

interface Bill {
    void calculate();
}

class Order implements Bill {
    private int orderNo;
    private String date;
    private int[] productId;
    private String[] name;
    private int[] quantity;
    private double[] unitPrice;

    public Order(int orderNo, String date, int[] productId, String[] name, int[] quantity,
        double[] unitPrice) {
        this.orderNo = orderNo;
        this.date = date;
        this.productId = productId;
        this.name = name;
        this.quantity = quantity;
        this.unitPrice = unitPrice;
    }

    public void calculate() {
        double netAmount = 0.0;

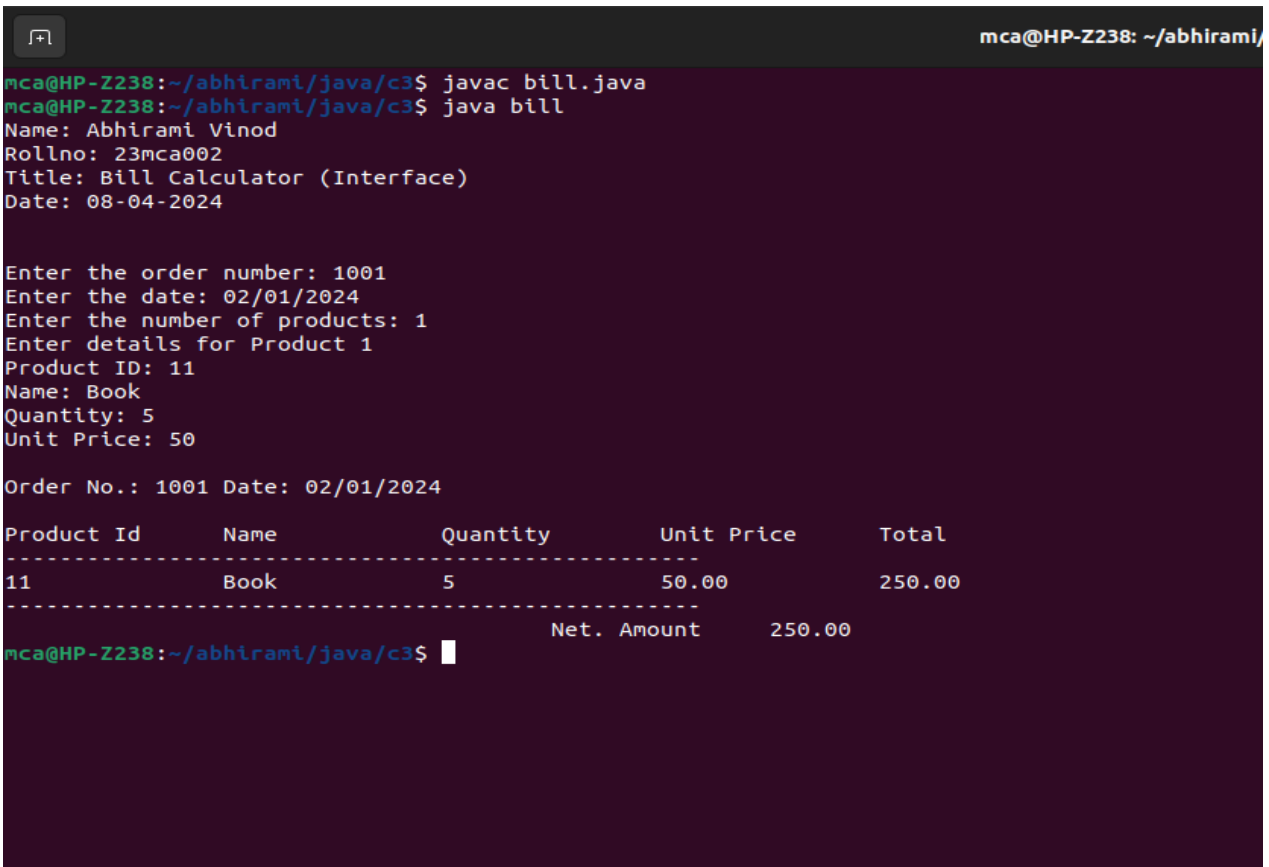
        System.out.println();
        System.out.println("Order No.: " + orderNo + "\tDate: " + date);
        System.out.println();
        System.out.println("Product Id\tName\t\tQuantity\tUnit Price\tTotal");
        System.out.println("-----");
```

```
for (int i = 0; i < productId.length; i++) {
    double total = quantity[i] * unitPrice[i];
    netAmount += total;
    System.out.printf("%d\t%s\t%d\t%.2f\t%.2f\n",
        productId[i], name[i], quantity[i], unitPrice[i], total);

}
System.out.println("-----");
System.out.printf("\t\t\tNet. Amount\t%.2f\n", netAmount); }
}

public class bill {
    public static void main(String[] args) {
        System.out.println("Name:  Abhirami  Vinod\nRollno:  23mca002\nTitle:  Bill  Calculator
(Interface)\nDate: 08-04-2024\n");
        System.out.println();
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the order number: ");
        int orderNo = scanner.nextInt();
        System.out.print("Enter the date: ");
        String date = scanner.next();
        System.out.print("Enter the number of products: ");
        int numProducts = scanner.nextInt();
        int[] productId = new int[numProducts];
        String[] name = new String[numProducts];
        int[] quantity = new int[numProducts];
        double[] unitPrice = new double[numProducts];
        for (int i = 0; i < numProducts; i++) {
            System.out.println("Enter details for Product " + (i + 1));
            System.out.print("Product ID: ");
            productId[i] = scanner.nextInt();
```

```
scanner.nextLine();
System.out.print("Name: ");
name[i] = scanner.nextLine();
System.out.print("Quantity: ");
quantity[i] = scanner.nextInt();
System.out.print("Unit Price: ");
unitPrice[i] = scanner.nextDouble();
}
Order order = new Order(orderNo, date, productId, name, quantity, unitPrice);
order.calculate();
scanner.close();
}
}
```

Output:

```
mca@HP-Z238: ~/abhirami/
mca@HP-Z238:~/abhirami/java/c3$ javac bill.java
mca@HP-Z238:~/abhirami/java/c3$ java bill
Name: Abhirami Vinod
Rollno: 23mca002
Title: Bill Calculator (Interface)
Date: 08-04-2024

Enter the order number: 1001
Enter the date: 02/01/2024
Enter the number of products: 1
Enter details for Product 1
Product ID: 11
Name: Book
Quantity: 5
Unit Price: 50

Order No.: 1001 Date: 02/01/2024
```

Product Id	Name	Quantity	Unit Price	Total
11	Book	5	50.00	250.00
Net. Amount			250.00	

```
mca@HP-Z238:~/abhirami/java/c3$
```