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

SCHOOL OF COMPUTING

MARADANA SRIJA

CH.SC.U4CSE24126

OBJECT ORIENTED PROGRAMMING (23CSE111)

LAB RECORD

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BONAFIDE CERTIFICATE

This is to certify that the Lab Record work for 23CSE111- Object Oriented Programming Subject submitted by ***CH.SC.U4CSE24126 – MARADANA SRIJA*** 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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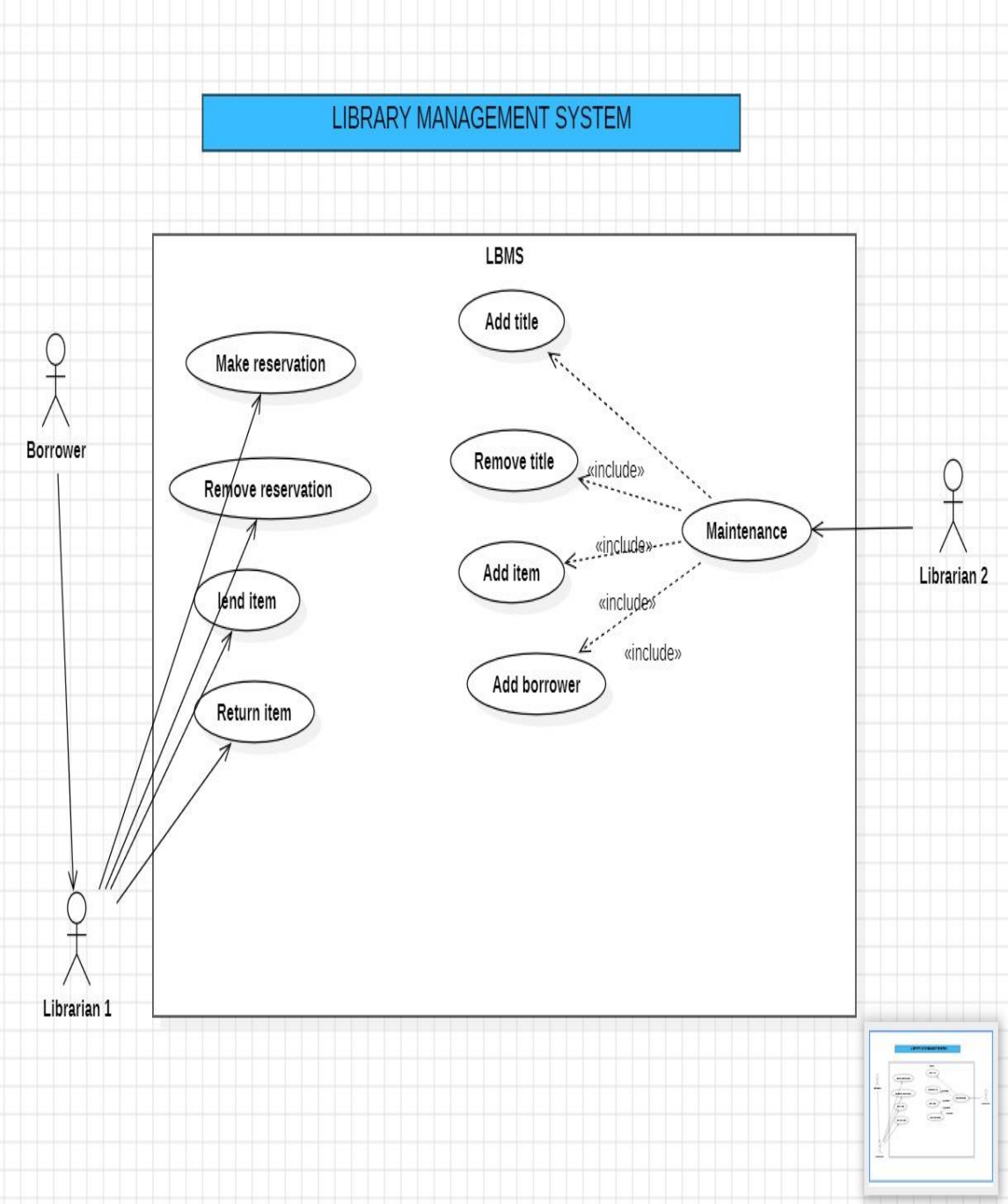

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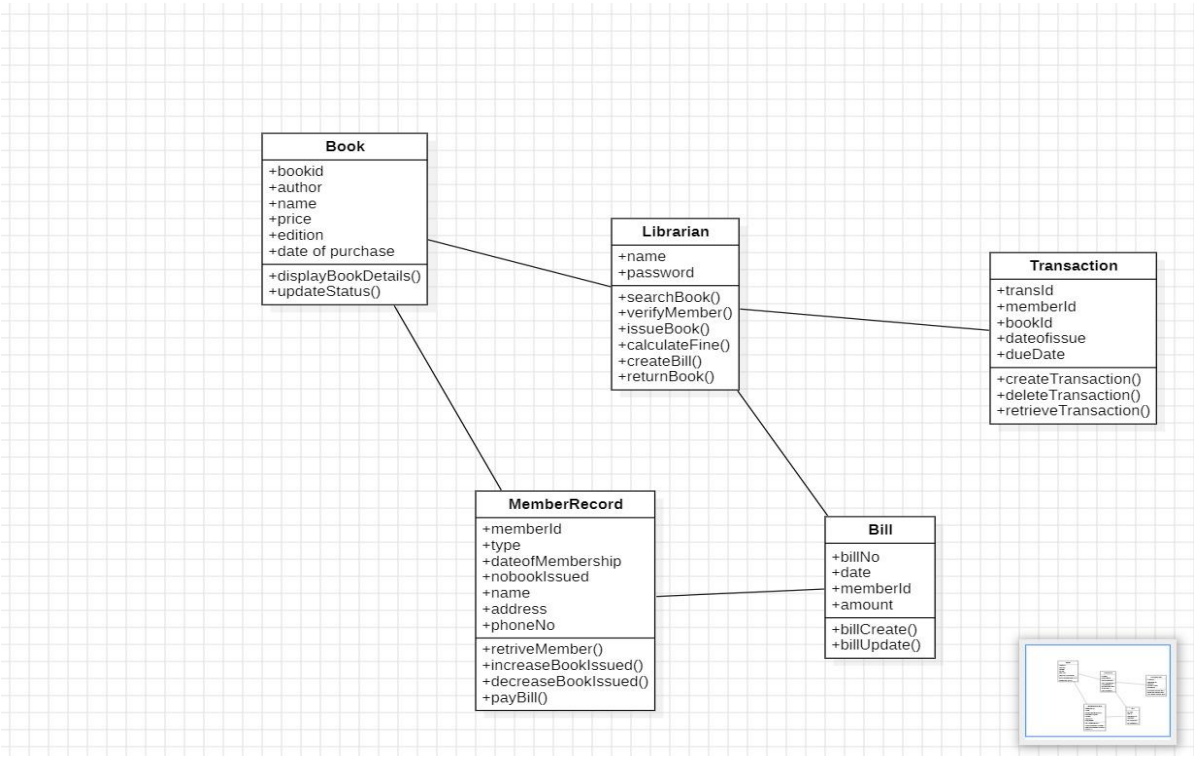

