Experiment-4

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Subject Name: Project Based Learning In Java with Lab **Subject Code: 22CSH-359**

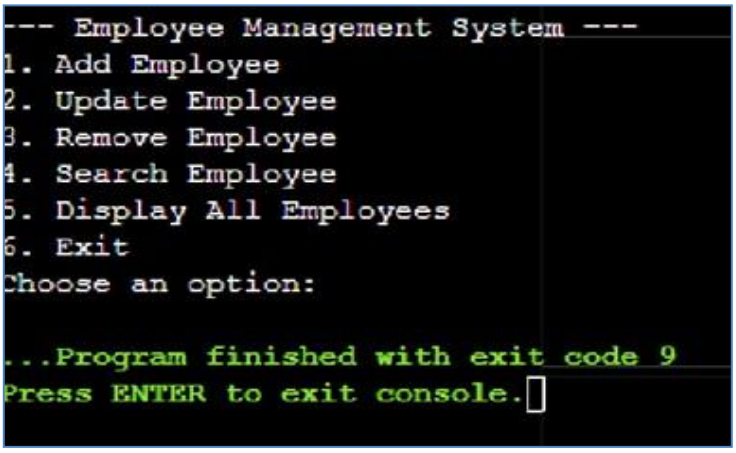
1. Write a Java program to implement an **ArrayList** that stores employee details (**ID**, **Name**, and **Salary**). The program should allow users to **add**, **update**, **remove**, and **search** employee records.

2. **Implementation/Code:**

```
import java.util.*;

class Employee { int id;
        Stringname;
        double salary;

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

        @Override
        public String toString() {
                return String.format("ID: %d, Name: %s, Salary: %.2f", id, name, salary);
        }
}

public class EmployeeManager {
        static List<Employee> employees = new ArrayList<>(); static Scanner sc = new
        Scanner(System.in);

        public static void main(String[] args) { while (true) {
                        System.out.print("""
                                \n--- Employee Management System ---
                                1. Add Employee
                                2. Update Employee
                                3. Remove Employee
                                4. Search Employee
                                5. Display All Employees
                                6. Exit
```

```
                        Choose an option: """);

                switch (sc.nextInt()) { case 1 ->
                        addEmployee();
                        case 2 -> updateEmployee(); case 3 ->
                        removeEmployee(); case 4 ->
                        searchEmployee(); case 5 ->
                        displayEmployees();
                        case 6 -> { System.out.println("Exiting..."); return; } default -> System.out.println("Invalid
                        choice! Try
again.");
                }
        }
    }

    static void addEmployee() { System.out.print("Enter ID, Name, Salary: ");
        employees.add(new Employee(sc.nextInt(), sc.next(), sc.nextDouble()));
        System.out.println("Employee added successfully!");
    }

    static void updateEmployee() { System.out.print("Enter Employee ID to
        update: "); int id = sc.nextInt();
        employees.stream().filter(e -> e.id == id).findFirst().ifPresentOrElse(e -> {
            System.out.print("Enter New Name and Salary: "); e.name = sc.next();
            e.salary = sc.nextDouble(); System.out.println("Employee updated
            successfully!");
        }, () -> System.out.println("Employee not found!"));
    }

    static void removeEmployee() { System.out.print("Enter Employee ID to
        remove: ");
        System.out.println(employees.removeIf(e -> e.id == sc.nextInt())
            ? "Employee removed successfully!"
            : "Employee not found!");
    }

    static void searchEmployee() { System.out.print("Enter Employee ID to search:
        ");
        employees.stream().filter(e -> e.id == sc.nextInt()).findFirst()
                .ifPresentOrElse(System.out::println, () -> System.out.println("Employee not found!"));
    }

    static void displayEmployees() {
        if (employees.isEmpty()) System.out.println("No employees found.");
        else employees.forEach(System.out::println);
    }
}
```

3. **OUTPUT:**



4. Create a Java program to **collect** and **store** all playing cards to help users **find** all cards of a given **symbol** (e.g., **Hearts**, **Diamonds**) using the **Collection** interface.

