AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF UGC ACT, 1956

SCHOOL OF COMPUTING

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CH.SC.U4CSE24109

OBJECT ORIENTED PROGRAMMING (23CSE111)

LAB RECORD

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AMRITA SCHOOL OF COMPUTING, CHENNAI

BONAFIDE CERTIFICATE

This is to certify that the Lab Record work for 23CSE111- Object Oriented Programming Subject submitted by ***CH.SC.U4CSE24109 – Chetan Kumar G*** in **“Computer Science and Engineering”** is a Bonafide record of the work carried out under my guidance and supervision at Amrita School of Computing, Chennai.

This Lab examination held on

Internal Examiner 1 Internal Examiner 2

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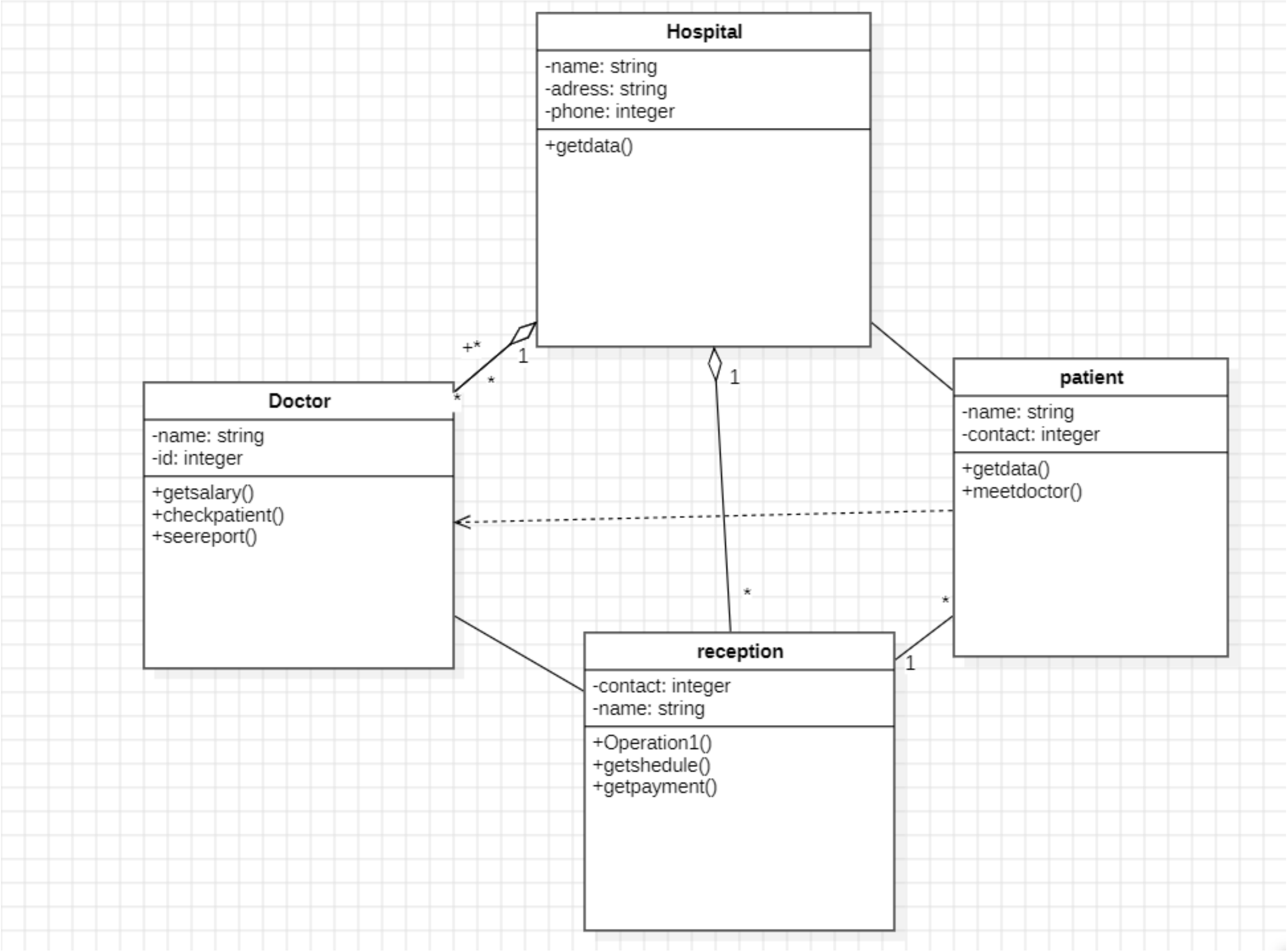
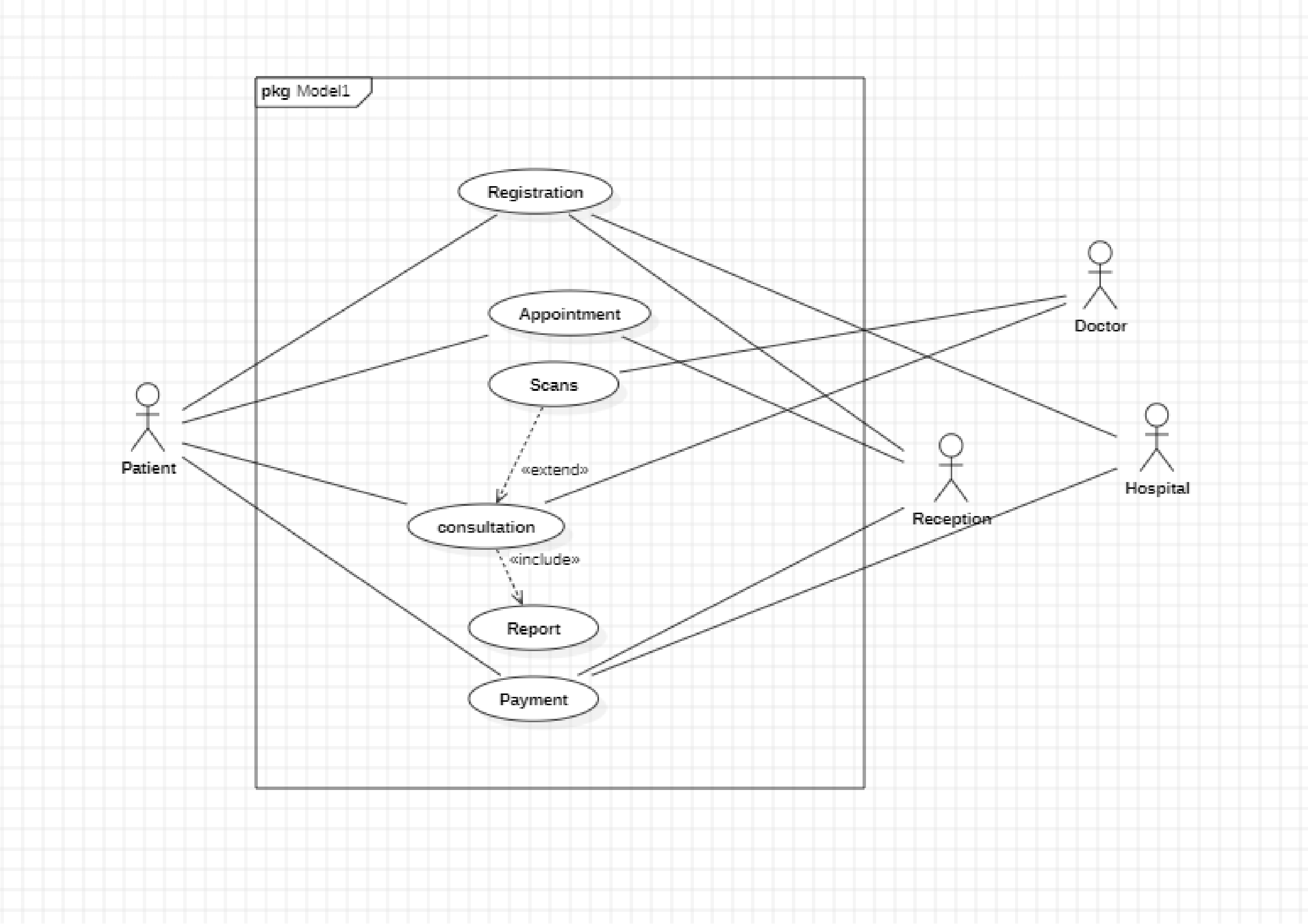
UML DIAGRAMS

1. HOSPITAL MANAGEMENT SYSTEM

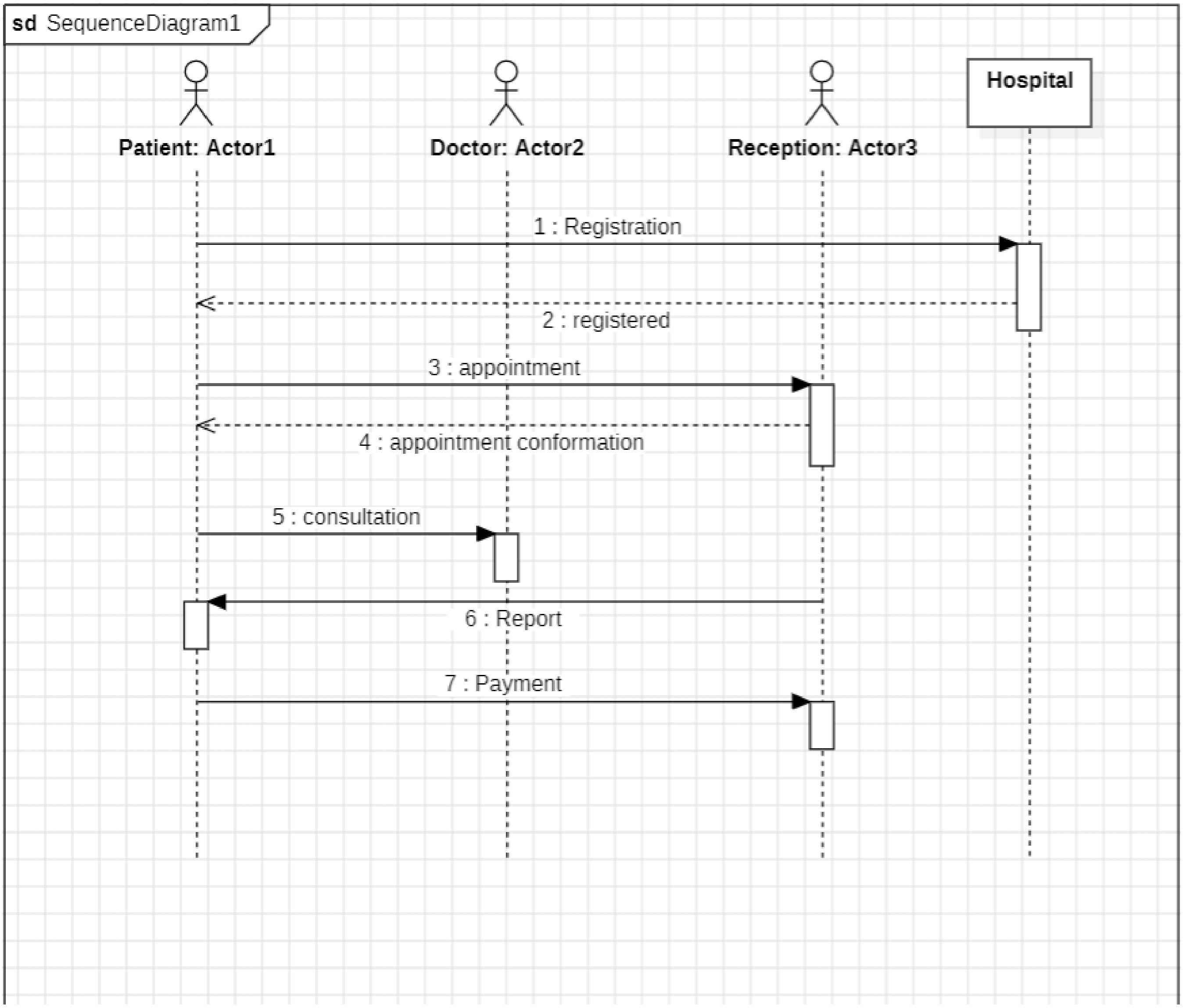
a) Class Diagram



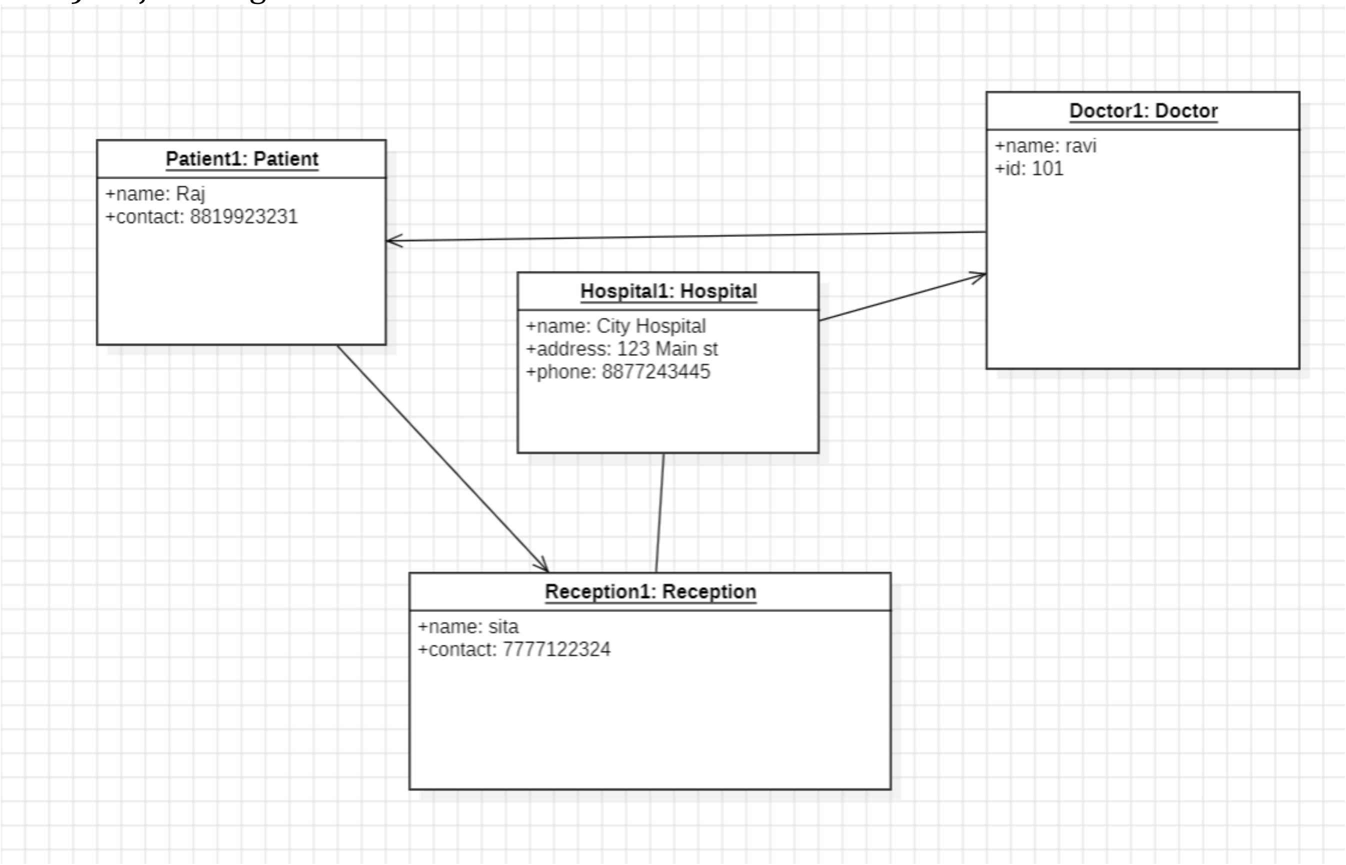
b) Use Case Diagram:



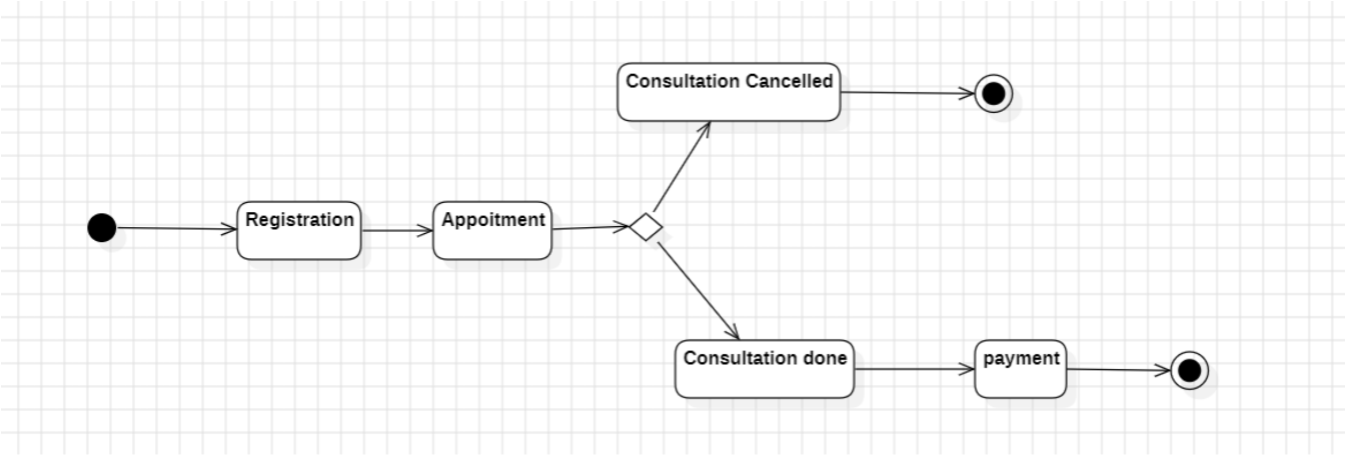
c) Sequence Diagram:



d) Object Diagram:

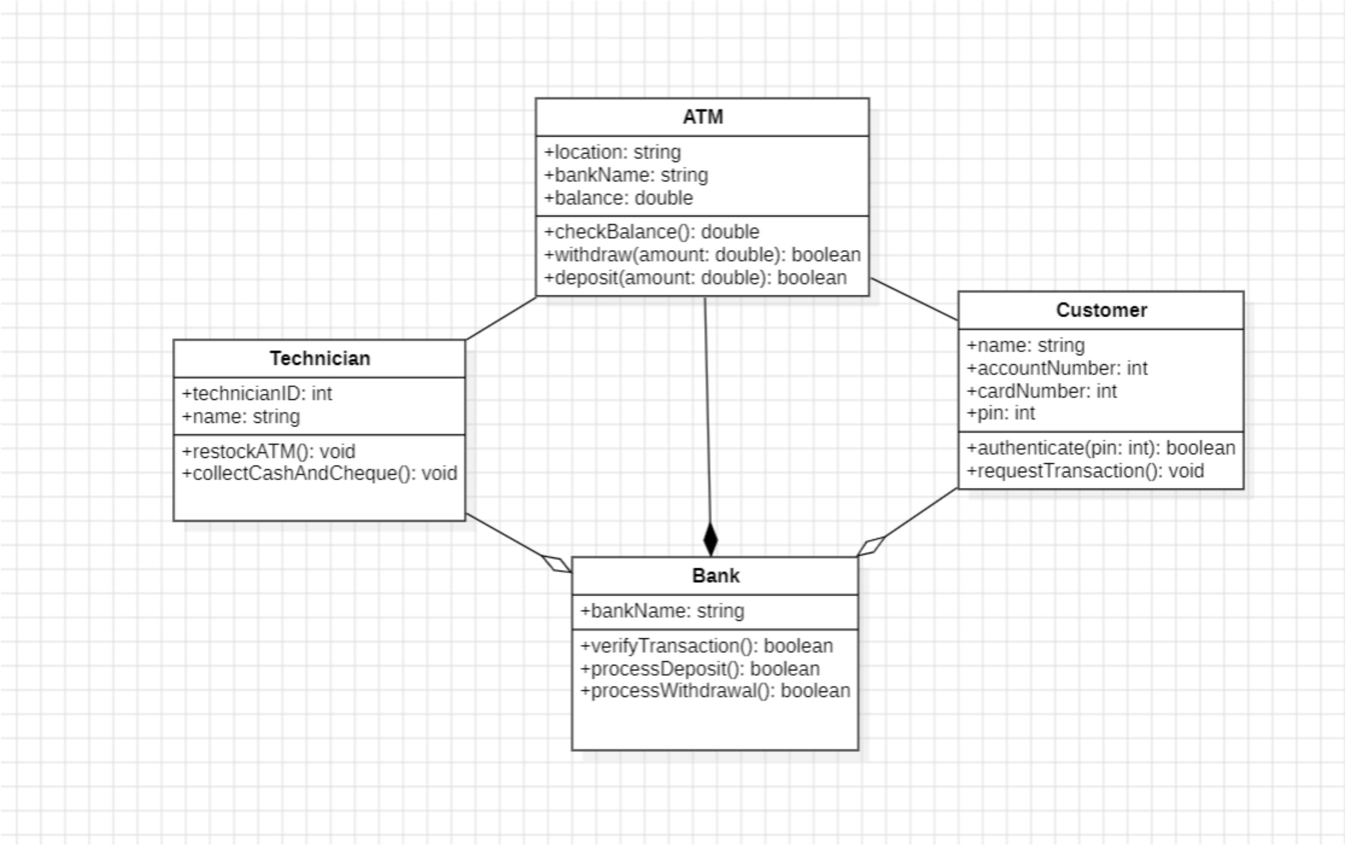


e) State-Activity Diagram:

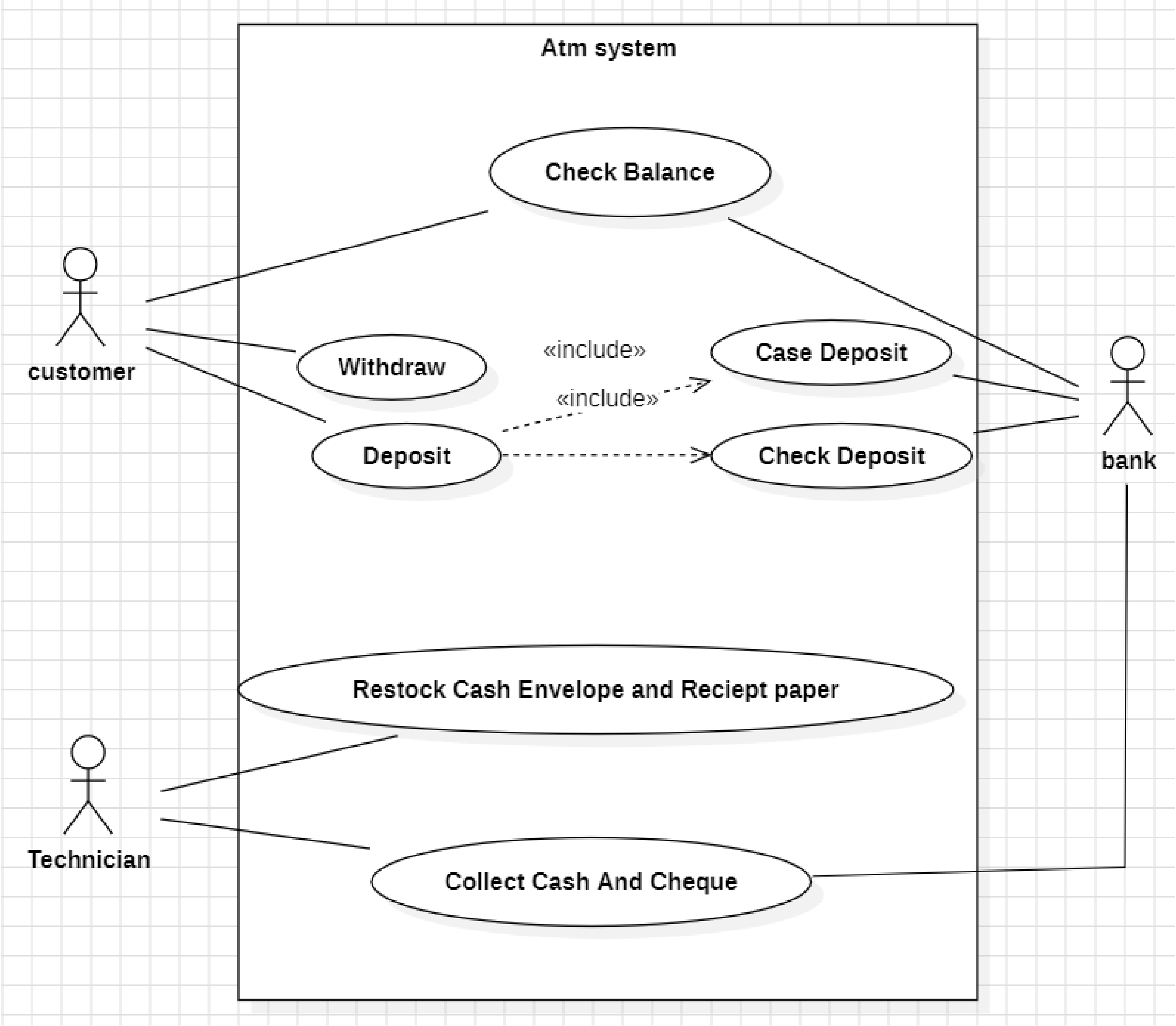


2.ATM Management System

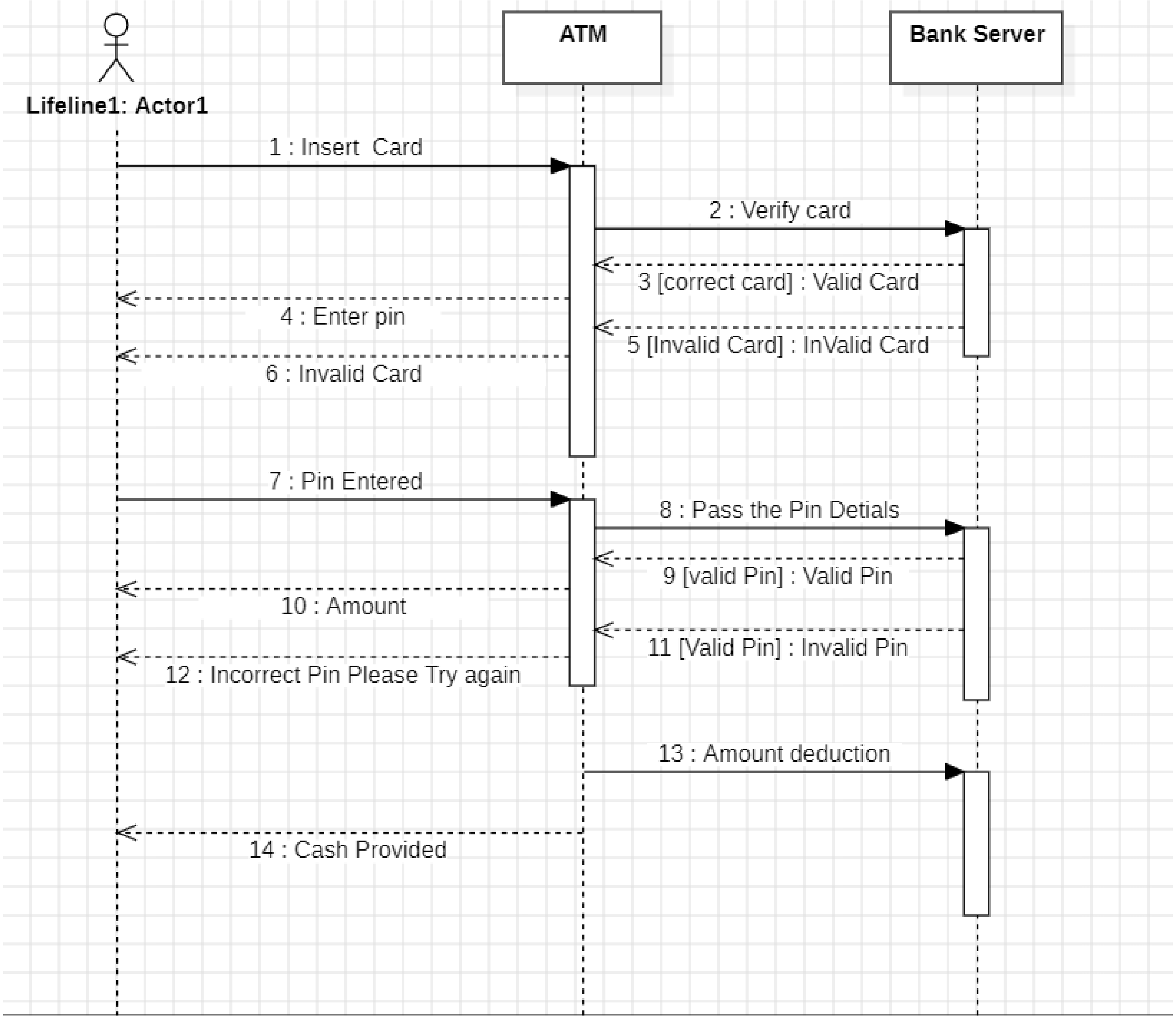
a) Class Diagram:


ATM
+location: string
+bankName: string
+balance: double
+checkBalance(): double
+withdraw(amount: double): boolean
+deposit(amount: double): boolean
Technician
+technicianID: int
+name: string
+restockATM(): void
+collectCashAndCheque(): void
Customer
+name: string
+accountNumber: int
+cardNumber: int
+pin: int
+authenticate(pin: int): boolean
+requestTransaction(): void
Bank
+bankName: string
+verifyTransaction(): boolean
+processDeposit(): boolean
+processWithdrawal(): boolean

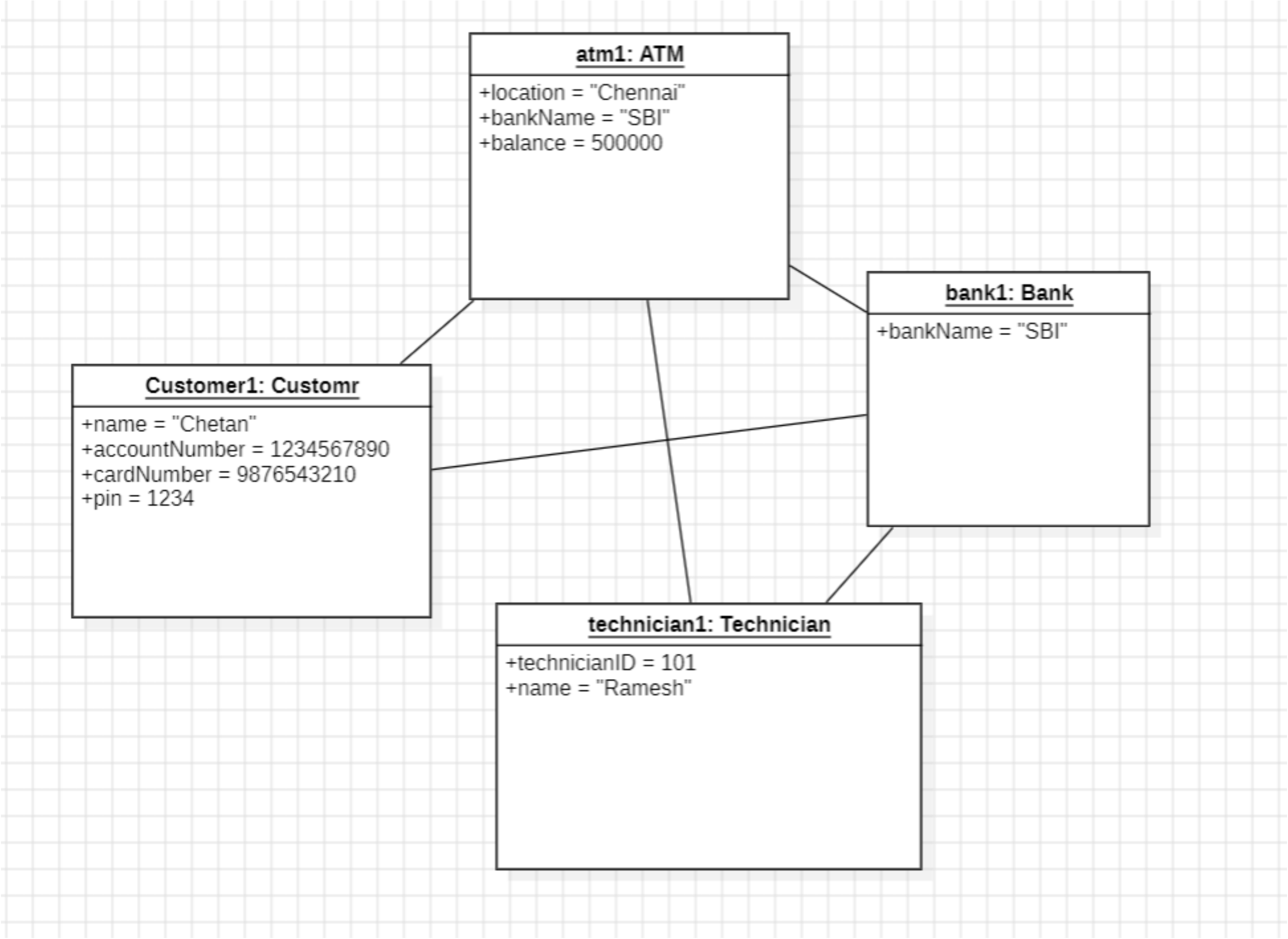
b) Use Case Diagram:



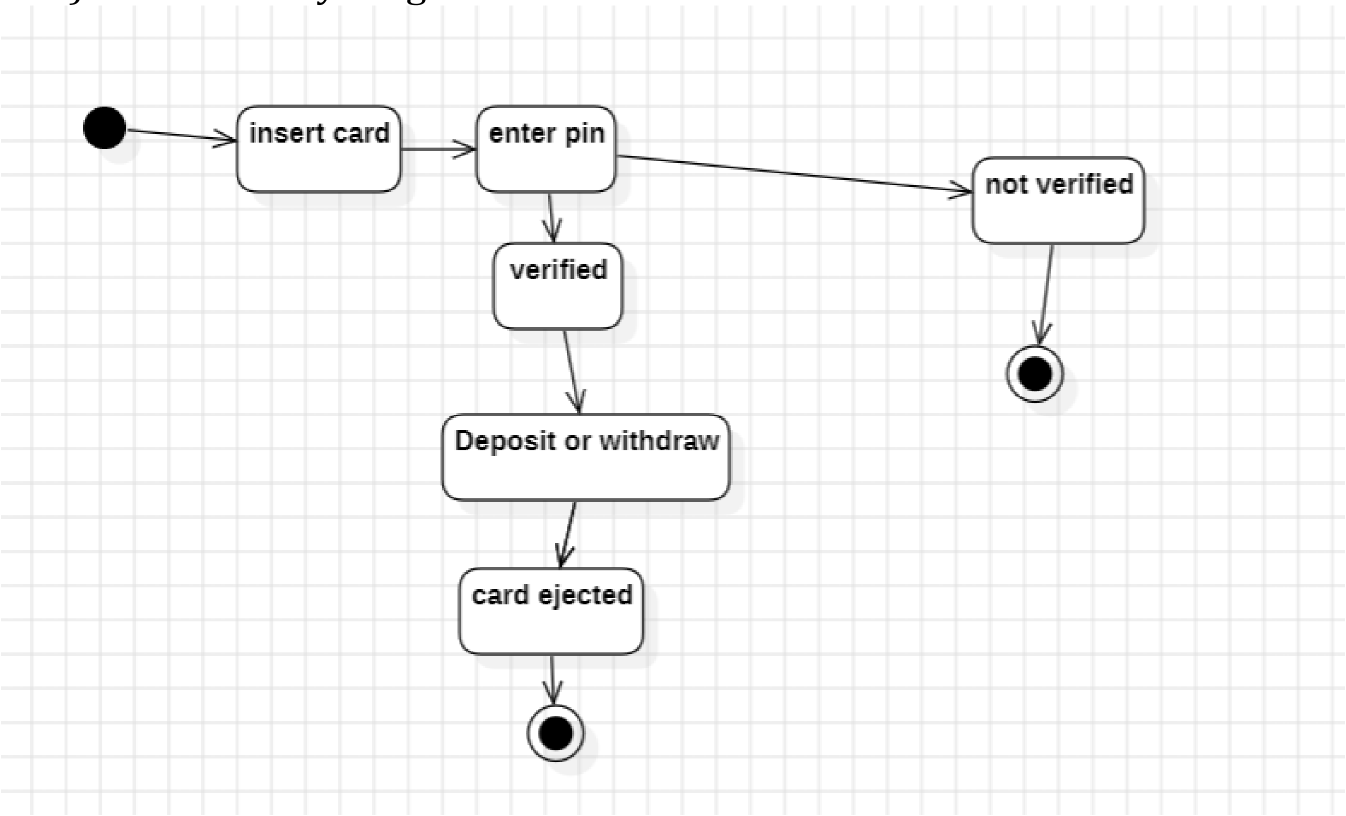
c) Sequence Diagram:



d) Object Diagram:



e) State-Activity Diagram:



3.Basic Java Programs

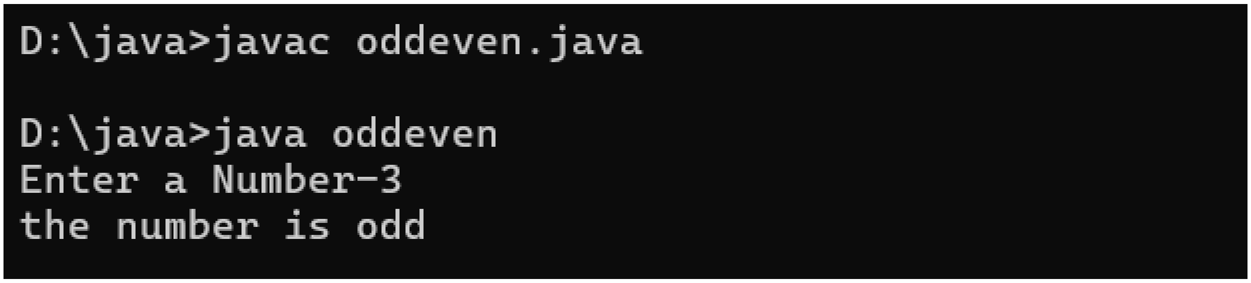
a) Check Even or Odd

Write a Java program that takes an integer input from the user and determines whether it is even or odd using an if-else statement.