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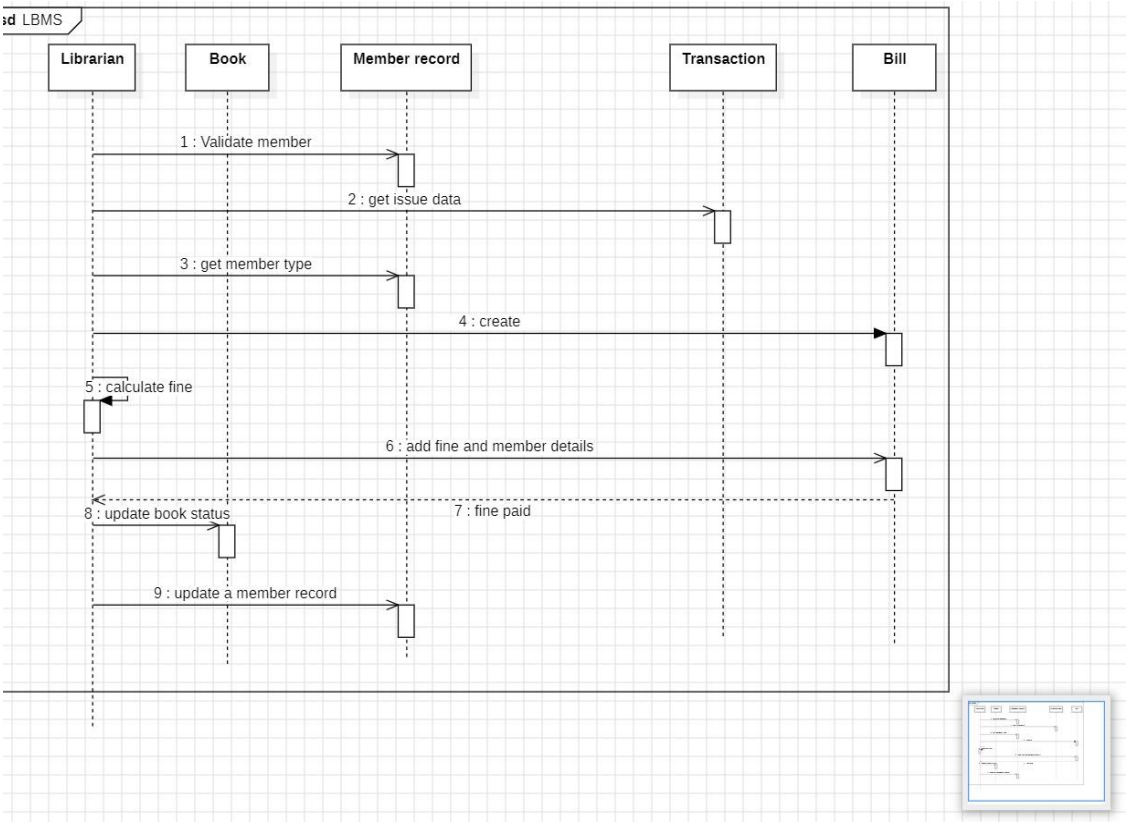