5. **CODE:**

```
import java.util.*;

// Class representing a Card class Card {
        private String symbol; private int
        value;

        public Card(String symbol, int value) { this.symbol = symbol;
                this.value = value;
        }

        public String getSymbol() { return symbol;
        }

        public int getValue() { return value;
        }

        @Override
        public String toString() {
                return String.format("Card { Symbol: '%s', Value: %d }", symbol, value);
        }
}

// Class for Card Collection Management public class
CardCollection {
```

```
private Collection<Card> cards = new ArrayList<>(); private Scanner scanner = new
Scanner(System.in);

// Method to add a card public void
addCard() {
        System.out.print("Enter Card Symbol: "); String symbol =
        scanner.next(); System.out.print("Enter Card Value: "); int
        value = scanner.nextInt(); cards.add(new Card(symbol,
        value));
        System.out.println("Card added successfully!");
}

// Method to display all cards public void
displayCards() {
        if (cards.isEmpty()) {
                System.out.println("No cards in the collection."); return;
        }
        System.out.println("\n--- All Cards ---"); cards.forEach(System.out::println);
}

// Method to find all cards of a given symbol public void
findCardsBySymbol() {
        System.out.print("Enter Symbol to search: "); String symbol =
        scanner.next();
        boolean found = false;
        System.out.println("\nCards with Symbol '" + symbol +
":");
        for (Card card : cards) {
                if (card.getSymbol().equalsIgnoreCase(symbol)) { System.out.println(card);
                        found = true;
                }
        }
        if (!found) {
                System.out.println("No cards found with symbol '" + symbol + "'.");
        }
}

// Menu-driven interface public void start() {
        while (true) {
                System.out.println("\n--- Card Collection System ---

");              System.out.println("1. Add Card"); System.out.println("2. Display All Cards");
```

```
                System.out.println("3. Find Cards by Symbol"); System.out.println("4.
                Exit"); System.out.print("Choose an option: ");

                int choice = scanner.nextInt(); switch (choice) {
                        case 1 -> addCard();
                        case 2 -> displayCards();
                        case 3 -> findCardsBySymbol(); case 4 -> {
                                System.out.println("Exiting..."); return;
                        }
                        default -> System.out.println("Invalid choice!
         Try again.");
                        }
                }
        }

        // Main method
        public static void main(String[] args) { CardCollection system = new
                CardCollection(); system.start();
        }
}
```

6. OUTPUT:

```
--- Card Collection System ---
1. Add Card
2. Display All Cards
3. Find Cards by Symbol
4. Exit
Choose an option: 1
Enter Card Symbol: ace
Enter Card Value: 12
Card added successfully!

--- Card Collection System ---
1. Add Card
2. Display All Cards
3. Find Cards by Symbol
4. Exit
Choose an option:
```

7. Develop a **ticket booking system** in **Java** using **synchronized threads** to ensure **no double booking** of seats. Implement **thread priorities** to simulate **VIP bookings** being **processed first**.

8. **CODE:**

```
import java.util.concurrent.locks.ReentrantLock;

// TicketBooking class handles seat reservations class TicketBooking
implements Runnable {
    private static int availableSeats = 10; // Total seats
    private static final ReentrantLock lock = new ReentrantLock(); // Lock to prevent
double booking
    private final String customerType; // VIP or Regular

    public TicketBooking(String customerType) { this.customerType = customerType;
    }

    @Override
    public void run() { bookTicket();
    }

    // Method to handle ticket booking private void
    bookTicket() {
        lock.lock(); // Ensure only one thread modifies availableSeats at a time
        try {
            if (availableSeats > 0) {
                System.out.println(customerType + " booked Seat No: " + availableSeats);
                availableSeats--; // Reduce seat count
            } else {
                System.out.println(customerType + " tried to book, but no seats
left!");
            }
        } finally {
            lock.unlock(); // Release the lock
        }
    }
```

```
}

// Main class for Ticket Booking System public class
TicketBookingSystem {
        public static void main(String[] args) {
                // Create ticket booking threads for VIP and Regular customers
                Thread vip1 = new Thread(new TicketBooking("VIP Customer
1"));
                Thread vip2 = new Thread(new TicketBooking("VIP Customer Thread reg1 = new
2"));
                Thread(new TicketBooking("Regular
Customer 1"));
                Thread reg2 = new Thread(new TicketBooking("Regular Customer 2"));

                // Set VIP bookings to higher priority vip1.setPriority(Thread.MAX_PRIORITY); //
                Priority 10 vip2.setPriority(Thread.MAX_PRIORITY); // Priority 10
                reg1.setPriority(Thread.MIN_PRIORITY); // Priority 1
                reg2.setPriority(Thread.MIN_PRIORITY); // Priority 1

                // Start threads vip1.start();
                vip2.start();
                reg1.start();
                reg2.start();
        }
}
```

9. OUTPUT:

```
VIP Customer 1 booked Seat No: 10
VIP Customer 2 booked Seat No: 9
Regular Customer 1 booked Seat No: 8
Regular Customer 2 booked Seat No: 7
```