Code:

```
import java.util.*;
public class oddeven{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();

            if(num%2==0){
                  System.out.println("the number is even");
            }

            else{
                  System.out.println("the number is odd");
            }
      }
}
```

Output:



```
D:\java>javac oddeven.java

D:\java>java oddeven
Enter a Number-3
the number is odd
```

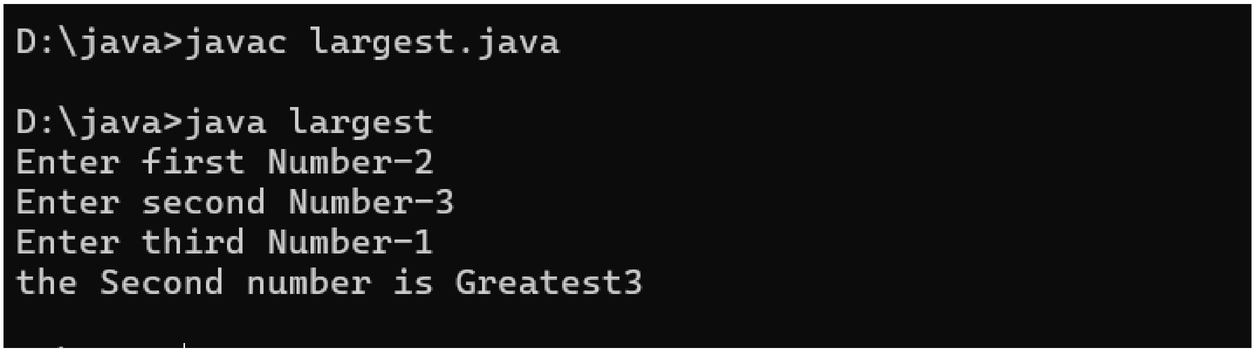
b) Largest of Three Numbers

Write a program that takes three integers as input and determines the largest among them using nested if-else statements.

Code:

```
import java.util.*;
public class largest{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter first Number-");
            int num1 = obj.nextInt();
            System.out.print("Enter second Number-");
            int num2 = obj.nextInt();
            System.out.print("Enter third Number-");
            int num3 = obj.nextInt();

            if(num1>num2){
                  if(num1>num3){
                        System.out.println("the First number is Greatest" + num1);
                  }
                  else if(num3>num1){
                        System.out.println("the Third number is Greatest" + num3);
                  }
                  else{
                        System.out.println("Two numbers are same");
                  }
            }

            else if(num2>num1){
                  if(num2>num3){
                        System.out.println("the Second number is Greatest" + num2);
                  }
                  else if(num3>num2){
                        System.out.println("the Third number is Greatest" + num3);
                  }
                  else{
                        System.out.println("Two numbers are same");

                  }

            }
      }
}
```

Output:



```
D:\java>javac largest.java

D:\java>java largest
Enter first Number-2
Enter second Number-3
Enter third Number-1
the Second number is Greatest3
```

c) Reverse a Number

Write a Java program that takes an integer input and reverses its digits using a while loop.

Example:

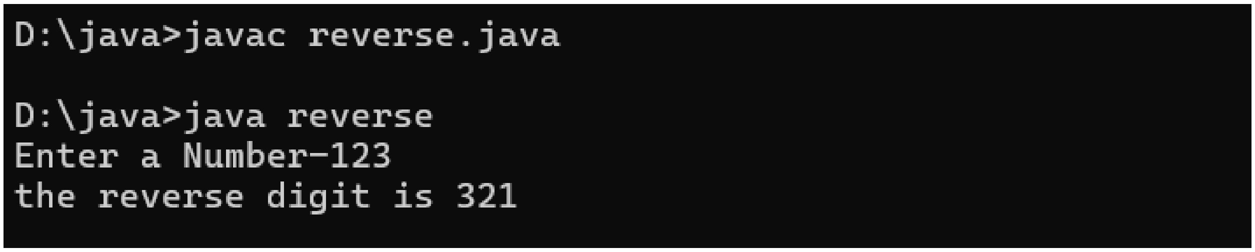
Input: 1234

Output: 4321

Code:

```
import java.util.*;
public class reverse{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            int reverse = 0;

            while (num!=0){
                  int digit=num%10;
                  reverse=reverse*10+digit;
                  num=num/10;
            }
            System.out.println("the reverse digit is " + reverse);
      }
}
```

Output:



```
D:\java>javac reverse.java

D:\java>java reverse
Enter a Number-123
the reverse digit is 321
```

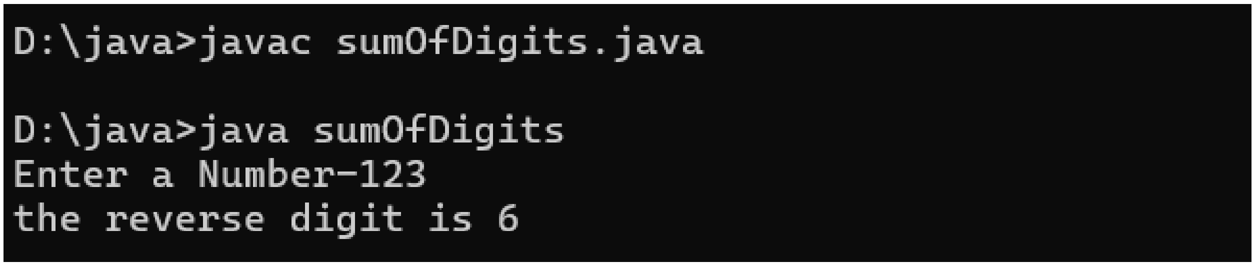
d) Sum of Digits

Write a program to find the sum of the digits of a given number using a while loop.
Example:
Input: 145
Output: 10 (1+4+5)

Code:

```
import java.util.*;
public class sumOfDigits{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            int sum= 0;

            while (num!=0){
                  int digit=num%10;
                  sum=sum+digit;
                  num=num/10;
            }
            System.out.println("the reverse digit is " + sum);
      }
}
```

Output;



```
D:\java>javac sumOfDigits.java

D:\java>java sumOfDigits
Enter a Number-123
the reverse digit is 6
```

e) Print Fibonacci Series

Write a Java program to print the first n numbers of the Fibonacci series using a for loop.

Example:

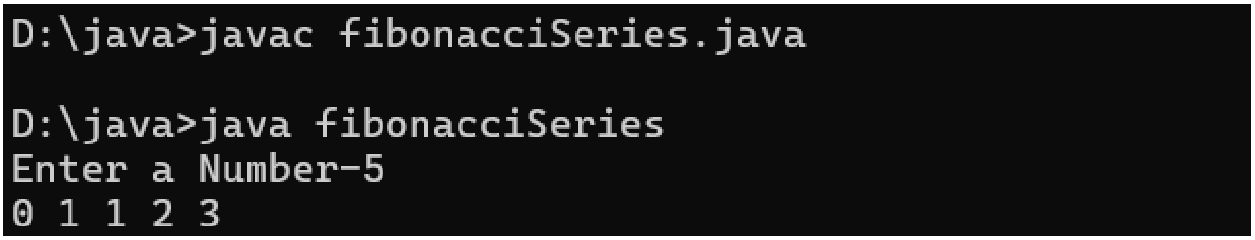
Input: 5

Output: 0 1 1 2 3

Code:

```
import java.util.*;
public class fibonacciSeries{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            int a= 0;
            int b= 1;
            System.out.print(a + " ");
            System.out.print(b + " ");
            num=num-2;
            while (num!=0){
                  int sum= a+b;
                  System.out.print(sum + " ");
                  a=b;
                  b=sum;
                  num=num-1;
            }
      }
}
```

Output:



```
D:\java>javac fibonacciSeries.java

D:\java>java fibonacciSeries
Enter a Number-5
0 1 1 2 3
```

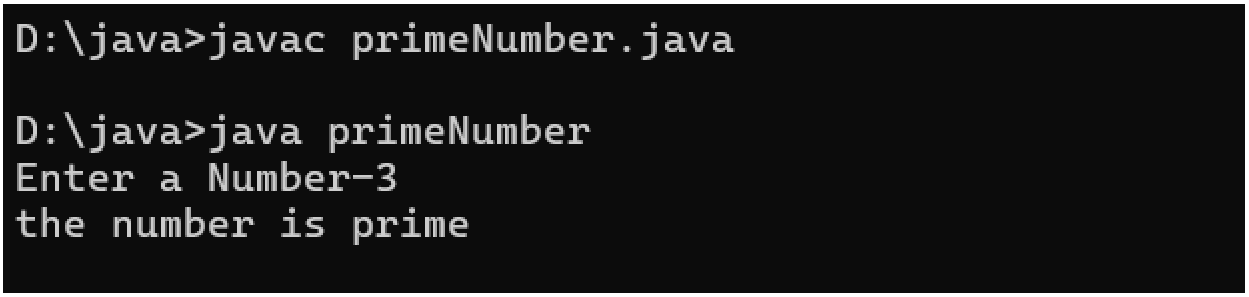
f) Prime Number Check

Write a Java program that takes an integer input and checks whether it is a prime number or not using a for loop.

Code:

```
import java.util.*;
public class primeNumber{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            for (int i=2; i<num; i++){
                  if(num%i==0){
                        System.out.println("the number is not prime");
                        break;
                  }
                  else{
                        System.out.println("the number is prime");
                  }
            }
      }
}
```

Output:



```
D:\java>javac primeNumber.java

D:\java>java primeNumber
Enter a Number-3
the number is prime
```

g) Print a Pyramid Pattern

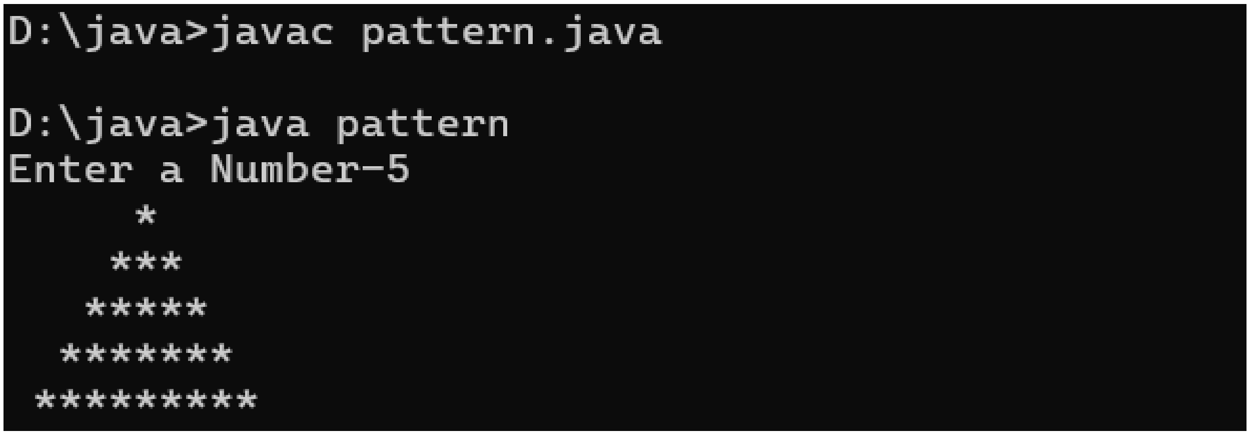
Write a program that prints a pyramid pattern of * based on user input.
Example:
Input: 5
Output:

```
    *
   ***
  *****
 *******
*********
```

Code:

```
import java.util.*;
public class pattern{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            for (int i=1; i<=num; i++){
                  for(int k=0; k<=num-i; k++){
                        System.out.print(" ");
                  }
                  for(int j=1; j<=(2*i-1); j++){
                        System.out.print("*");
                  }
                  System.out.println();
            }
      }
}
```

Output:



```
D:\java>javac pattern.java

D:\java>java pattern
Enter a Number-5
     *
    ***
   *****
  *******
 *********
```

h) Factorial of a Number

Write a Java program that calculates the factorial of a given number using a for loop.

Example:

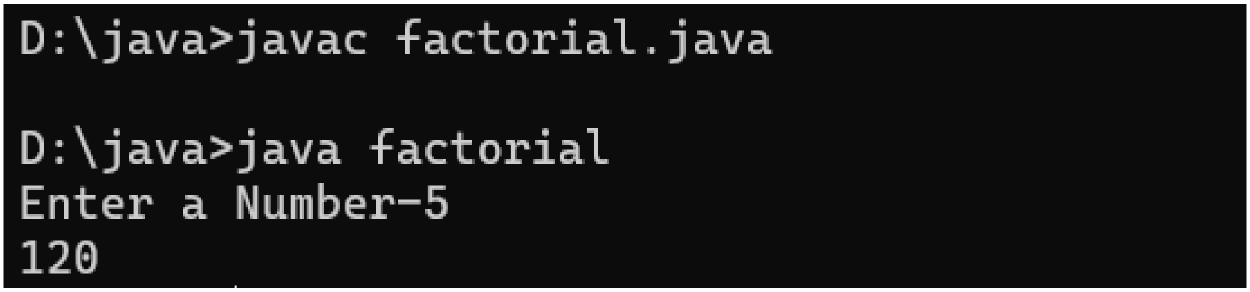
Input: 5

Output: 120 (5! = 5 × 4 × 3 × 2 × 1)

Code:

```
import java.util.*;
public class factorial{

      public static void main(String[] args){
            Scanner obj = new Scanner(System.in);
            System.out.print("Enter a Number-");
            int num = obj.nextInt();
            int factorial=1;
            for (int i=1; i<=num; i++){
                  factorial=factorial*i;
            }
            System.out.print(factorial);
      }
}
```

Output:



```
D:\java>javac factorial.java

D:\java>java factorial
Enter a Number-5
120
```

i) Armstrong Number

Write a Java program to check if a number is an Armstrong number (sum of cubes of digits equals the number).

Example:

Input: 153

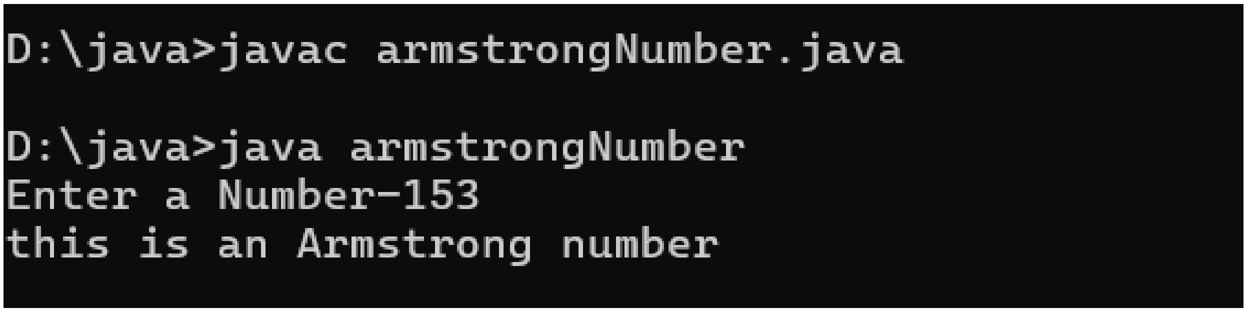
Output: Yes, it's an Armstrong number.

(Because $1^3 + 5^3 + 3^3 = 153$)

Code:

```
import java.util.*;
public class armstrongNumber{

    public static void main(String[] args){
        Scanner obj = new Scanner(System.in);
        System.out.print("Enter a Number-");
        int num = obj.nextInt();
        int num2=num;
        int sum= 0;
        String str = String.valueOf(num);
        int len = str.length();

        while (num!=0){
            int digit=num%10;
            sum=sum+(int) Math.pow(digit, len);
            num=num/10;
        }
        if(sum==num2){
            System.out.println("this is an Armstrong number");
        }
        else{
                System.out.println("this is not an Armstrong number");
        }
    }
}
```

Output:



```
D:\java>javac armstrongNumber.java

D:\java>java armstrongNumber
Enter a Number-153
this is an Armstrong number
```

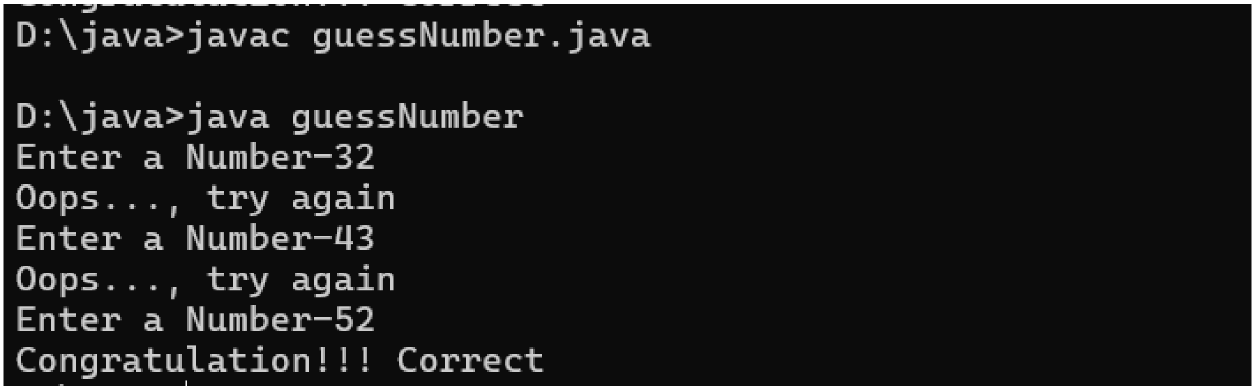
j) Number Guessing Game

Write a simple number guessing game where the program randomly selects a number (1-100), and the user keeps guessing until they get it right.