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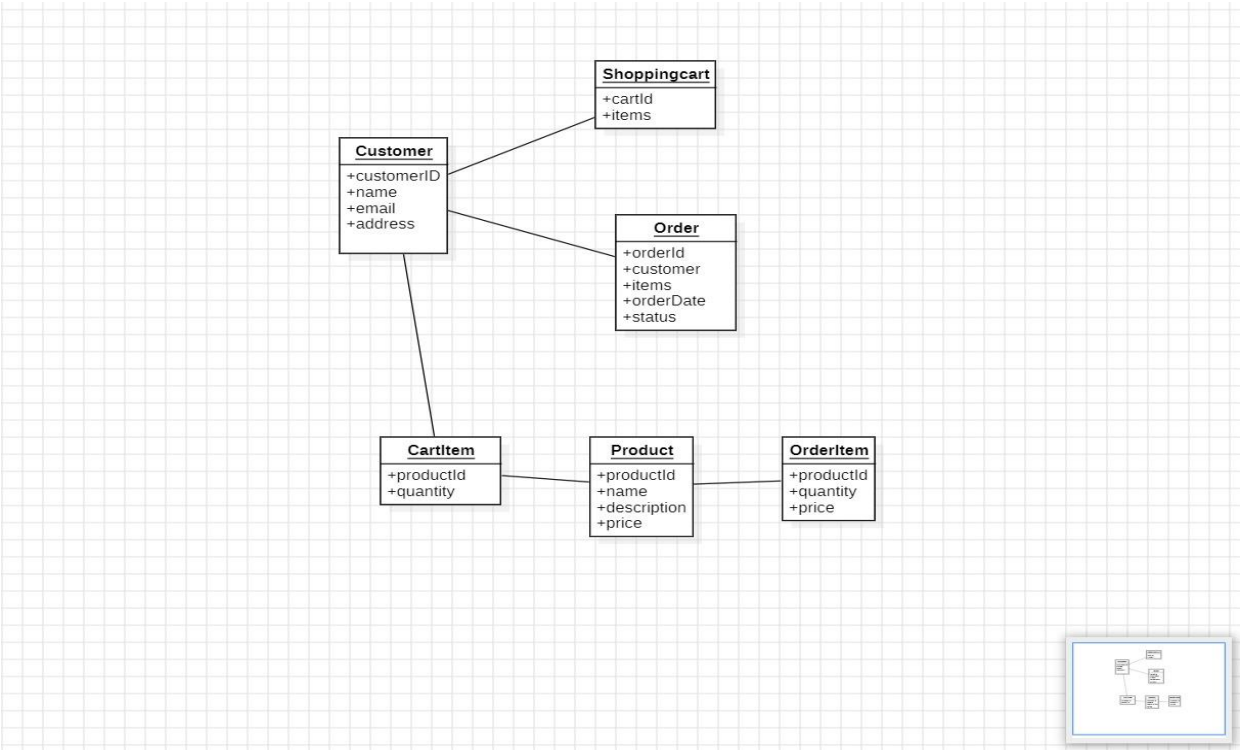

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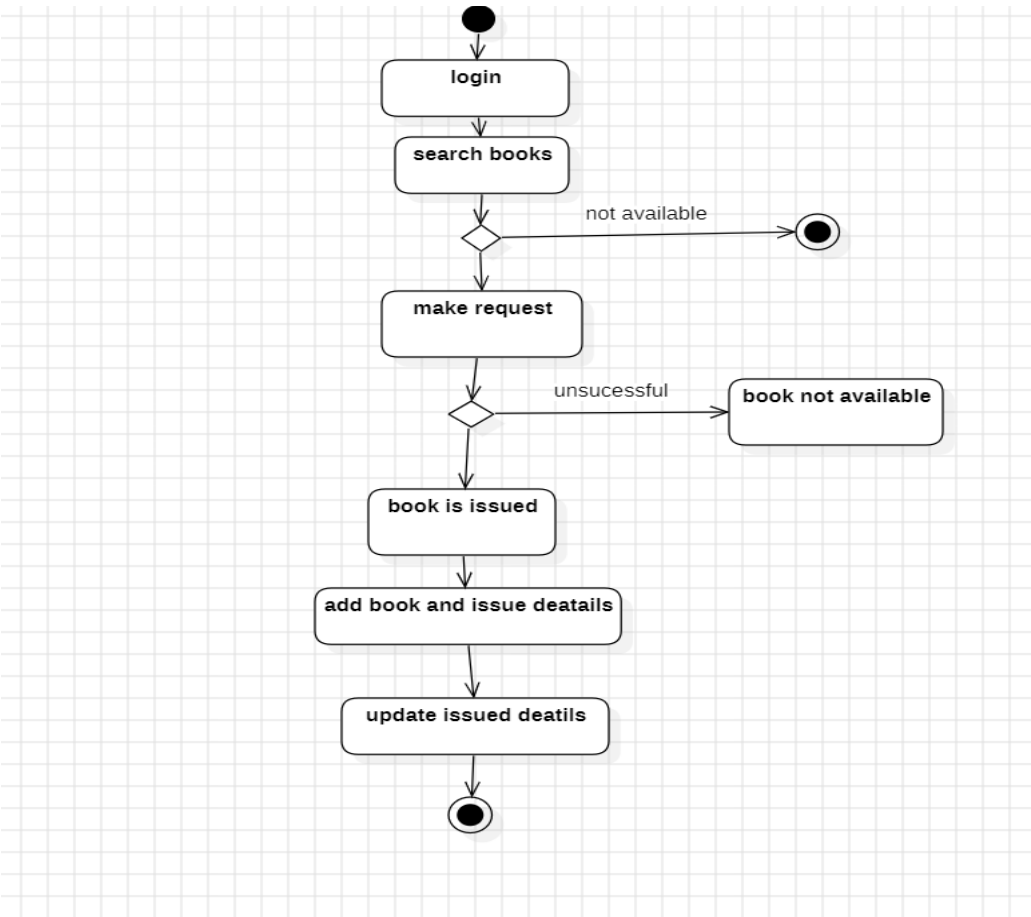

2. ONLINE SHOPPING SYSTEM

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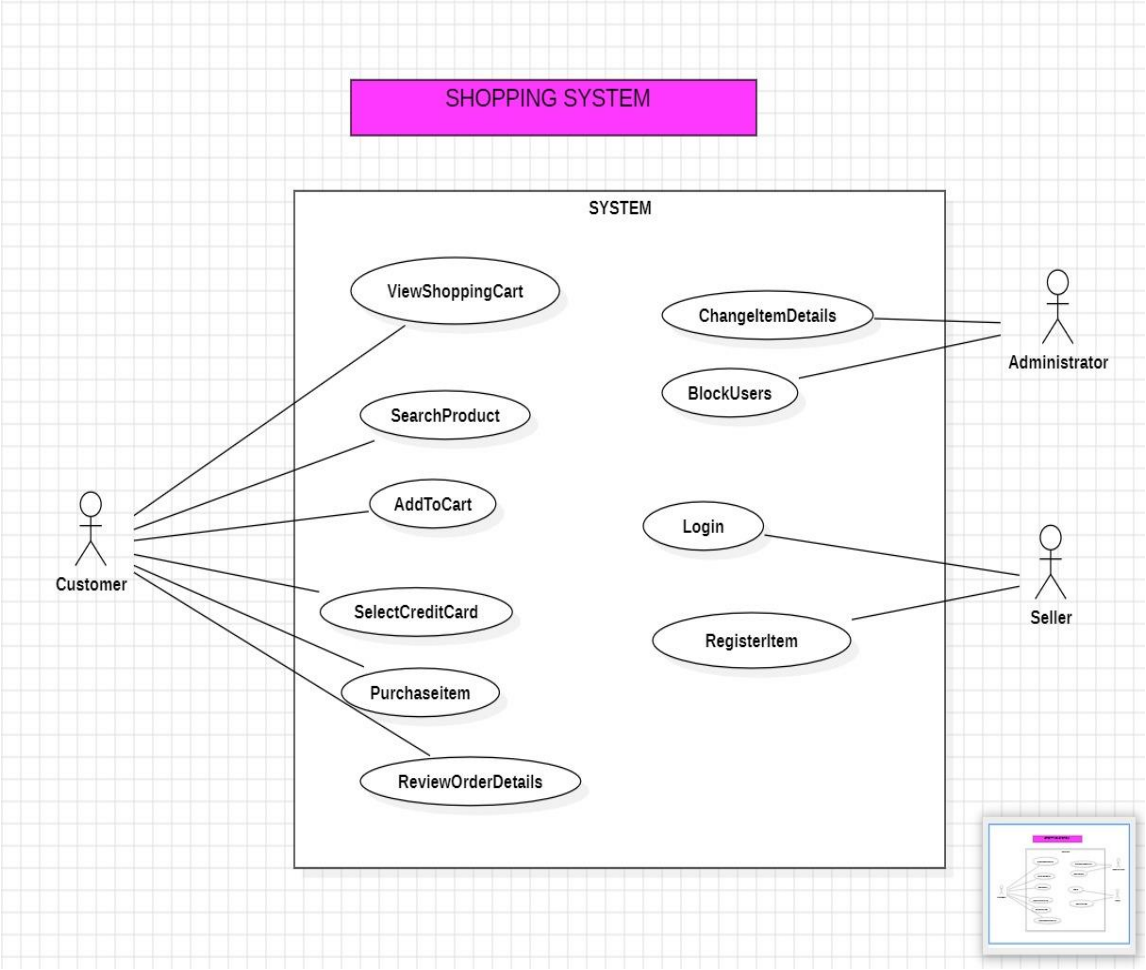