Code:

```
import java.util.*;
import java.util.Random;
public class guessNumber{

      public static void main(String[] args){
            Random random= new Random();
            int rannum = random.nextInt(100)+1;
            Scanner obj = new Scanner(System.in);
            Boolean a=true;
            while(a){
                  System.out.print("Enter a Number-");
                  int num = obj.nextInt();
                  if (num==rannum){
                        System.out.print("Congratulation!!! Correct");
                        a=false;
                  }
                  else{
                        System.out.println("Oops..., try again");
                  }
            }
      }
}
```

Output:



```
D:\java>javac guessNumber.java

D:\java>java guessNumber
Enter a Number-32
Oops..., try again
Enter a Number-43
Oops..., try again
Enter a Number-52
Congratulation!!! Correct
```

INHERITANCE

4.SINGLE INHERITANCE

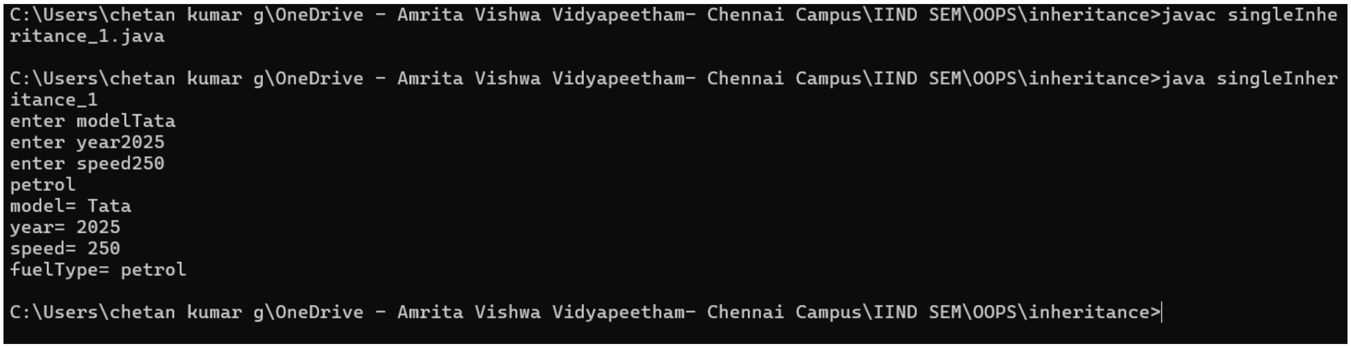
a) Vehicle Management System

Code:

```
import java.util.*;

class Vehicle{
    String model;
    int year;
    int speed;
    Vehicle(String model,int year,int speed){
        this.model=model;
        this.year=year;
        this.speed=speed;
    }

    void displayInfo(){
        System.out.println("model="+" "+model);
        System.out.println("year="+" "+year);
        System.out.println("speed="+" "+speed);
    }
}

class car extends Vehicle{
    String fuelType;

    car(String fuelType,String model,int year,int speed){
        super(model,year,speed);
        this.fuelType=fuelType;
    }

    void displayInfoFuel(){
        System.out.println("fuelType="+" "+fuelType);
    }
}
```

```
public class singleInheritance_1{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("enter model");
        String model=sc.nextLine();
        System.out.print("enter year");
        int year=sc.nextInt();
        System.out.print("enter speed");
        int speed=sc.nextInt();
        sc.nextLine();
        String fuelType=sc.nextLine();

        car obj = new car(fuelType,model,year,speed);
        obj.displayInfo();
        obj.displayInfoFuel();
    }
}
```

OUTPUT:



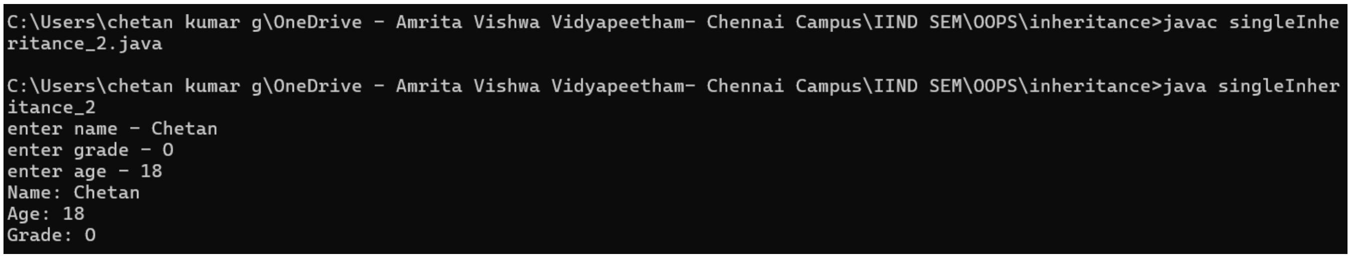
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac singleInhe
ritance_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java singleInher
itance_1
enter modelTata
enter year2025
enter speed250
petrol
model= Tata
year= 2025
speed= 250
fuelType= petrol

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>
```

b) Student Management System

Code :

```
import java.util.*;
class Person {
    String name;
    int age;

    Person(String name, int age) {
        this.name = name;
        this.age = age;
    }

    void displayInfo() {
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
    }
}

class Student extends Person {
    String grade;

    Student(String name, int age, String grade) {
        super(name, age);
        this.grade = grade;
    }

    void displayStudentInfo() {
        displayInfo();
        System.out.println("Grade: " + grade);
    }
}

public class singleInheritance_2 {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.print("enter name - ");
        String name=sc.nextLine();
        System.out.print("enter grade - ");

        String grade=sc.nextLine();

        System.out.print("enter age - ");

        int age=sc.nextInt();

        Student student = new Student(name,age,grade);

        student.displayStudentInfo();

    }

}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac singleInhe
ritance_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java singleInher
itance_2
enter name - Chetan
enter grade - O
enter age - 18
Name: Chetan
Age: 18
Grade: O
```

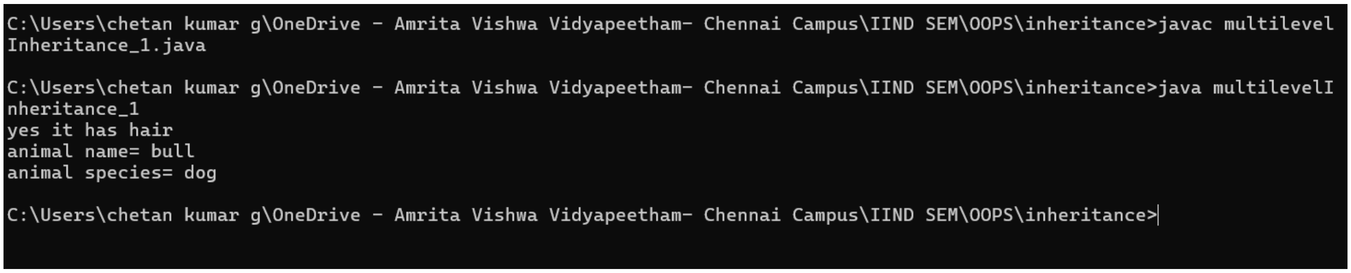
5.MULTILEVEL INHERITANCE

a) Animals Information

Code :

```
class Animal{
    String name;
    String species;

    Animal(String name,String species){
        this.name=name;
        this.species=species;
    }

    void displayInfo(){
        System.out.println("animal name="+" "+name);
        System.out.println("animal species="+" "+species);
    }
}

class mammal extends Animal{
    boolean hair;
    mammal(boolean hair,String name, String species){
        super(name,species);
        this.hair=hair;
    }

    void displayInfomammal(){
        if (hair){
            System.out.println("yes it has hair");
            displayInfo();
        }

        else{
            System.out.println("no it doesn't has hair");
            displayInfo();
        }
    }
}

public class multilevelInheritance_1{
    public static void main(String[] args){
        mammal obj = new mammal(true,"bull","dog");
        obj.displayInfomammal();
    }
}

class dog extends mammal{
    String breed;

    dog(String breed,boolean hair,String name, String species){
        super(hair,name,species);
        this.breed=breed;
    }
}
```

OUTPUT:



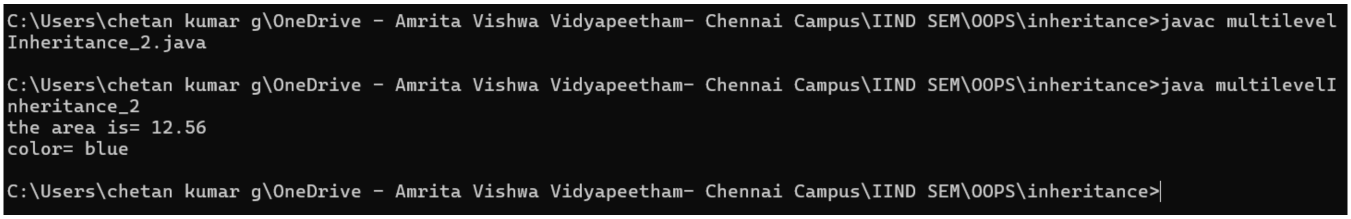
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac multilevel
Inheritance_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java multilevelI
nheritance_1
yes it has hair
animal name= bull
animal species= dog

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>
```

b) Shape Details

Code:

```
class Shapes{
    String color;

    Shapes(String color){
        this.color=color;
    }

    void displayInfo(){
        System.out.println("color="+" "+color);
    }
}

class twoDShapes extends Shapes{
    twoDShapes(String color){
        super(color);
    }

    void displayArea(double area){
        System.out.println("the area is="+" "+area);
        displayInfo();
    }
}

class Circle extends twoDShapes{
    int radius;

    Circle(int radius,String color){
        super(color);
        this.radius=radius;
    }

    void calculateArea(){
        double area= 3.14*radius*radius;
        displayArea(area);
    }
}

public class multilevelInheritance_2{
    public static void main(String[] args){
        Circle obj = new Circle(2,"blue");
        obj.calculateArea();
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac multilevel
Inheritance_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java multilevelI
nheritance_2
the area is= 12.56
color= blue

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>
```

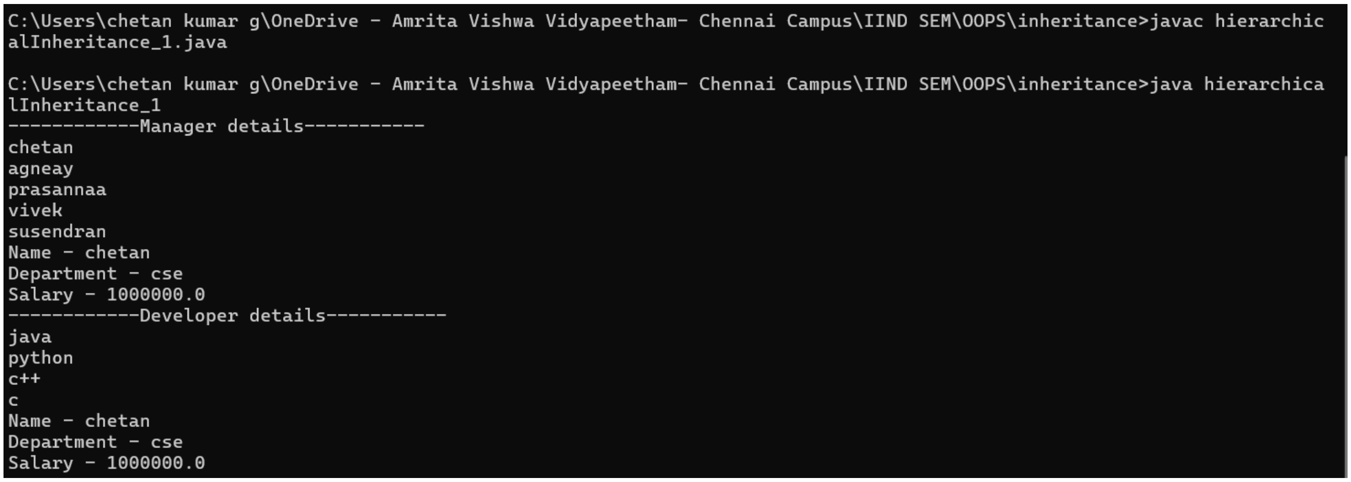
6.HIERARCHICAL INHERITANCE

a) Employee Management System

Code :

```
import java.util.Arrays;
class Employee{
    String name;
    String department;
    double salary;
    Employee(String name,String department,double salary){
        this.name=name;
        this.department=department;
        this.salary=salary;
    }
    void displayInfo(){
        System.out.println("Name - "+name);
        System.out.println("Department - "+department);
        System.out.println("Salary - "+salary);
    }
}
class manager extends Employee{
    String[] team = new String[4];

    manager(String name,String department,double salary,String[] team){
        super(name,department,salary);
        this.team=team;
    }
    void displayManagerInfo(){
        //System.out.println(Arrays.toString(team));
        for(String name:team){
            System.out.println(name);
        }
        displayInfo();
    }
}
class developer extends Employee{
    String[] languages;
    developer(String name,String department,double salary,String[] languages){
        super(name,department,salary);
        this.languages=languages;
    }
    void displayDeveloperInfo(){
        for(String name:languages){
            System.out.println(name);
        }
        displayInfo();
    }
}
public class hierarchicalInheritance_1{
    public static void main(String[] args){
        String[] team = {"chetan","agneay","prasannaa","vivek","susendran"};
        String[] lang = {"java","python","c++","c"};
        manager obj1 = new manager("chetan","cse",1000000,team);
        System.out.println("------------Manager details-----------");
        obj1.displayManagerInfo();
        System.out.println("------------Developer details-----------");
        developer obj2 = new developer("chetan","cse",1000000,lang);
        obj2.displayDeveloperInfo();
    }
}
```

OUTPUT:



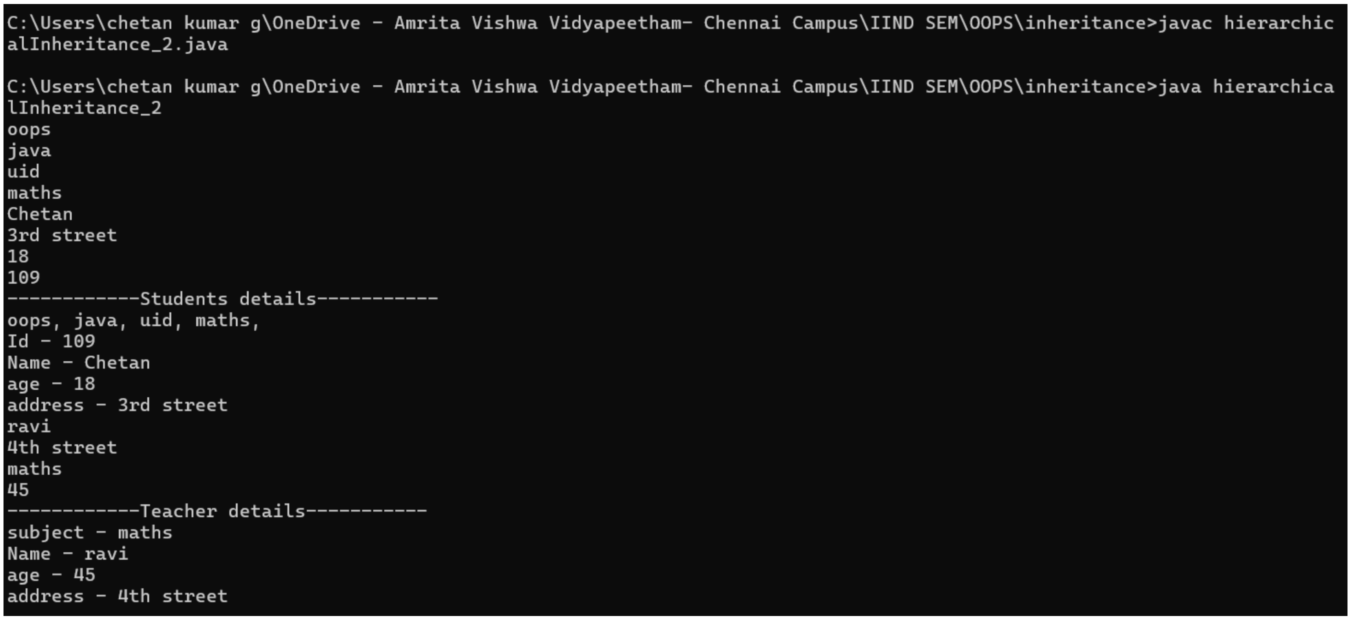
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac hierarchic
alInheritance_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java hierarchica
lInheritance_1
------------Manager details-----------
chetan
agneay
prasannaa
vivek
susendran
Name - chetan
Department - cse
Salary - 1000000.0
------------Developer details-----------
java
python
c++
c
Name - chetan
Department - cse
Salary - 1000000.0
```

b) School Management System

Code :

```
import java.util.*;
class person{
    String name;
    int age;
    String address;

    person(String name,int age, String address){
        this.name=name;
        this.age=age;
        this.address=address;
    }

    void displayInfo(){
        System.out.println("Name - "+name);
        System.out.println("age - "+age);
        System.out.println("address - "+address);
    }
}

class student extends person{
    String[] course = new String[5];
    int id;

    student(String name,int age, String address,String[] course,int id){
        super(name,age,address);
        this.course=course;
        this.id=id;
    }
    void displayStudentInfo(){
        //System.out.println(Arrays.toString(team));
        for(String name:course){
            System.out.print(name+", ");

        }
        System.out.println();
        System.out.println("Id - "+id);
        displayInfo();
    }


}

class teacher extends person{
    String subject;

    teacher(String name,int age, String address,String subject){
        super(name,age,address);
        this.subject=subject;

    }
    void displayTeacherInfo(){
        System.out.println("subject - "+subject);
        displayInfo();
    }


}

public class hierarchicalInheritance_2{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        String[] arr= new String[4];
        for (int i=0 ; i<=3 ; i++){
            String arrele=sc.nextLine();
            arr[i]=arrele;
        }
        String name = sc.nextLine();
        String address = sc.nextLine();
        int age = sc.nextInt();
        int id = sc.nextInt();
        student obj1 = new student(name,age,address,arr,id);
        System.out.println("------------Students details-----------");
        obj1.displayStudentInfo();


        sc.nextLine();
        String tname = sc.nextLine();
        String taddress = sc.nextLine();
        String tsubject = sc.nextLine();
        int tage = sc.nextInt();
        teacher obj2 = new teacher(tname,tage,taddress,tsubject);
        System.out.println("------------Teacher details-----------");
        obj2.displayTeacherInfo();
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac hierarchic
alInheritance_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java hierarchica
lInheritance_2
oops
java
uid
maths
Chetan
3rd street
18
109
------------Students details-----------
oops, java, uid, maths,
Id - 109
Name - Chetan
age - 18
address - 3rd street
ravi
4th street
maths
45
------------Teacher details-----------
subject - maths
Name - ravi
age - 45
address - 4th street
```

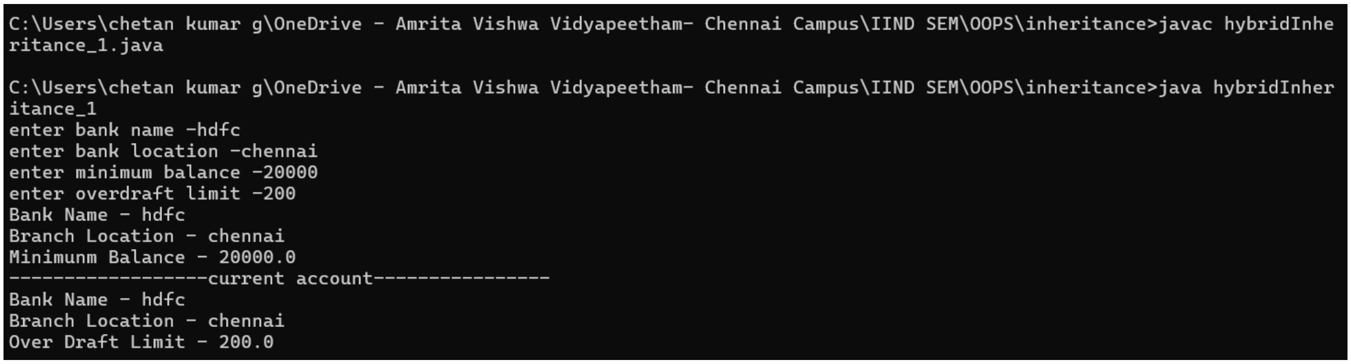
7.HYBRID INHERITANCE

a) Account Management System

Code:

```
import java.util.*;

class Bank{
    String bankname;

    Bank(String bankname){
        this.bankname=bankname;
    }

    void bankDetails(){
        System.out.println("Bank Name - "+bankname);
    }
}

class branch extends Bank{
    String branchLocation;

    branch(String bankname,String bankLocation){
        super(bankname);
        this.branchLocation=bankLocation;
    }

    void branchLocation(){
        bankDetails();
        System.out.println("Branch Location - "+branchLocation);
    }
}

class savingAccount extends branch{
    double minBalance;

    savingAccount(String bankname,String bankLocation,double minBalance){
        super(bankname, bankLocation);
        this.minBalance=minBalance;
    }

    void accountType(){
        branchLocation();
        System.out.println("Minimunm Balance - "+ minBalance);
    }
}

class currentAccount extends branch{
    double overDraftLimit;

    currentAccount(String bankname,String bankLocation,double overDraftLimit){
        super(bankname, bankLocation);
        this.overDraftLimit=overDraftLimit;
    }

    void accountType(){
        branchLocation();
        System.out.println("Over Draft Limit - "+ overDraftLimit);
    }
}

public class hybridInheritance_1{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("enter bank name -");
        String name= sc.nextLine();
        System.out.print("enter bank location -");
        String address=sc.nextLine();
        System.out.print("enter minimum balance -");
        double minbal=sc.nextDouble();
        System.out.print("enter overdraft limit -");
        double overdraft=sc.nextDouble();
        savingAccount sa = new savingAccount(name,address,minbal);
        sa.accountType();
        System.out.println("------------------current account----------------");
        currentAccount ca = new currentAccount(name,address,overdraft);
        ca.accountType();