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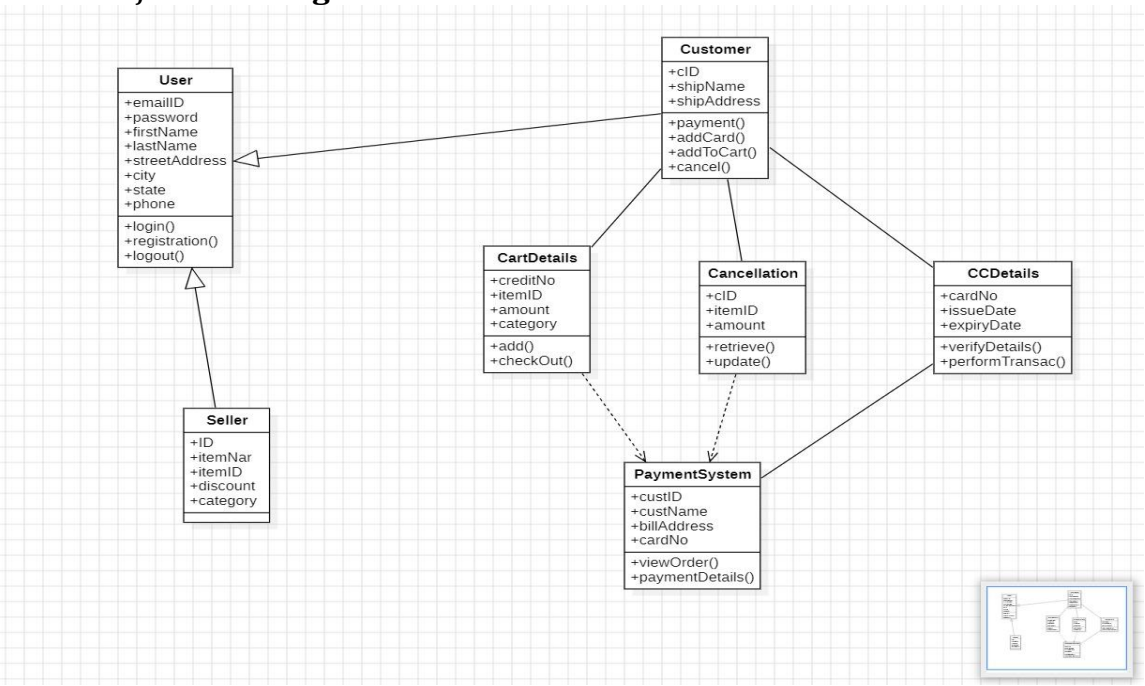
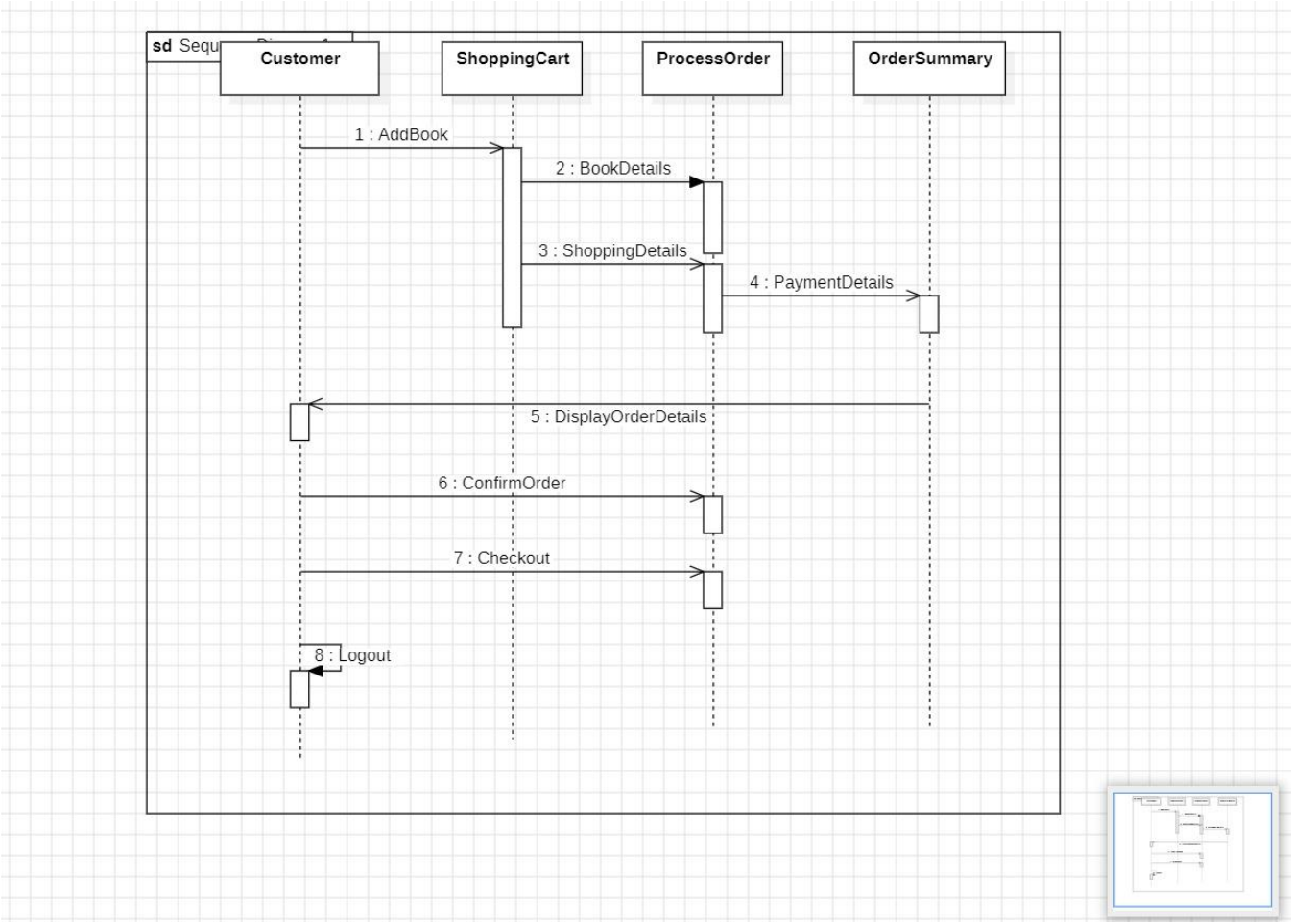
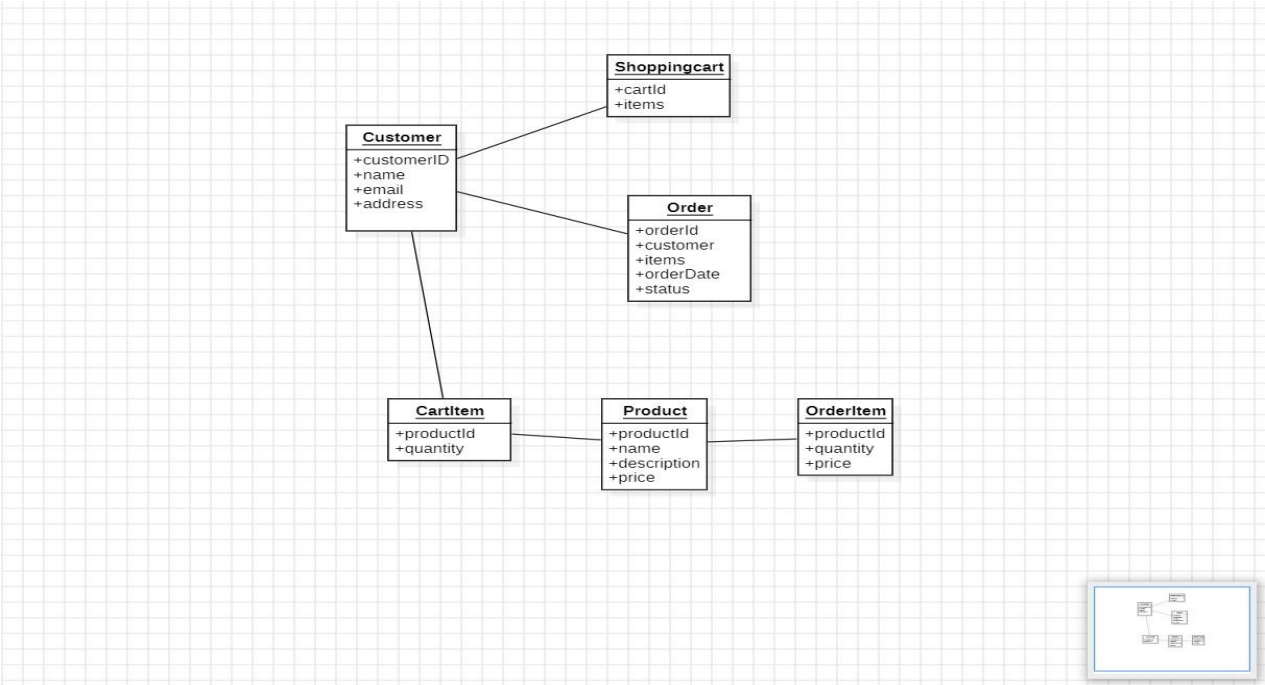


2.c) Sequence Diagram:



2.d) Object Diagram:



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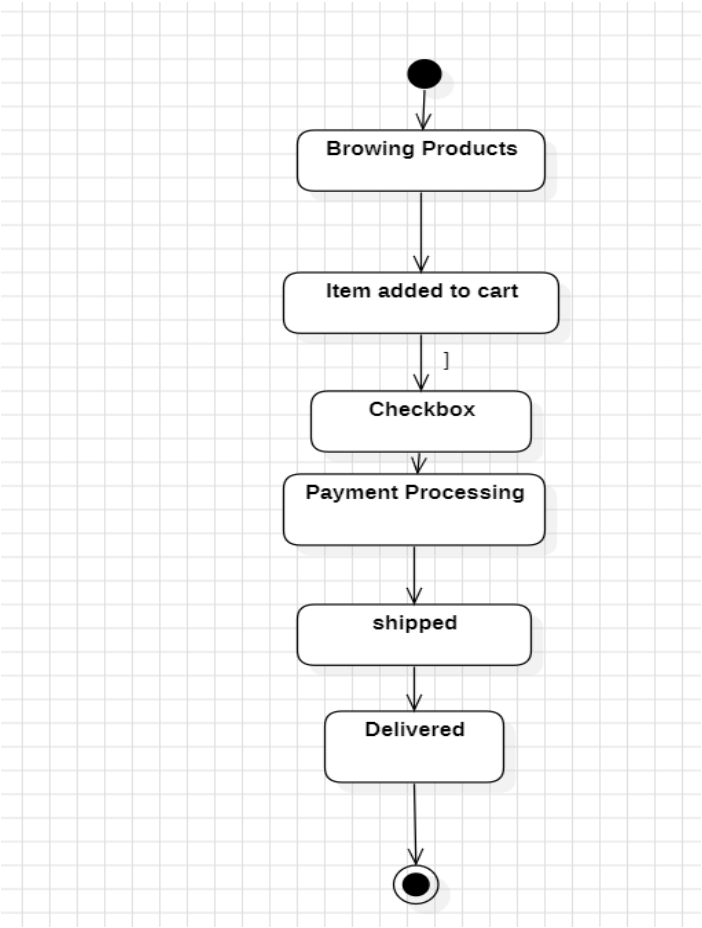
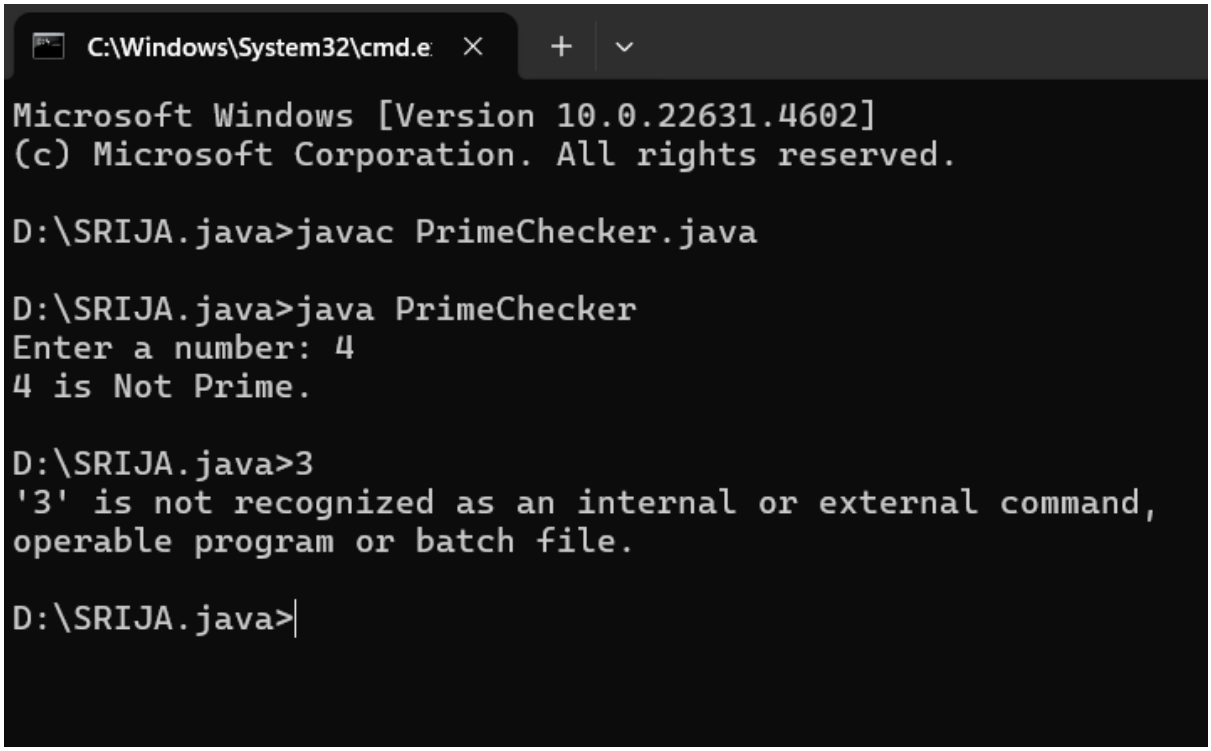


3. Basic Java Programs

1)Java Program to Check if a Number is Prime
CODE:

```
import java.util.Scanner;

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

      System.out.print("Enter a number: ");
      int num = scanner.nextInt();
      boolean isPrime = true;

      if (num <= 1) {
         isPrime = false;
      } else {
         for (int i = 2; i <= num / 2; i++) {
            if (num % i == 0) {
               isPrime = false;
               break;
            }
         }
      }

      if (isPrime)
         System.out.println(num + " is Prime.");
      else
         System.out.println(num + " is Not Prime.");

      scanner.close();
   }
}
```

OUTPUT:



2) Find the Greatest Common Divisor (GCD) Using a Class

CODE:

```
import java.util.Scanner;

class GCDCalculator {
   int a, b;

   void inputNumbers() {
      Scanner scanner = new Scanner(System.in);
      System.out.print("Enter first number: ");
      a = scanner.nextInt();
      System.out.print("Enter second number: ");
      b = scanner.nextInt();
   }

   void findGCD() {
      int num1 = a, num2 = b;
      while (num2 != 0) {
         int temp = num2;
         num2 = num1 % num2;
         num1 = temp;
      }
      System.out.println("GCD: " + num1);
   }
}

public class GCDApp {
   public static void main(String[] args) {
      GCDCalculator gcd = new GCDCalculator();
      gcd.inputNumbers();
      gcd.findGCD();
```

```
    }
}
```

OUTPUT:

```
D:\SRIJA.java>javac GCDApp.java

D:\SRIJA.java>java GCDApp
Enter first number: 10
Enter second number: 12
GCD: 2

D:\SRIJA.java>
```

3) Convert Celsius to Fahrenheit

CODE:

```
import java.util.Scanner;

class TemperatureConverter {
    double celsius;

    void inputTemperature() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter temperature in Celsius: ");
        celsius = scanner.nextDouble();
    }

    void convert() {
        double fahrenheit = (celsius * 9/5) + 32;
        System.out.println("Temperature in Fahrenheit: " + fahrenheit);
    }
}

public class TemperatureApp {
    public static void main(String[] args) {
        TemperatureConverter temp = new TemperatureConverter();
        temp.inputTemperature();
        temp.convert();
    }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac TemperatureApp.java

D:\SRIJA.java>java TemperatureApp
Enter temperature in Celsius: 40
Temperature in Fahrenheit: 104.0

D:\SRIJA.java>
```

4) Student Grading System for Multiple Students (While Loop)

Problem: Allow multiple students to enter their marks using a **while loop**, and print their grades.

CODE:

```
import java.util.Scanner;

class MultipleStudentsGrading {
   void assignGrades() {
      Scanner scanner = new Scanner(System.in);
      char choice;

      while (true) {
         System.out.print("Enter student marks: ");
         int marks = scanner.nextInt();

         if (marks >= 90)
            System.out.println("Grade: A");
         else if (marks >= 80)
            System.out.println("Grade: B");
         else if (marks >= 70)
            System.out.println("Grade: C");
         else if (marks >= 60)
            System.out.println("Grade: D");
         else
            System.out.println("Grade: F");

         System.out.print("Do you want to enter another student's marks? (y/n): ");
         choice = scanner.next().charAt(0);
         if (choice == 'n' || choice == 'N')
            break;
      }
   }
}

public class MultiStudentGradeApp {
   public static void main(String[] args) {
      MultipleStudentsGrading msg = new MultipleStudentsGrading();
      msg.assignGrades();
   }
```

}

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac MultiStudentGradeApp.java

D:\SRIJA.java>java MultiStudentGradeApp
Enter student marks: 20
Grade: F
Do you want to enter another student?s marks? (y/n): yes
Enter student marks: 56
Grade: F
Do you want to enter another student?s marks? (y/n): no

D:\SRIJA.java>
```

5) Grading System for Multiple Subjects (Do-While Loop)

Problem: Calculate the **average marks and grade** for a student across multiple subjects using a **do-while loop**.

CODE:

```
import java.util.Scanner;

class SubjectGrading {
   void calculateAverageGrade() {
      Scanner scanner = new Scanner(System.in);
      int totalMarks = 0, subjectCount = 0, marks;
      char choice;

      do {
         System.out.print("Enter subject marks: ");
         marks = scanner.nextInt();
         totalMarks += marks;
         subjectCount++;

         System.out.print("Do you have more subjects? (y/n): ");
         choice = scanner.next().charAt(0);
      } while (choice == 'y' || choice == 'Y');

      double average = (double) totalMarks / subjectCount;
      System.out.println("Average Marks: " + average);

      if (average >= 90)
         System.out.println("Final Grade: A");
      else if (average >= 80)
         System.out.println("Final Grade: B");
      else if (average >= 70)
         System.out.println("Final Grade: C");
      else if (average >= 60)
         System.out.println("Final Grade: D");
      else
         System.out.println("Final Grade: F");
```

```
    }
}

public class SubjectGradingApp {
    public static void main(String[] args) {
        SubjectGrading sg = new SubjectGrading();
        sg.calculateAverageGrade();
    }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac  SubjectGradingApp.java

D:\SRIJA.java>java  SubjectGradingApp
Enter subject marks: 67
Do you have more subjects? (y/n): 50
Average Marks: 67.0
Final Grade: D

D:\SRIJA.java>
```

6) **Employee Payroll System**

Problem: Create classes for **Employee, Salary, and Payroll**. Implement methods to calculate salary based on working hours, generate pay slips, and apply bonuses.

CODE:

```
class Employee {
    String name;
    int empId;
    double hourlyRate;

    Employee(String name, int empId, double hourlyRate) {
        this.name = name;
        this.empId = empId;
        this.hourlyRate = hourlyRate;
    }

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

    void displayInfo() {
        System.out.println("Employee: " + name + ", ID: " + empId);
    }
}

class Payroll {
    static void generatePaySlip(Employee employee, int hoursWorked) {
```

```
        double salary = employee.calculateSalary(hoursWorked);
        System.out.println("Pay Slip for " + employee.name);
        System.out.println("Hours Worked: " + hoursWorked);
        System.out.println("Total Salary: $" + salary);
    }
}

public class PayrollApp {
    public static void main(String[] args) {
        Employee emp1 = new Employee("Alice Johnson", 1001, 20);
        emp1.displayInfo();
        Payroll.generatePaySlip(emp1, 40);
    }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac PayrollApp.java

D:\SRIJA.java>java PayrollApp
Employee: Alice Johnson, ID: 1001
Pay Slip for Alice Johnson
Hours Worked: 40
Total Salary: $800.0