    }

}
```

OUTPUT:



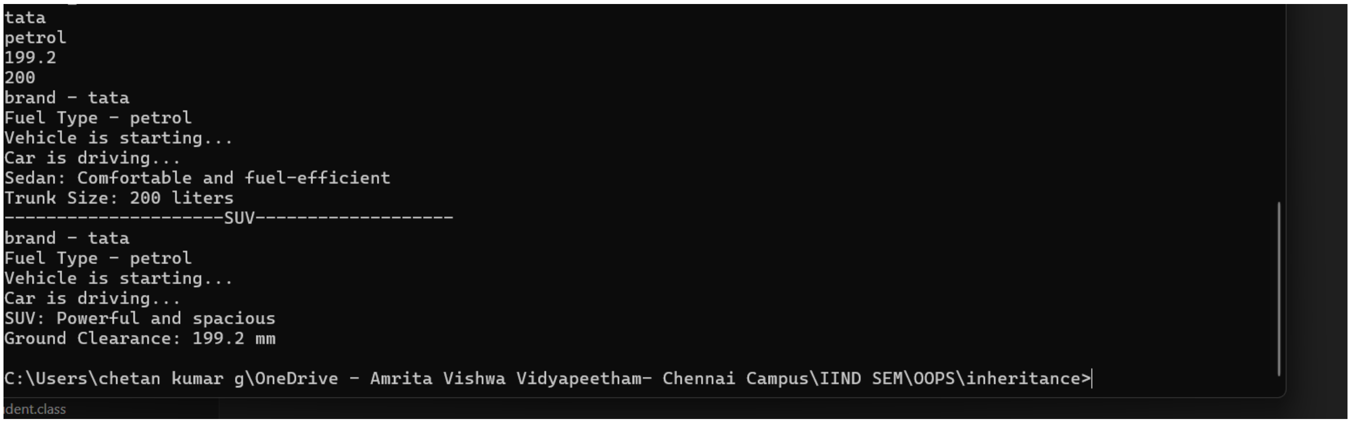
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>javac hybridInhe
ritance_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>java hybridInher
itance_1
enter bank name -hdfc
enter bank location -chennai
enter minimum balance -20000
enter overdraft limit -200
Bank Name - hdfc
Branch Location - chennai
Minimunm Balance - 20000.0
------------------current account----------------
Bank Name - hdfc
Branch Location - chennai
Over Draft Limit - 200.0
```

b) Car Management System

Code :

```
import java.util.Scanner;


class Vehicle {
    String brand;


    Vehicle(String brand){
        this.brand=brand;
    }


    void displayInfo(){
        System.out.println("brand - "+brand);
    }


    void start() {
        System.out.println("Vehicle is starting...");
    }
}


class Car extends Vehicle {
    String fueltype ;


    Car(String brand,String fueltype){
        super(brand);
        this.fueltype=fueltype;
    }


    void displayFuelInfo(){
        System.out.println("Fuel Type - "+fueltype);
    }
    void drive() {
        System.out.println("Car is driving...");
    }
}


class Sedan extends Car {
    int trunksize;

    Sedan(String brand,String fueltype,int trunksize){
        super(brand, fueltype);
        this.trunksize=trunksize;
    }

    void sedanFeatures() {
        displayInfo();
        displayFuelInfo();
        start();
        drive();
        System.out.println("Sedan: Comfortable and fuel-efficient");
        System.out.println("Trunk Size: " + trunksize + " liters");
    }
}

class SUV extends Car {
    double groundClearance;

    SUV(String brand,String fueltype,double groundClearance){
        super(brand, fueltype);
        this.groundClearance=groundClearance;
    }

    void suvFeatures() {
        displayInfo();
        displayFuelInfo();
        start();
        drive();
        System.out.println("SUV: Powerful and spacious");
        System.out.println("Ground Clearance: " + groundClearance + " mm");
    }
}

public class hybridInheritance_2 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String brand = sc.nextLine();

        String fueltype = sc.nextLine();

        double groundClearance=sc.nextDouble();

        int trunksize=sc.nextInt();

        Sedan se = new Sedan(brand,fueltype,trunksize);

        se.sedanFeatures();


        System.out.println("---------------------SUV-------------------");

        SUV su = new SUV(brand,fueltype,groundClearance);

        su.suvFeatures();

    }

}
```

OUTPUT:



```
tata
petrol
199.2
200
brand - tata
Fuel Type - petrol
Vehicle is starting...
Car is driving...
Sedan: Comfortable and fuel-efficient
Trunk Size: 200 liters
---------------------SUV-------------------
brand - tata
Fuel Type - petrol
Vehicle is starting...
Car is driving...
SUV: Powerful and spacious
Ground Clearance: 199.2 mm

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\inheritance>
```

POLYMORPHISM

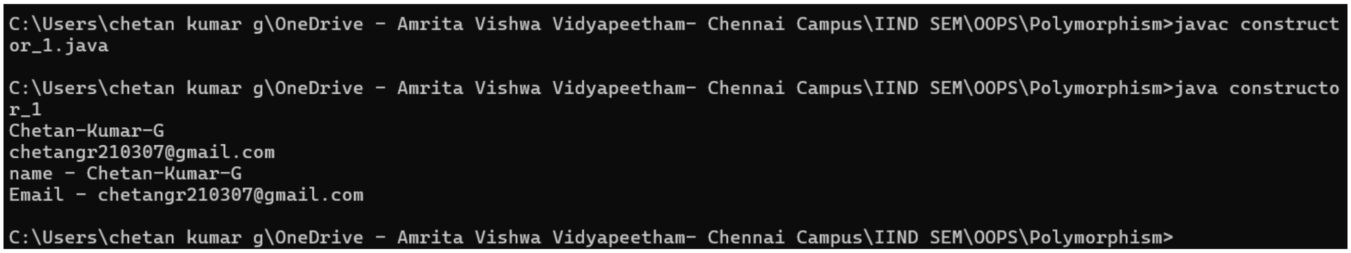
8.CONSTRUCTOR

a) Email Management System

Code :

```
import java.util.Scanner;

class user{
      String username;
      String email;

      user(String username, String email){
            this.username=username;
            this.email=email;
            System.out.println("name - "+username);
            System.out.println("Email - "+email);
      }

}

public class constructor_1 {

      public static void main(String[] args) {
            Scanner sc = new Scanner(System.in);
            String username=sc.nextLine();
            String email = sc.nextLine();
            user obj = new user(username,email);
      }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac construct
or_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>java constructo
r_1
Chetan-Kumar-G
chetangr210307@gmail.com
name - Chetan-Kumar-G
Email - chetangr210307@gmail.com

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

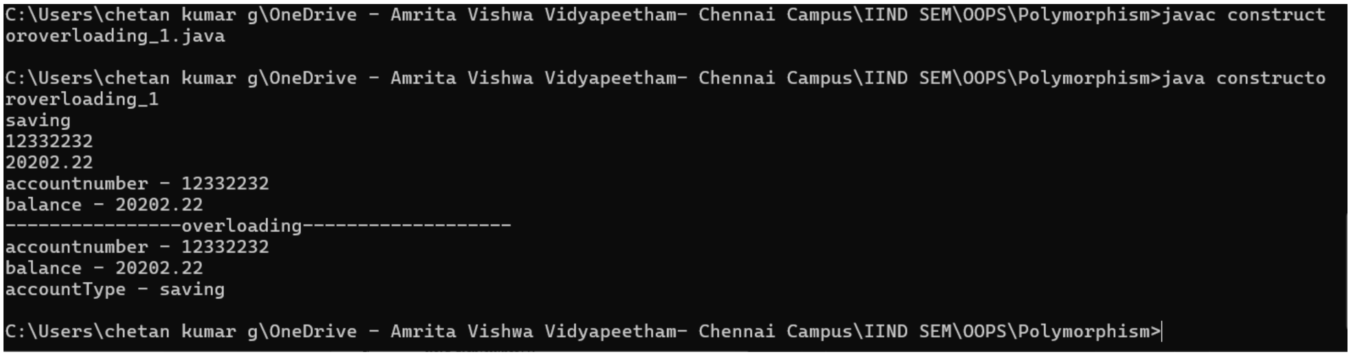
9.CONSTRUCTOR OVERLOADING

a) Animals Information

Code :

```
import java.util.Scanner;

class account{
    int accountNumber;
    double balance;
    String accountType;

    account(int accountNumber,double balance){
        this.accountNumber=accountNumber;
        this.balance=balance;
        System.out.println("accountnumber - "+accountNumber);
        System.out.println("balance - "+balance);
    }

    account(int accountNumber,double balance,String accountType){
        this.accountNumber=accountNumber;
        this.balance=balance;
        this.accountType=accountType;
        System.out.println("accountnumber - "+accountNumber);
        System.out.println("balance - "+balance);
        System.out.println("accountType - "+accountType);
    }
}
public class constructoroverloading_1 {
    public static void main(String[] args) {
        Scanner sc =new Scanner(System.in);
        String accountType= sc.nextLine();
        int accountNumber= sc.nextInt();
        double balance= sc.nextDouble();

        account obj1 = new account(accountNumber, balance);
        System.out.println("----------------overloading-------------------");
        account obj2 = new account(accountNumber, balance, accountType);
    }


}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac construct
oroverloading_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>java constructo
roverloading_1
saving
12332232
20202.22
accountnumber - 12332232
balance - 20202.22
----------------overloading-------------------
accountnumber - 12332232
balance - 20202.22
accountType - saving

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

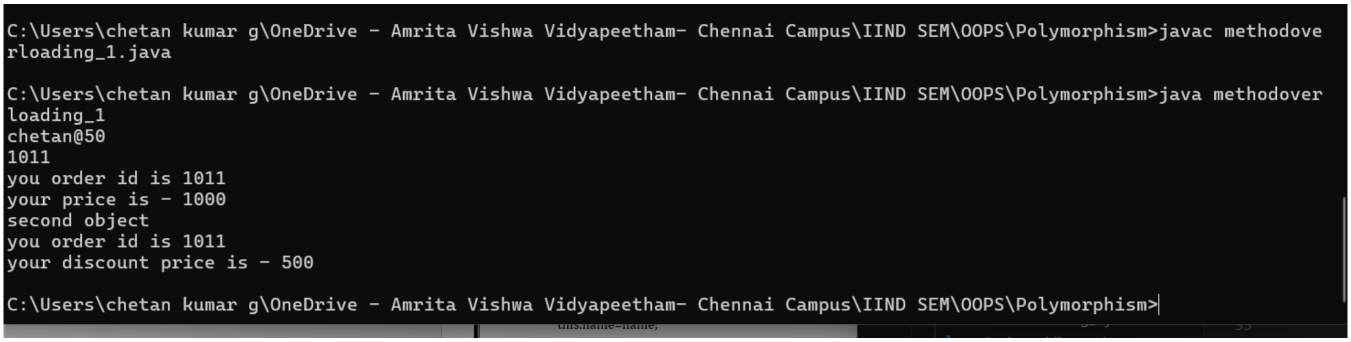
10.METHOD OVERLOADING

a) Order Management System

Code :

```
import java.util.*;

class order{
    int orderid;
    String discountCode;
    int price = 1000;

    void displayPrice(int orderid){
        System.out.println("you order id is "+orderid);
        System.out.println("your price is - "+price);
    }

    void displayPrice(int orderid,String discountCode){
        System.out.println("you order id is "+orderid);
        price = price-(price/2);
        System.out.println("your discount price is - "+price);
    }

}
public class methodoverloading_1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String discountCode = sc.nextLine();
        int orderid = sc.nextInt();
        order o1 = new order();
        o1.displayPrice(orderid);

        System.out.println("second object");
        order o2 = new order();
        o2.displayPrice(orderid,discountCode);
        }
}
```

OUTPUT:



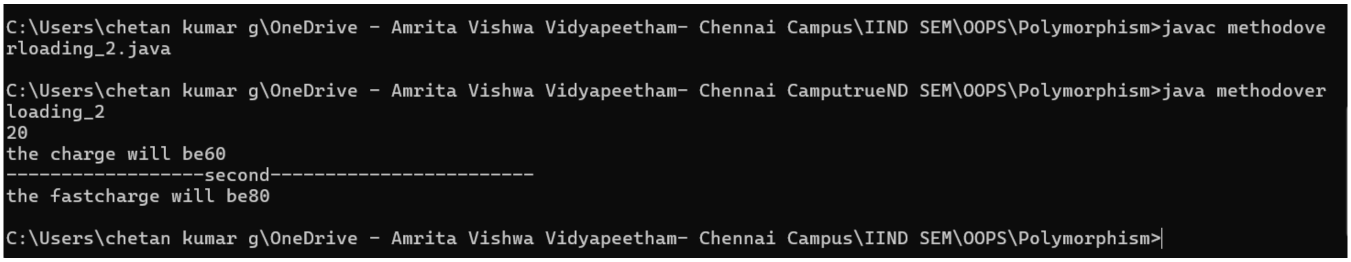
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac methodove
rloading_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>java methodover
loading_1
chetan@50
1011
you order id is 1011
your price is - 1000
second object
you order id is 1011
your discount price is - 500

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

b) Phone Charging System

Code :

```
import java.util.Scanner;

class mobilecharge{
    int min;
    boolean fastcharge;
    int charge = 40;

    void charge(int min){
        System.out.println("the charge will be"+ (charge+20));
    }

    void charge(int min,boolean fastcharge){
        if (fastcharge){
            System.out.println("the fastcharge will be"+ (charge+40));
        }

        else{
            System.out.println("the charge will be"+ (charge+20));
        }

    }

}
public class methodoverloading_2 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        boolean fastcharge = sc.nextBoolean();
        int min = sc.nextInt();

        mobilecharge obj1 = new mobilecharge();
        obj1.charge(min);
        System.out.println("------------------second------------------------");

        obj1.charge(min, fastcharge);
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac methodove
rloading_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai CamputrueND SEM\OOPS\Polymorphism>java methodover
loading_2
20
the charge will be60
------------------second------------------------
the fastcharge will be80

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

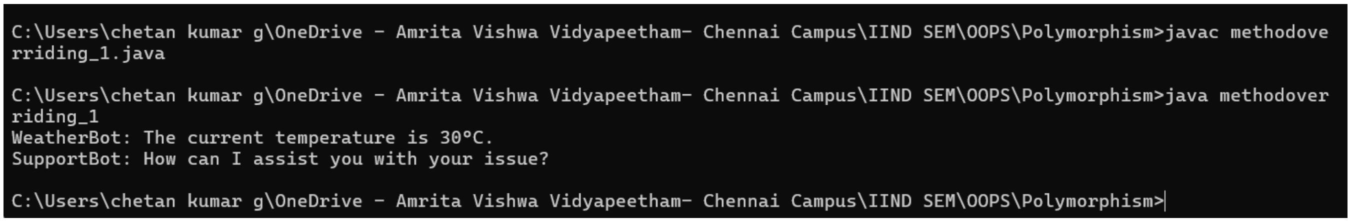
11.METHOD OVERRIDING

a) Chatbot System

Code :

```
class Chatbot {
    void reply(String message) {
        System.out.println("Chatbot: Processing message...");
    }
}
class WeatherBot extends Chatbot {
    void reply(String message) {
        System.out.println("WeatherBot: The current temperature is 30°C.");
    }
}
class SupportBot extends Chatbot {
    void reply(String message) {
        System.out.println("SupportBot: How can I assist you with your issue?");
    }
}
public class methodoverriding_1 {
    public static void main(String[] args) {
        Chatbot bot1 = new WeatherBot();
        Chatbot bot2 = new SupportBot();

        bot1.reply("What's the weather?");
        bot2.reply("I need help with my order.");
    }
}
```

OUTPUT:



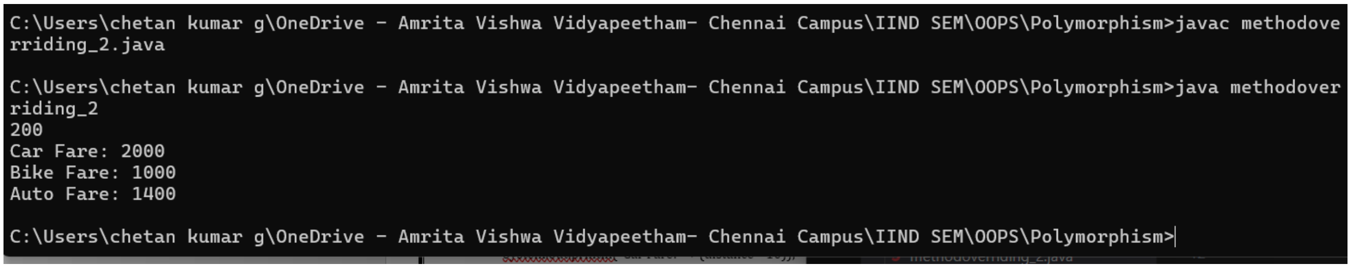
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac methodove
rriding_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>java methodover
riding_1
WeatherBot: The current temperature is 30°C.
SupportBot: How can I assist you with your issue?

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

b) Vehicle Fare Management System

Code :

```
import java.util.Scanner;

class Vehicle {
    void calculateFare(int distance) {
        System.out.println("Calculating fare for " + distance + " km.");
    }
}

class Car extends Vehicle {
    @Override
    void calculateFare(int distance) {
        System.out.println("Car Fare: " + (distance * 10));
    }
}

class Bike extends Vehicle {
    @Override
    void calculateFare(int distance) {
        System.out.println("Bike Fare: " + (distance * 5));
    }
}

class Auto extends Vehicle {
    @Override
    void calculateFare(int distance) {
        System.out.println("Auto Fare: " + (distance * 7));
    }
}

public class methodoverriding_2{
    public static void main(String[] args) {
        Vehicle car = new Car();
        Vehicle bike = new Bike();
        Vehicle auto = new Auto();
        Scanner sc = new Scanner(System.in);
        int distance = sc.nextInt();

        car.calculateFare(distance);

        bike.calculateFare(distance);

        auto.calculateFare(distance);

    }

}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>javac methodove
rriding_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>java methodover
riding_2
200
Car Fare: 2000
Bike Fare: 1000
Auto Fare: 1400

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Polymorphism>
```

ABSTRACTION

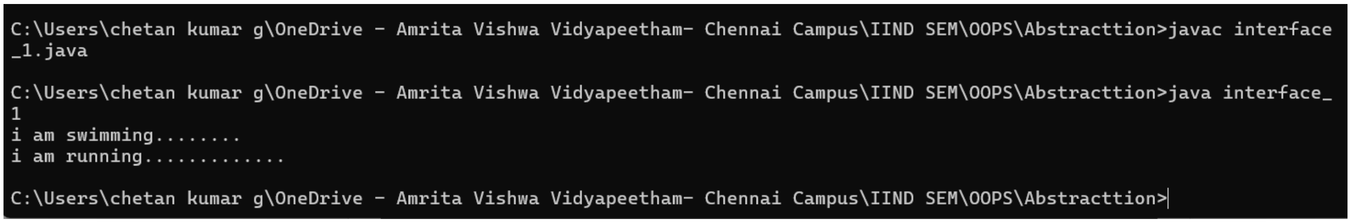
12. INTERFACE

a) Sports Management System

Code:

```
interface swimming{
    void swim();
}

interface running{
    void run();
}

class triathlete implements swimming,running{
    public void swim(){
        System.out.println("i am swimming........");
    }

    public void run(){
        System.out.println("i am running.............");
    }
}

public class interface_1{
    public static void main(String[] args) {
        triathlete obj = new triathlete();
        obj.swim();
        obj.run();
    }
}
```

OUTPUT:



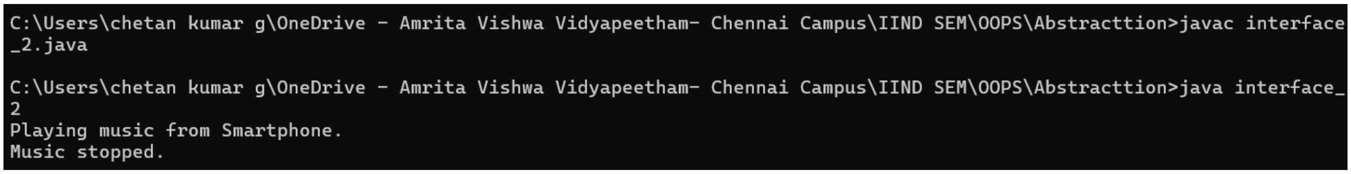
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac interface
_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java interface_
1
i am swimming........
i am running.............

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>
```

b) Music Management System

Code :

```
interface MusicPlayer {
    void play();
    void stop();
}

class Smartphone implements MusicPlayer {
    public void play() {
        System.out.println("Playing music from Smartphone.");
    }

    public void stop() {
        System.out.println("Music stopped.");
    }
}

public class interface_2 {
    public static void main(String[] args) {
        MusicPlayer myPhone = new Smartphone();
        myPhone.play();
        myPhone.stop();
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac interface
_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java interface_
2
Playing music from Smartphone.
Music stopped.
```

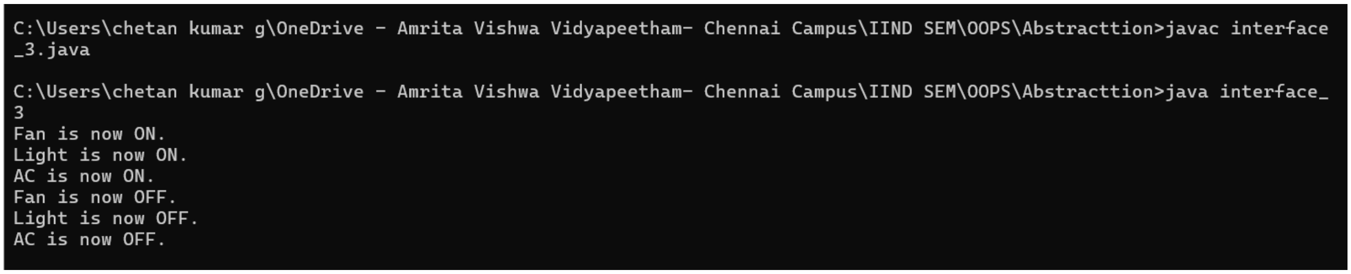
c)Smart Home Management System

Code:

```
interface SmartDevice {
    void turnOn();
    void turnOff();
}

class Fan implements SmartDevice {
    public void turnOn() {
        System.out.println("Fan is now ON.");
    }

    public void turnOff() {
        System.out.println("Fan is now OFF.");
    }
}

class Light implements SmartDevice {
    public void turnOn() {
        System.out.println("Light is now ON.");
    }

    public void turnOff() {
        System.out.println("Light is now OFF.");
    }
}

class AC implements SmartDevice {
    public void turnOn() {
        System.out.println("AC is now ON.");
    }

    public void turnOff() {
        System.out.println("AC is now OFF.");
    }
}
```

```
public class interface_3 {
    public static void main(String[] args) {
        SmartDevice[] devices = { new Fan(), new Light(), new AC() };

        for (SmartDevice device : devices) {
            device.turnOn();
        }

        for (SmartDevice device : devices) {
            device.turnOff();
        }
    }
}
```

OUTPUT:



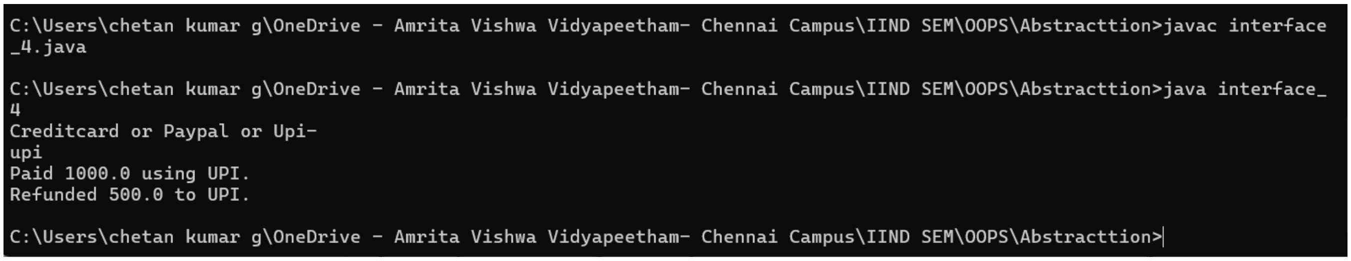
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac interface
_3.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java interface_
3
Fan is now ON.
Light is now ON.
AC is now ON.
Fan is now OFF.
Light is now OFF.
AC is now OFF.
```

d)Online Payment Management System

Code:

```
import java.util.Scanner;


interface OnlinePayment {
    void pay(double amount);
    void refund(double amount);
}

class CreditCard implements OnlinePayment {

    public void pay(double amount) {
        System.out.println("Paid " + amount + " using Credit Card.");
    }

    public void refund(double amount) {
        System.out.println("Refunded " + amount + " to Credit Card.");
    }
}

class PayPal implements OnlinePayment {

    public void pay(double amount) {
        System.out.println("Paid " + amount + " using PayPal.");
    }



    public void refund(double amount) {
        System.out.println("Refunded " + amount + " to PayPal.");
    }
}

class UPI implements OnlinePayment {

    public void pay(double amount) {
        System.out.println("Paid " + amount + " using UPI.");
    }
    public void refund(double amount) {
        System.out.println("Refunded " + amount + " to UPI.");
    }
}

public class interface_4{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Creditcard or Paypal or Upi-");
        String type = sc.nextLine();
        if (type.equalsIgnoreCase("creditcard")){
            OnlinePayment paymentMethod = new CreditCard();
            paymentMethod.pay(1000);
            paymentMethod.refund(500);
        }

        else if(type.equalsIgnoreCase("paypal"))
        {
            OnlinePayment paymentMethod = new PayPal();
            paymentMethod.pay(1000);
            paymentMethod.refund(500);
        }

        else if(type.equalsIgnoreCase("upi"))
        {
            OnlinePayment paymentMethod = new UPI();
            paymentMethod.pay(1000);
            paymentMethod.refund(500);
        }

        else{
            System.out.println("invalid type");
        }

    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac interface
_4.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java interface_
4
Creditcard or Paypal or Upi-
upi
Paid 1000.0 using UPI.
Refunded 500.0 to UPI.

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>
```

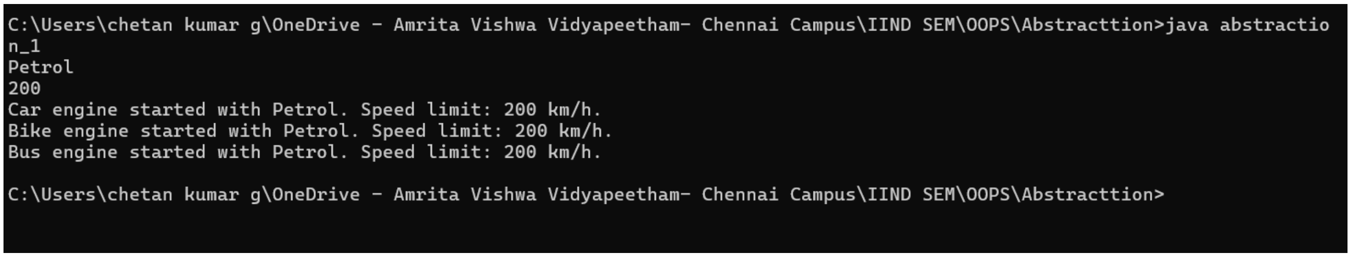
13. ABSTRACT CLASS

a) Fare Calculator System

Code :

```
import java.text.ListFormat.Style;
import java.util.Scanner;

abstract class Vehicle {
    String fuelType;
    int speedLimit;

    public Vehicle(String fuelType, int speedLimit) {
        this.fuelType = fuelType;
        this.speedLimit = speedLimit;
    }

    abstract void startEngine();
}

class Car extends Vehicle {
    public Car(String fuelType,int speedLimit) {
        super(fuelType,speedLimit);
    }



    void startEngine() {
        System.out.println("Car engine started with " + fuelType + ". Speed limit: " + speedLimit + " km/h.");
    }
}

class Bike extends Vehicle {
    public Bike(String fuelType,int speedLimit) {
        super(fuelType,speedLimit);
    }



    void startEngine() {
        System.out.println("Bike engine started with " + fuelType + ". Speed limit: " + speedLimit + " km/h.");
    }
}

class Bus extends Vehicle {
    public Bus(String fuelType,int speedLimit) {
        super(fuelType,speedLimit);
    }



    void startEngine() {
        System.out.println("Bus engine started with " + fuelType + ". Speed limit: " + speedLimit + " km/h.");
    }
}

public class abstraction_1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String fuelType = sc.nextLine();
        int speedLimit=sc.nextInt();
        Vehicle[] vehicles = { new Car(fuelType,speedLimit), new Bike(fuelType,speedLimit), new
Bus(fuelType,speedLimit) };
        for (Vehicle v : vehicles) {
            v.startEngine();
        }
    }
}
```

OUTPUT:



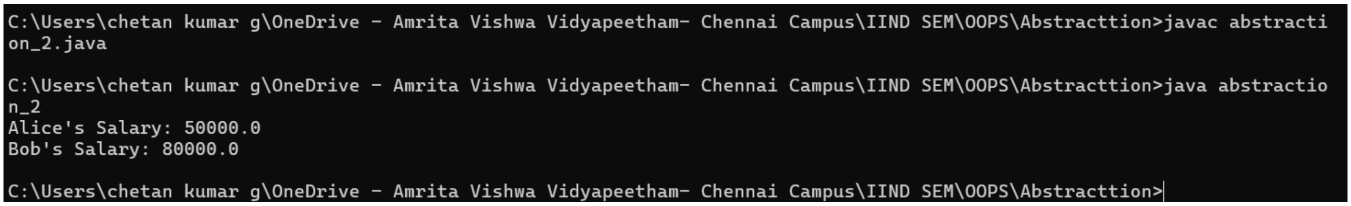
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java abstractio
n_1
Petrol
200
Car engine started with Petrol. Speed limit: 200 km/h.
Bike engine started with Petrol. Speed limit: 200 km/h.
Bus engine started with Petrol. Speed limit: 200 km/h.

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>
```

b) Employee Management System

Code:

```
abstract class Employee {
    String name;
    int id;



    public Employee(String name, int id) {
        this.name = name;
        this.id = id;
    }



    abstract double calculateSalary();
}

class SalariedEmployee extends Employee {
    double monthlySalary;

    public SalariedEmployee(String name, int id, double monthlySalary) {
        super(name, id);
        this.monthlySalary = monthlySalary;
    }

    double calculateSalary() {
        return monthlySalary;
    }
}

class HourlyEmployee extends Employee {
    double hourlyRate;
    int hoursWorked;

    public HourlyEmployee(String name, int id, double hourlyRate, int hoursWorked) {
        super(name, id);
        this.hourlyRate = hourlyRate;
        this.hoursWorked = hoursWorked;
    }

    double calculateSalary() {
        return hourlyRate * hoursWorked;
    }
}



public class abstraction_2{
    public static void main(String[] args) {
        Employee emp1 = new SalariedEmployee("Alice", 101, 50000);
        Employee emp2 = new HourlyEmployee("Bob", 102, 500, 160);

        System.out.println(emp1.name + "'s Salary: " + emp1.calculateSalary());
        System.out.println(emp2.name + "'s Salary: " + emp2.calculateSalary());
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac abstracti
on_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java abstractio
n_2
Alice's Salary: 50000.0
Bob's Salary: 80000.0

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>
```

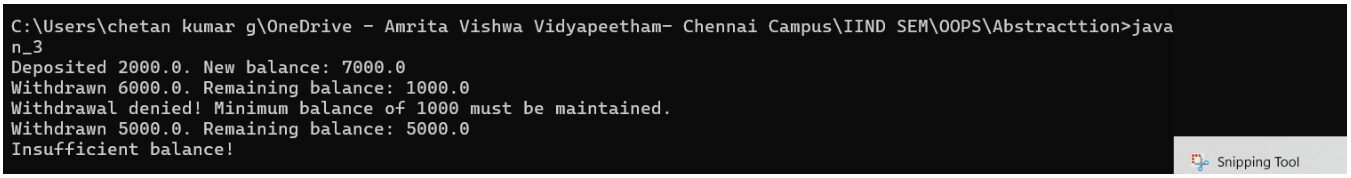
c)Bank Account Management System

Code :

```
abstract class BankAccount {
    String accountNumber;
    double balance;

    public BankAccount(String accountNumber, double balance) {
        this.accountNumber = accountNumber;
        this.balance = balance;
    }


    public void deposit(double amount) {
        balance += amount;
        System.out.println("Deposited " + amount + ". New balance: " + balance);
    }


    abstract void withdraw(double amount);
}

class SavingsAccount extends BankAccount {
    public SavingsAccount(String accountNumber, double balance) {
        super(accountNumber, balance);
    }


    void withdraw(double amount) {
        if (balance - amount >= 1000) {
            balance -= amount;
            System.out.println("Withdrawn " + amount + ". Remaining balance: " + balance);
        } else {
            System.out.println("Withdrawal denied! Minimum balance of 1000 must be maintained.");
        }
    }
}
```

```
class CurrentAccount extends BankAccount {
    public CurrentAccount(String accountNumber, double balance) {
        super(accountNumber, balance);
    }


    void withdraw(double amount) {
        if (balance >= amount) {
            balance -= amount;
            System.out.println("Withdrawn " + amount + ". Remaining balance: " + balance);
        } else {
            System.out.println("Insufficient balance!");
        }
    }
}

public class abstraction_3 {
    public static void main(String[] args) {
        BankAccount savings = new SavingsAccount("SA12345", 5000);
        BankAccount current = new CurrentAccount("CA67890", 10000);

        savings.deposit(2000);
        savings.withdraw(6000);
        savings.withdraw(2000);

        current.withdraw(5000);
        current.withdraw(6000);
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java
n_3
Deposited 2000.0. New balance: 7000.0
Withdrawn 6000.0. Remaining balance: 1000.0
Withdrawal denied! Minimum balance of 1000 must be maintained.
Withdrawn 5000.0. Remaining balance: 5000.0
Insufficient balance!
```

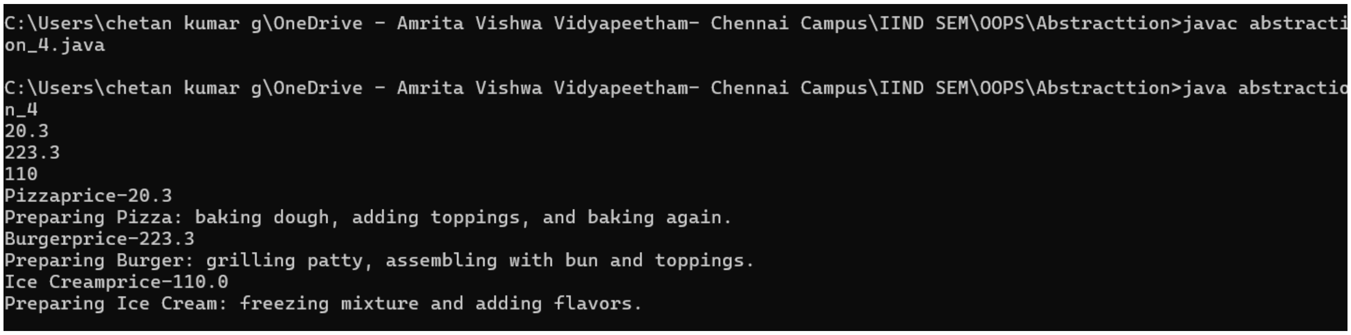
d)Food Management System

Code :

```
import java.util.Scanner;

abstract class FoodItem {
    String name;
    double price;

    public FoodItem(String name, double price) {
        this.name = name;
        this.price = price;
        System.out.println(name + "price-" +price);
    }

    abstract void prepare();
}

class Pizza extends FoodItem {
    public Pizza(double price) {
        super("Pizza", price);
    }

    void prepare() {
        System.out.println("Preparing Pizza: baking dough, adding toppings, and baking again.");
    }
}

class Burger extends FoodItem {
    public Burger(double price) {
        super("Burger", price);
    }

    void prepare() {
        System.out.println("Preparing Burger: grilling patty, assembling with bun and toppings.");
    }
}
```

```
class IceCream extends FoodItem {
    public IceCream(double price) {
        super("Ice Cream", price);
    }

    void prepare() {
        System.out.println("Preparing Ice Cream: freezing mixture and adding flavors.");
    }
}

public class abstraction_4 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        double pp = sc.nextDouble();
        double bp = sc.nextDouble();
        double ip = sc.nextDouble();

        FoodItem pizza = new Pizza(pp);
        pizza.prepare();
        FoodItem burger = new Burger(bp);
        burger.prepare();
        FoodItem icecream = new IceCream(ip);
        icecream.prepare();

    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>javac abstracti
on_4.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Abstracttion>java abstractio
n_4
20.3
223.3
110
Pizzaprice-20.3
Preparing Pizza: baking dough, adding toppings, and baking again.
Burgerprice-223.3
Preparing Burger: grilling patty, assembling with bun and toppings.
Ice Creamprice-110.0
Preparing Ice Cream: freezing mixture and adding flavors.
```

ENCAPSULATION

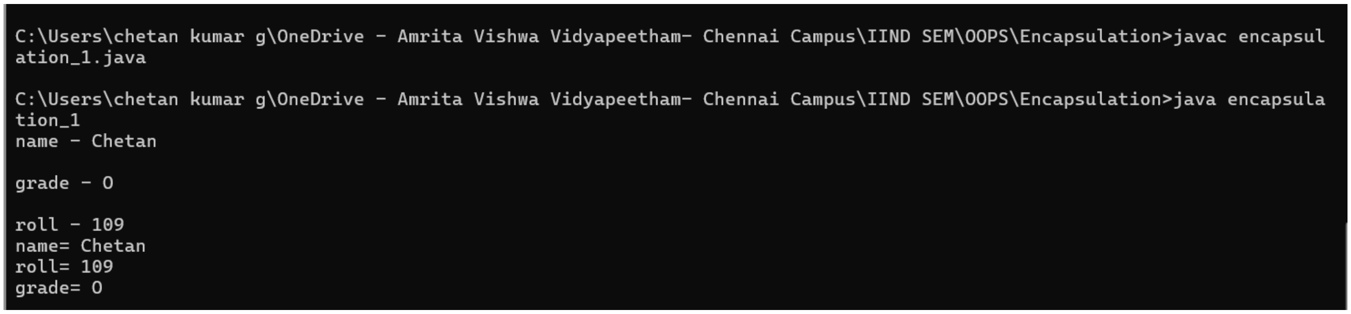
14. ENCAPSULATION

a) Student Management System

Code :

```
import java.util.Scanner;

class students{
    private String name;
    private int roll;
    private String grade;

    public void setname(String name1){
        name=name1;
    }

    public void setgrade(String grade1){
        grade=grade1;
    }

    public void setroll(int roll1){
        roll=roll1;
    }


    public String getname(){
        return name;
    }

    public String getgrade(){
        return grade;
    }
    public int getroll(){
        return roll;
    }
}
public class encapsulation_1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("name - ");
        String name1 = sc.nextLine();
        System.out.println("");
        System.out.print("grade - ");
        String grade1 = sc.nextLine();
        System.out.println("");
        System.out.print("roll - ");
        int roll1 = sc.nextInt();
        students obj = new students();
        obj.setname(name1);
        obj.setgrade(grade1);
        obj.setroll(roll1);
        System.out.println("name="+" "+obj.getname());
        System.out.println("roll="+" "+obj.getroll());
        System.out.println("grade="+" "+obj.getgrade());
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>javac encapsul
ation_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>java encapsula
tion_1
name - Chetan

grade - O

roll - 109
name= Chetan
roll= 109
grade= O
```