D:\SRIJA.java>
```

7) Airline Reservation System

Problem: Create classes for **Flight, Passenger, Ticket, and Booking**. Implement methods to book tickets, cancel reservations, and display flight details.

CODE:

```
import java.util.ArrayList;

class Flight {
    String flightNumber;
    String destination;

    Flight(String flightNumber, String destination) {
        this.flightNumber = flightNumber;
        this.destination = destination;
    }

    void displayFlightDetails() {
        System.out.println("Flight: " + flightNumber + " to " + destination);
    }
}
```

```
class Passenger {
   String name;
   int age;

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

   void displayPassengerInfo() {
      System.out.println("Passenger: " + name + ", Age: " + age);
   }
}

class Ticket {
   Flight flight;
   Passenger passenger;

   Ticket(Flight flight, Passenger passenger) {
      this.flight = flight;
      this.passenger = passenger;
   }

   void displayTicketDetails() {
      flight.displayFlightDetails();
      passenger.displayPassengerInfo();
   }
}

public class AirlineReservationApp {
   public static void main(String[] args) {
      Flight flight = new Flight("AI123", "New York");
      Passenger passenger = new Passenger("John Smith", 30);

      Ticket ticket = new Ticket(flight, passenger);
      ticket.displayTicketDetails();
   }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac AirlineReservationApp.java

D:\SRIJA.java>java AirlineReservationApp
Flight: AI123 to New York
Passenger: John Smith, Age: 30

D:\SRIJA.java>
```

8) **University Management System**

Problem: Create classes for **Department, Faculty, Student, and Exam**. Implement methods to assign faculty to courses, conduct exams, and manage student records.

CODE:

```
import java.util.ArrayList;

class Department {
   String name;
   ArrayList<String> courses = new ArrayList<>();

   Department(String name) {
      this.name = name;
   }

   void addCourse(String course) {
      courses.add(course);
   }

   void displayDetails() {
      System.out.println("Department: " + name);
      System.out.println("Courses Offered: " + courses);
   }
}

class Faculty {
   String name;
   String department;

   Faculty(String name, String department) {
      this.name = name;
      this.department = department;
   }

   void displayInfo() {
      System.out.println("Faculty: " + name + ", Department: " + department);
   }
```

```
}

class Student {
   String name;
   int id;

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

   void displayInfo() {
      System.out.println("Student: " + name + ", ID: " + id);
   }
}

public class UniversityApp {
   public static void main(String[] args) {
      Department csDept = new Department("Computer Science");
      csDept.addCourse("Java");
      csDept.addCourse("Data Structures");

      Faculty prof = new Faculty("Dr. Brown", "Computer Science");
      Student student = new Student("Alice", 101);

      csDept.displayDetails();
      prof.displayInfo();
      student.displayInfo();
   }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac UniversityApp.java

D:\SRIJA.java>java UniversityApp
Department: Computer Science
Courses Offered: [Java, Data Structures]
Faculty: Dr. Brown, Department: Computer Science
Student: Alice, ID: 101

D:\SRIJA.java>
```

9) **Hotel Booking System**

Problem: Create classes for **Hotel, Room, Guest, and Reservation**. Implement methods to check room availability, book rooms, and manage guest details.

CODE:

```
import java.util.ArrayList;

class Room {
   int roomNumber;
   boolean isBooked;

   Room(int roomNumber) {
      this.roomNumber = roomNumber;
      this.isBooked = false;
   }

   void bookRoom() {
      if (!isBooked) {
         isBooked = true;
         System.out.println("Room " + roomNumber + " booked successfully.");
      } else {
         System.out.println("Room " + roomNumber + " is already booked.");
      }
   }

   void displayRoomInfo() {
      System.out.println("Room " + roomNumber + " - " + (isBooked ? "Booked" : "Available"));
   }
}

class Guest {
   String name;
   int guestId;

   Guest(String name, int guestId) {
      this.name = name;
      this.guestId = guestId;
   }

   void displayGuestInfo() {
      System.out.println("Guest: " + name + ", ID: " + guestId);
   }
}

public class HotelBookingApp {
   public static void main(String[] args) {
      Room room1 = new Room(101);
      Room room2 = new Room(102);

      Guest guest1 = new Guest("Alice Johnson", 1);

      guest1.displayGuestInfo();
      room1.displayRoomInfo();
      room1.bookRoom();
      room1.displayRoomInfo();
   }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac HotelBookingApp.java

D:\SRIJA.java>java HotelBookingApp
Guest: Alice Johnson, ID: 1
Room 101 - Available
Room 101 booked successfully.
Room 101 - Booked

D:\SRIJA.java>
```

10) **Online Shopping System**

Problem: Define classes for **User, Product, Order, and Payment**. Implement methods to browse products, place orders, process payments, and track shipments.

CODE:

```
import java.util.ArrayList;

class Product {
   String name;
   double price;

   Product(String name, double price) {
      this.name = name;
      this.price = price;
   }

   void displayProduct() {
      System.out.println("Product: " + name + " - Price: $" + price);
   }
}

class Order {
   ArrayList<Product> products = new ArrayList<>();

   void addProduct(Product product) {
      products.add(product);
   }

   void displayOrderDetails() {
      System.out.println("Order Details:");
      double total = 0;
      for (Product p : products) {
         p.displayProduct();
         total += p.price;
      }
      System.out.println("Total: $" + total);
```

```
    }
}

public class ShoppingApp {
    public static void main(String[] args) {
        Product p1 = new Product("Smartphone", 700);
        Product p2 = new Product("Headphones", 50);

        Order order = new Order();
        order.addProduct(p1);
        order.addProduct(p2);
        order.displayOrderDetails();
    }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.4602]
(c) Microsoft Corporation. All rights reserved.

D:\SRIJA.java>javac ShoppingApp.java

D:\SRIJA.java>java ShoppingApp
Order Details:
Product: Smartphone - Price: $700.0
Product: Headphones - Price: $50.0
Total: $750.0

D:\SRIJA.java>
```