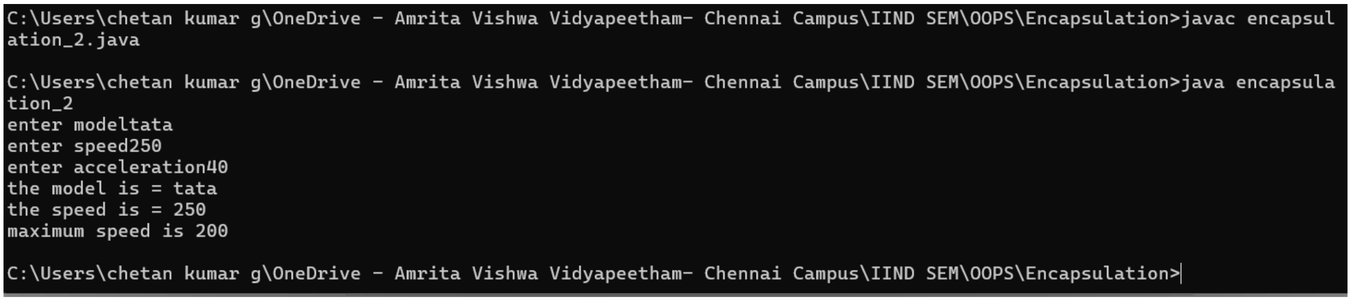
b) Car Driving System

Code :

```
import java.util.Scanner;

class car{
    private String model;
    private int speed;

    public void setmodel(String model1){
        model = model1;
    }

    public void setspeed(int speed1){
        speed = speed1;
    }

    public String getmodel(){
        return model;
    }

    public int getspeed(){
        return speed;
    }

    public void acceleration(int amount){

        if(speed + amount<=200){
            speed=speed+amount;
            System.out.println("the acceleration amount="+" "+ amount +", current speed " + speed);
        }

        else{
            System.out.println("maximum speed is 200");
        }

    }
}
```

```
public class encapsulation_2 {
    public static void main(String[] args) {
        Scanner sc =new Scanner(System.in);

        System.out.print("enter model");
        String model=sc.nextLine();

        System.out.print("enter speed");
        int speed=sc.nextInt();

        System.out.print("enter acceleration");
        int acceleration=sc.nextInt();

        car obj =new car();

        obj.setmodel(model);
        obj.setspeed(speed);
        System.out.println("the model is = "+obj.getmodel());
        System.out.println("the speed is = "+obj.getspeed());
        obj.acceleration(acceleration);


    }

}
```

OUTPUT:



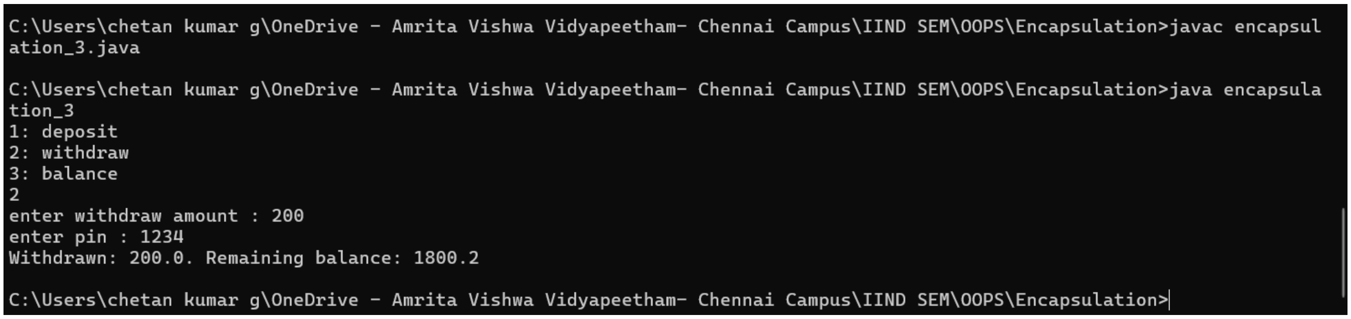
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>javac encapsul
ation_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>java encapsula
tion_2
enter modeltata
enter speed250
enter acceleration40
the model is = tata
the speed is = 250
maximum speed is 200

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>
```

c)Bank Management System

Code :

```
import java.util.Scanner;

class BankAccount {
    private String accountNumber;
    private double balance;
    private int pin;

    public BankAccount(String accountNumber, double initialBalance, int pin) {
        this.accountNumber = accountNumber;
        this.balance = initialBalance;
        this.pin = pin;
    }

    public void deposit(double amount) {
        if (amount > 0) {
            balance += amount;
            System.out.println("Deposited: " + amount + ". New balance: " + balance);
        } else {
            System.out.println("Invalid deposit amount.");
        }
    }

    public void withdraw(double amount, int enteredPin) {
        if (enteredPin == pin) {
            if (amount > 0 && amount <= balance) {
                balance -= amount;
                System.out.println("Withdrawn: " + amount + ". Remaining balance: " + balance);
            } else {
                System.out.println("Insufficient balance or invalid amount.");
            }
        } else {
            System.out.println("Incorrect PIN! Access denied.");
        }
    }
    public void checkBalance(int enteredPin) {
        if (enteredPin == pin) {
            System.out.println("Current balance: " + balance);
        } else {
            System.out.println("Incorrect PIN! Cannot display balance.");
        }
    }
}

public class encapsulation_3 {
    public static void main(String[] args) {
        Scanner sc =new Scanner(System.in);


        BankAccount myAccount = new BankAccount("123456789",2000.2,1234);



        System.out.println("1: deposit ");
        System.out.println("2: withdraw ");
        System.out.println("3: balance ");

        int check = sc.nextInt();

        if (check==1){
            System.out.print("enter deposit amount : ");
            double depamo = sc.nextDouble();
            myAccount.deposit(depamo);
        }

        else if(check==2){
            System.out.print("enter withdraw amount : ");
            double witamo = sc.nextDouble();

            System.out.print("enter pin : ");
            int wpin = sc.nextInt();
            myAccount.withdraw(witamo, wpin);
        }
        else if(check==3){

            System.out.print("enter pin : ");

            int pin = sc.nextInt();

            myAccount.checkBalance(pin);

        }


        else{

            System.out.println("invalid option");

        }

    }

}
```

OUTPUT:



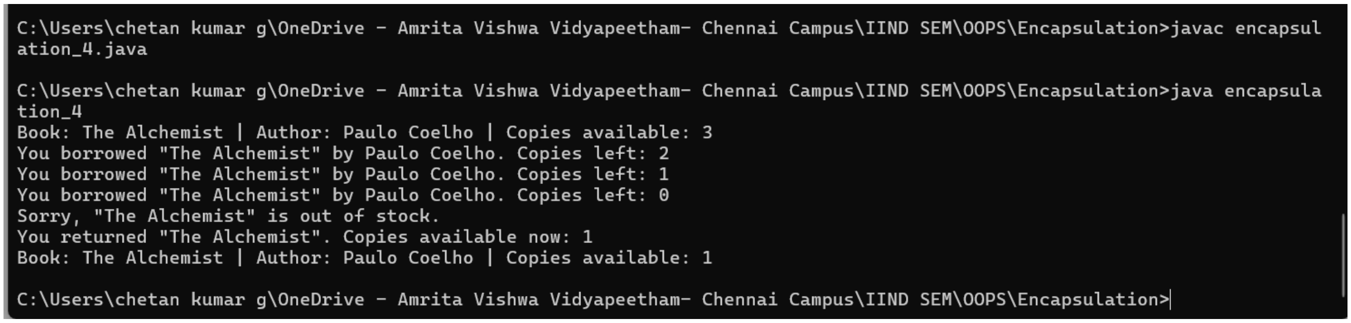
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>javac encapsul
ation_3.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>java encapsula
tion_3
1: deposit
2: withdraw
3: balance
2
enter withdraw amount : 200
enter pin : 1234
Withdrawn: 200.0. Remaining balance: 1800.2

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>
```

d)Library Management System

Code :

```
class Book {
    private String title;
    private String author;
    private int copies;

    public Book(String title, String author, int copies) {
        this.title = title;
        this.author = author;
        this.copies = copies;
    }

    public void borrowBook() {
        if (copies > 0) {
            copies--;
            System.out.println("You borrowed \"" + title + "\" by " + author + ". Copies left: " + copies);
        } else {
            System.out.println("Sorry, \"" + title + "\" is out of stock.");
        }
    }

    public void returnBook() {
        copies++;
        System.out.println("You returned \"" + title + "\". Copies available now: " + copies);
    }

    public void getDetails() {
        System.out.println("Book: " + title + " | Author: " + author + " | Copies available: " + copies);
    }
}



public class encapsulation_4 {
    public static void main(String[] args) {
        Book myBook = new Book("The Alchemist", "Paulo Coelho", 3);
        myBook.getDetails();
        myBook.borrowBook();

        myBook.borrowBook();

        myBook.borrowBook();

        myBook.borrowBook();

        myBook.returnBook();

        myBook.getDetails();

    }

}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>javac encapsul
ation_4.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>java encapsula
tion_4
Book: The Alchemist | Author: Paulo Coelho | Copies available: 3
You borrowed "The Alchemist" by Paulo Coelho. Copies left: 2
You borrowed "The Alchemist" by Paulo Coelho. Copies left: 1
You borrowed "The Alchemist" by Paulo Coelho. Copies left: 0
Sorry, "The Alchemist" is out of stock.
You returned "The Alchemist". Copies available now: 1
Book: The Alchemist | Author: Paulo Coelho | Copies available: 1

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Encapsulation>
```

15. PACKAGES

a) Library Management System

Code:

Book.java:

```
package library.books;

public class Book {
    private int bookID;
    private String title;
    private String author;
    private boolean available;

    public Book(int bookID, String title, String author) {
        this.bookID = bookID;
        this.title = title;
        this.author = author;
        this.available = true;
    }

    public void displayBookDetails() {
        System.out.println("Book ID: " + bookID + ", Title: " + title + ", Author: " +
author + ", Available: " + available);
    }

    public boolean isAvailable() {
        return available;
    }

    public void borrowBook() {
        if (available) {
            available = false;
        }
    }

    public void returnBook() {
        available = true;
    }

    public String getTitle() {
        return title;
    }
}
```

Member.java:

```
package library.members;

public class Member {
    private int memberID;
    private String name;
    private String email;

    public Member(int memberID, String name, String email) {
        this.memberID = memberID;
        this.name = name;
        this.email = email;
    }

    public void displayMemberDetails() {
        System.out.println("Member ID: " + memberID + ", Name: " + name + ", Email: " +
email);
    }

    public String getName() {
        return name;
    }
}
```

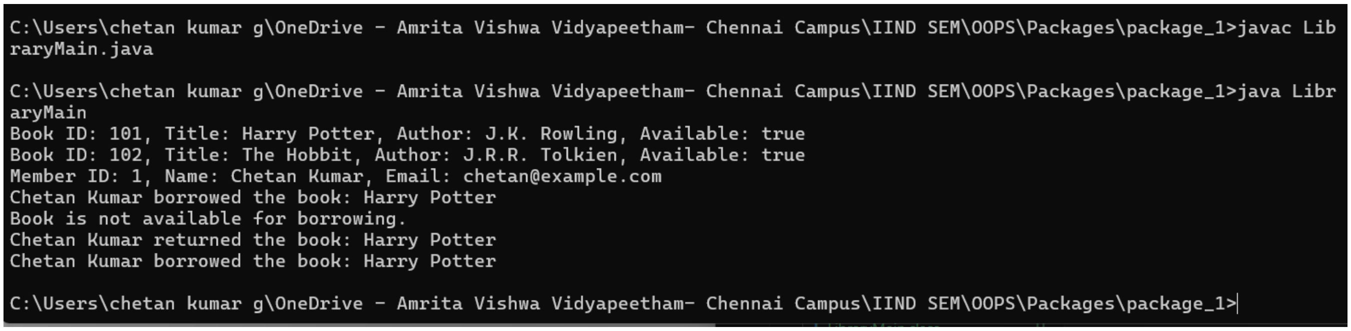
Transaction.java:

```
package library.transactions;

import library.books.Book;
import library.members.Member;

public class Transaction {
    public static void borrowBook(Member member, Book book) {
        if (book.isAvailable()) {
            book.borrowBook();
            System.out.println(member.getName() + " borrowed the book: " +
book.getTitle());
        } else {
            System.out.println("Book is not available for borrowing.");
        }
    }

    public static void returnBook(Member member, Book book) {
        book.returnBook();
        System.out.println(member.getName() + " returned the book: " + book.getTitle());
    }
}
```

LibraryMain.java

```
import library.books.Book;

import library.members.Member;

import library.transactions.Transaction;


public class LibraryMain {

    public static void main(String[] args) {

        // Creating books

        Book book1 = new Book(101, "Harry Potter", "J.K. Rowling");
        Book book2 = new Book(102, "The Hobbit", "J.R.R. Tolkien");

        Member member1 = new Member(1, "Chetan Kumar", "chetan@example.com");

        book1.displayBookDetails();
        book2.displayBookDetails();
        member1.displayMemberDetails();

        Transaction.borrowBook(member1, book1);
        Transaction.borrowBook(member1, book1); // Should show "not available"
        Transaction.returnBook(member1, book1);
        Transaction.borrowBook(member1, book1); // Now it should work
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_1>javac Lib
raryMain.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_1>java Libr
aryMain
Book ID: 101, Title: Harry Potter, Author: J.K. Rowling, Available: true
Book ID: 102, Title: The Hobbit, Author: J.R.R. Tolkien, Available: true
Member ID: 1, Name: Chetan Kumar, Email: chetan@example.com
Chetan Kumar borrowed the book: Harry Potter
Book is not available for borrowing.
Chetan Kumar returned the book: Harry Potter
Chetan Kumar borrowed the book: Harry Potter

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_1>
```

b) Shopping Management System

Code:

Customer.java:

```
package shopping.customers;

public class Customer {
    private int customerID;
    private String name;

    public Customer(int customerID, String name) {
        this.customerID = customerID;
        this.name = name;
    }

    public String getName() {
        return name;
    }
}
```

Product.java:

```
package shopping.products;

public class Product {
    private int productID;
    private String name;
    private double price;
    public Product(int productID, String name, double price) {
        this.productID = productID;
        this.name = name;
        this.price = price;
    }
    public void displayProduct() {
        System.out.println("Product ID: " + productID + ", Name: " + name + ", Price: $" +
price);
    }

    public double getPrice() {
        return price;
    }
    public String getName() {
        return name;
    }
}
```

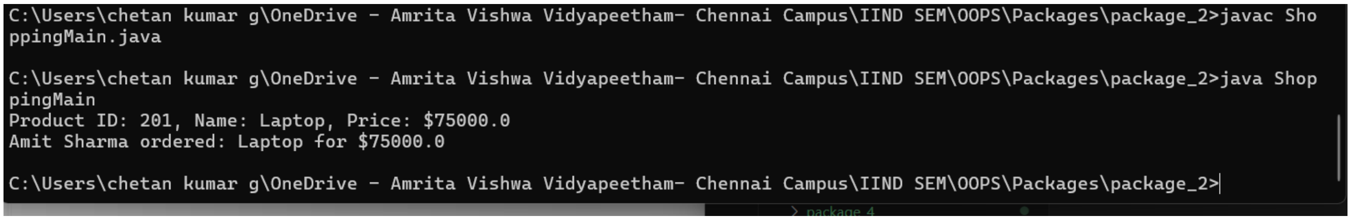
Order.java:

```
package shopping.orders;
import shopping.products.Product;
import shopping.customers.Customer;
public class Order {
    public static void placeOrder(Customer customer, Product product) {
        System.out.println(customer.getName() + " ordered: " + product.getName() + " for $"
+ product.getPrice());
    }
}
```

ShoppingMain.java:

```
import shopping.products.Product;
import shopping.customers.Customer;
import shopping.orders.Order;

public class ShoppingMain {
    public static void main(String[] args) {
        Product p1 = new Product(201, "Laptop", 75000);
        Customer c1 = new Customer(101, "Amit Sharma");

        p1.displayProduct();
        Order.placeOrder(c1, p1);
    }
}
```

OUTPUT:



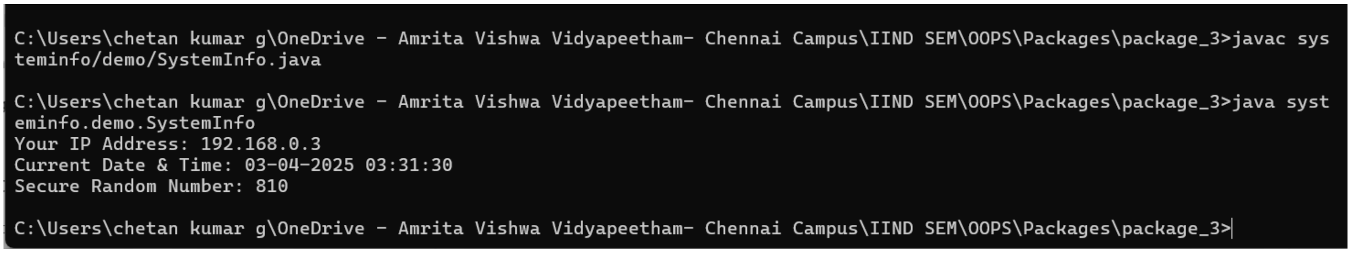
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_2>javac Sho
ppingMain.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_2>java Shop
pingMain
Product ID: 201, Name: Laptop, Price: $75000.0
Amit Sharma ordered: Laptop for $75000.0

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_2>
```

c)IP Address System

Code:

```
package systeminfo.demo;

import java.net.InetAddress;
import java.time.LocalDateTime;
import java.time.format.DateTimeFormatter;
import java.security.SecureRandom;

public class SystemInfo {
    public static void main(String[] args) {
        try {
            InetAddress ip = InetAddress.getLocalHost();
            System.out.println("Your IP Address: " + ip.getHostAddress());

            LocalDateTime now = LocalDateTime.now();
            DateTimeFormatter format = DateTimeFormatter.ofPattern("dd-MM-yyyy HH:mm:ss");
            System.out.println("Current Date & Time: " + now.format(format));

            SecureRandom random = new SecureRandom();
            int randomNumber = random.nextInt(1000);
            System.out.println("Secure Random Number: " + randomNumber);

        } catch (Exception e) {
            System.out.println("Error: " + e.getMessage());
        }
    }
}
```

OUTPUT:



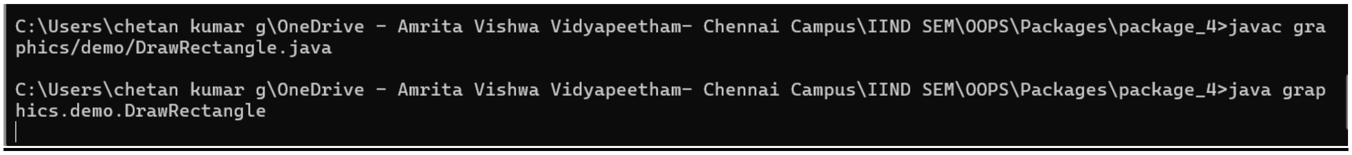
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_3>javac sys
teminfo/demo/SystemInfo.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_3>java syst
eminfo.demo.SystemInfo
Your IP Address: 192.168.0.3
Current Date & Time: 03-04-2025 03:31:30
Secure Random Number: 810

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_3>
```

d)Draw A Rectangle

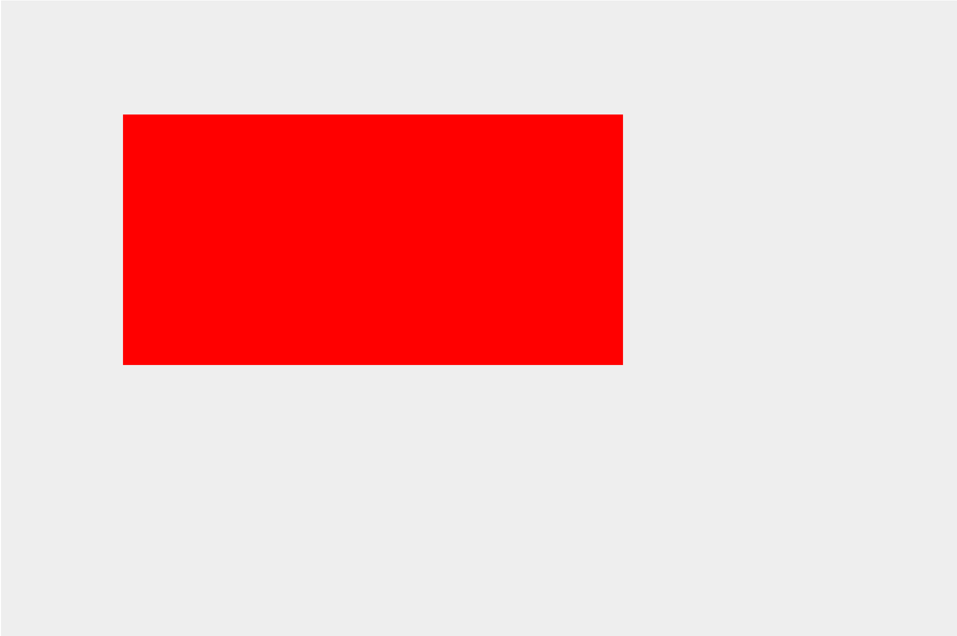
Code :

```
package graphics.demo;
import java.awt.*;
import javax.swing.*;
public class DrawRectangle extends JPanel {
    public void paintComponent(Graphics g) {
        super.paintComponent(g);
        g.setColor(Color.RED);
        g.fillRect(50, 50, 200, 100);
    }
    public static void main(String[] args) {
        JFrame frame = new JFrame();
        frame.add(new DrawRectangle());
        frame.setSize(400, 300);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setVisible(true);
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_4>javac gra
phics/demo/DrawRectangle.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Packages\package_4>java grap
hics.demo.DrawRectangle
```



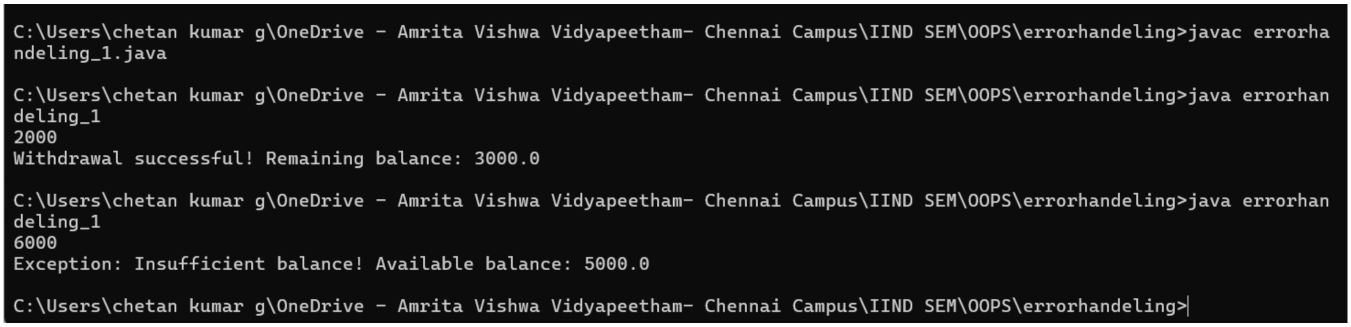
16. EXCEPTIONAL HANDELING

a) ATM Withdraw System

Code :

```
import java.util.Scanner;

class InsufficientBalanceException extends Exception {
    public InsufficientBalanceException(String message) {
        super(message);
    }
}

class BankAccount {
    private double balance;

    public BankAccount(double balance) {
        this.balance = balance;
    }

    public void withdraw(double amount) throws InsufficientBalanceException {
        if (amount > balance) {
            throw new InsufficientBalanceException("Insufficient balance! Available balance: " + balance);
        }
        balance -= amount;
        System.out.println("Withdrawal successful! Remaining balance: " + balance);
    }
}

public class errorhandeling_1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        double amount = sc.nextDouble();
        BankAccount account = new BankAccount(5000);

        try {
            account.withdraw(amount);
        } catch (InsufficientBalanceException e) {
            System.out.println("Exception: " + e.getMessage());
        }
    }
}
```

OUTPUT:



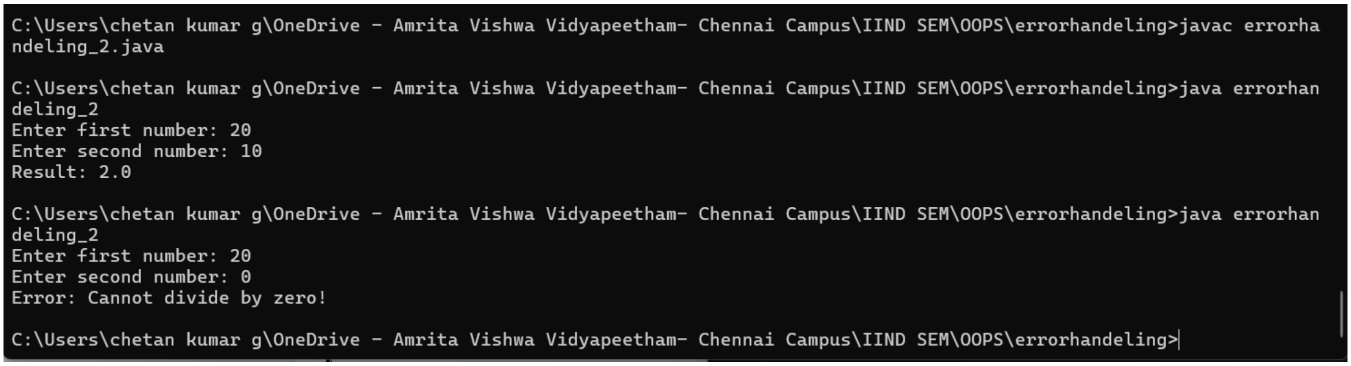
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>javac errorha
ndeling_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_1
2000
Withdrawal successful! Remaining balance: 3000.0

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_1
6000
Exception: Insufficient balance! Available balance: 5000.0

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>
```

b) Division By 0

Code :

```
import java.util.Scanner;

class Calculator {
    public double divide(int num1, int num2) {
        return num1 / num2;
    }
}

public class errorhandeling_2 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter first number: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter second number: ");
        int num2 = scanner.nextInt();
        Calculator calc = new Calculator();
        try {
            double result = calc.divide(num1, num2);
            System.out.println("Result: " + result);
        } catch (ArithmeticException e) {
            System.out.println("Error: Cannot divide by zero!");
        }

        scanner.close();
    }
}
```

OUTPUT:



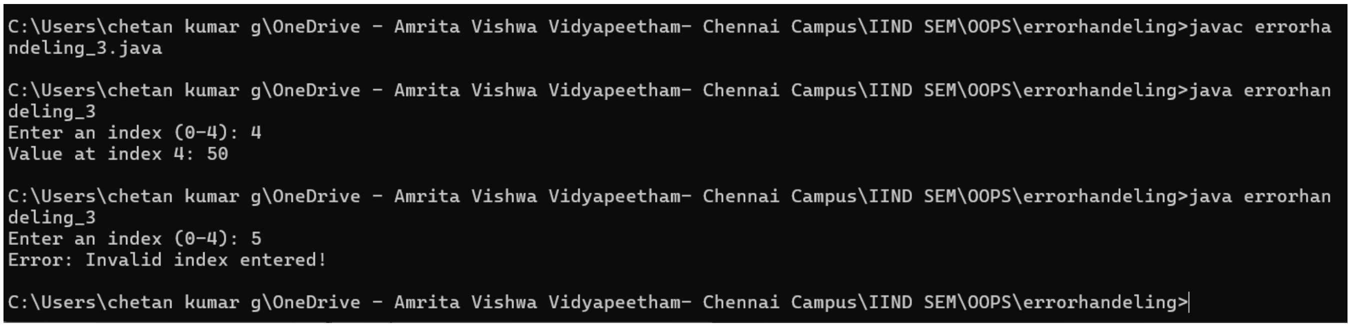
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>javac errorha
ndeling_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_2
Enter first number: 20
Enter second number: 10
Result: 2.0

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_2
Enter first number: 20
Enter second number: 0
Error: Cannot divide by zero!

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>
```

c)Array Index Manager

Code:

```
import java.util.Scanner;


class ArrayHandler {
    private int[] numbers = {10, 20, 30, 40, 50};


    public void printValueAtIndex(int index) {
        System.out.println("Value at index " + index + ": " + numbers[index]);
    }
}


public class errorhandeling_3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        ArrayHandler arrayHandler = new ArrayHandler();


        System.out.print("Enter an index (0-4): ");
        int index = scanner.nextInt();


        try {
            arrayHandler.printValueAtIndex(index);
        } catch (ArrayIndexOutOfBoundsException e) {
            System.out.println("Error: Invalid index entered!");
        }


        scanner.close();
    }
}
```

OUTPUT:



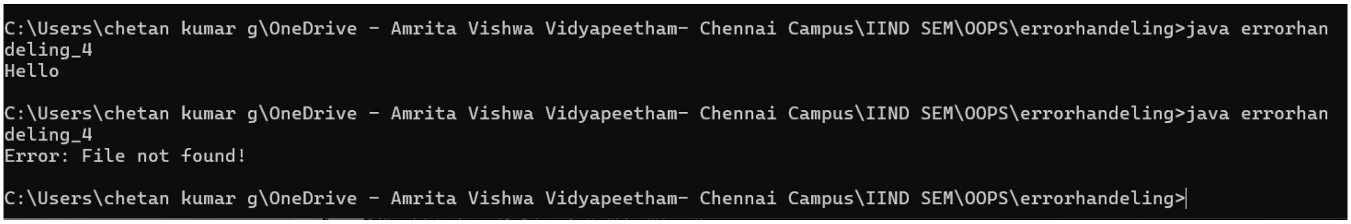
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>javac errorha
ndeling_3.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_3
Enter an index (0-4): 4
Value at index 4: 50

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_3
Enter an index (0-4): 5
Error: Invalid index entered!

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>
```

d)File Reading

Code:

```
import java.io.*;

class FileHandler {
    public void readFile(String filename) throws IOException {
        File file = new File(filename);
        BufferedReader br = new BufferedReader(new FileReader(file));

        String line;
        while ((line = br.readLine()) != null) {
            System.out.println(line);
        }
        br.close();
    }
}

public class errorhandeling_4{
    public static void main(String[] args) {
        FileHandler fileHandler = new FileHandler();
        String filename = "sample.txt";

        try {
            fileHandler.readFile(filename);
        } catch (FileNotFoundException e) {
            System.out.println("Error: File not found!");
        } catch (IOException e) {
            System.out.println("Error: Issue reading the file!");
        }
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_4
Hello

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>java errorhan
deling_4
Error: File not found!

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\errorhandeling>
```

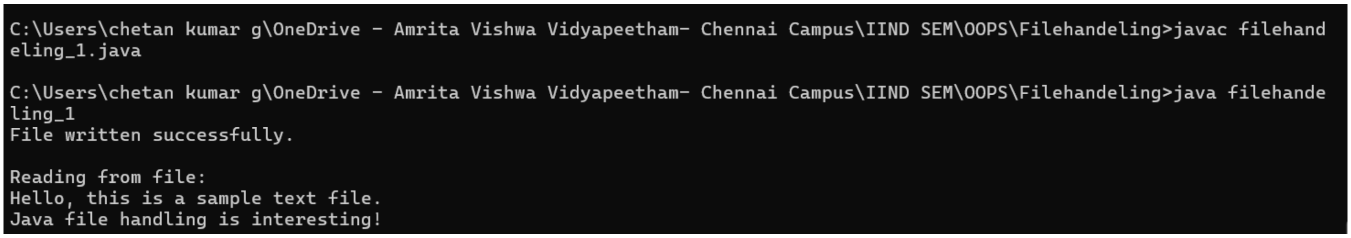
17. FILE HANDELING

a) Writing/Reading A File

Code:

```
import java.io.*;

public class filehandeling_1 {
    public static void main(String[] args) {
        String fileName = "output.txt";
        String content = "Hello, this is a sample text file.\nJava file handling is interesting!";
        try (FileWriter writer = new FileWriter(fileName)) {
            writer.write(content);
            System.out.println("File written successfully.");
        } catch (IOException e) {
            System.out.println("An error occurred while writing to the file.");
            e.printStackTrace();
        }
        try (BufferedReader reader = new BufferedReader(new FileReader(fileName))) {
            String line;
            System.out.println("\nReading from file:");
            while ((line = reader.readLine()) != null) {
                System.out.println(line);
            }
        } catch (IOException e) {
            System.out.println("An error occurred while reading the file.");
            e.printStackTrace();
        }
    }
}
```

OUTPUT:



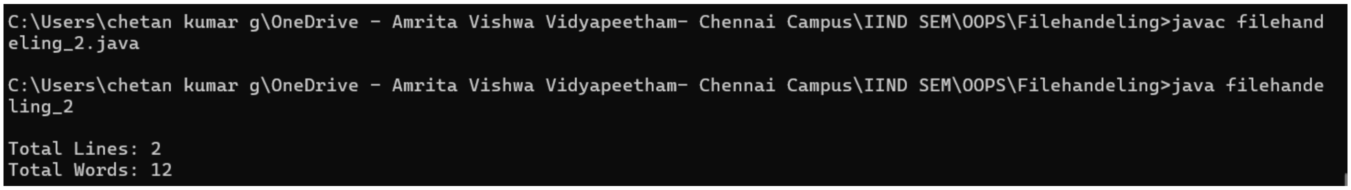
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>javac filehand
eling_1.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>java filehande
ling_1
File written successfully.

Reading from file:
Hello, this is a sample text file.
Java file handling is interesting!
```

b) Line Count

Code :

```
import java.io.*;

public class filehandeling_2{
    public static void main(String[] args) {
        String fileName = "output.txt";

        try (BufferedReader reader = new BufferedReader(new FileReader(fileName))) {
            int lineCount = 0, wordCount = 0;
            String line;
            while ((line = reader.readLine()) != null) {
                lineCount++;
                wordCount += line.split("\\s+").length;
            }
            System.out.println("\nTotal Lines: " + lineCount);
            System.out.println("Total Words: " + wordCount);
        } catch (IOException e) {
            System.out.println("An error occurred while processing the file.");
            e.printStackTrace();
        }
    }
}
```

OUTPUT:



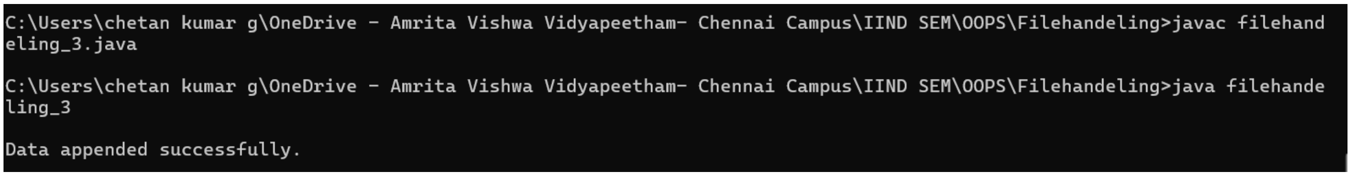
```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>javac filehand
eling_2.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>java filehande
ling_2

Total Lines: 2
Total Words: 12
```

c)Append Data To File

Code:

```
import java.io.*;


public class filehandeling_3{
    public static void main(String[] args) {
        String fileName = "output.txt";



        try (FileWriter writer = new FileWriter(fileName, true);
             BufferedWriter bufferedWriter = new BufferedWriter(writer)) {
            bufferedWriter.newLine();
            bufferedWriter.write("Appending new data to the file.");
            System.out.println("\nData appended successfully.");
        } catch (IOException e) {
            System.out.println("An error occurred while appending data.");
            e.printStackTrace();
        }
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>javac filehand
eling_3.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>java filehande
ling_3

Data appended successfully.
```

output.txt:

Hello, this is a sample text file.

Java file handling is interesting!

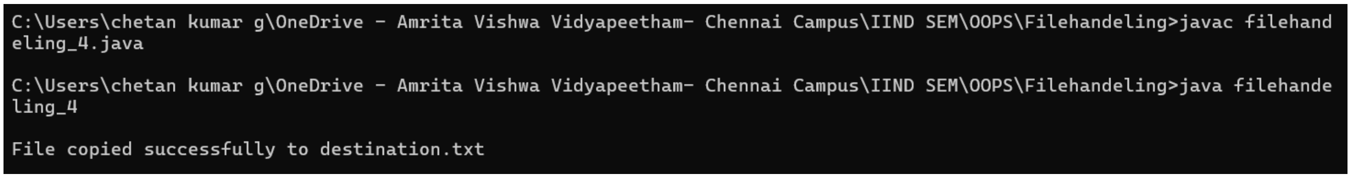
Appending new data to the file.

d)Copy The File

Code:

```
import java.io.*;

public class filehandeling_4{
    public static void main(String[] args) {
        String sourceFile = "output.txt";
        String destinationFile = "destination.txt";

        try (BufferedReader reader = new BufferedReader(new FileReader(sourceFile));
             BufferedWriter writer = new BufferedWriter(new FileWriter(destinationFile))) {
            String line;
            while ((line = reader.readLine()) != null) {
                writer.write(line);
                writer.newLine();
            }
            System.out.println("\nFile copied successfully to " + destinationFile);
        } catch (IOException e) {
            System.out.println("An error occurred while copying the file.");
            e.printStackTrace();
        }
    }
}
```

OUTPUT:



```
C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>javac filehand
eling_4.java

C:\Users\chetan kumar g\OneDrive - Amrita Vishwa Vidyapeetham- Chennai Campus\IIND SEM\OOPS\Filehandeling>java filehande
ling_4

File copied successfully to destination.txt
```

destination.txt:

Hello, this is a sample text file.

Java file handling is interesting!

Appending new data to the file.