



Experiment 4

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Subject: Java

UID: 22BCS16316

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Subject Code: 22CSH-359

1. Aim: Implement and manage data using Java Collections and Threads.

2. Problem Statements:

- **Easy Level:** Implement an ArrayList to store employee details (ID, Name, and Salary). Allow users to add, update, remove, and search employees.
- **Medium Level:** Create a program to collect and store all the cards to assist users in finding all the cards in a given symbol using the Collection interface.
- **Hard Level:** Develop a ticket booking system with synchronized threads to ensure no double booking of seats. Use thread priorities to simulate VIP bookings being processed first.

3. Implementation/Code:

Problem 1.1: Employee Management System

```
import java.util.*;
class Employee {
    int id;
    String name;
    double salary;

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

    @Override
    public String toString() {
```

```
        return "ID: " + id + ", Name: " + name + ", Salary: " + salary;
    }
}

public class EmployeeManagement {
    private static List<Employee> employees = new ArrayList<>();

    public static void addEmployee(int id, String name, double salary) {
        employees.add(new Employee(id, name, salary));
    }

    public static void updateEmployee(int id, String newName, double newSalary) {
        for (Employee emp : employees) {
            if (emp.id == id) {
                emp.name = newName;
                emp.salary = newSalary;
                return;
            }
        }
    }

    public static void removeEmployee(int id) {
        employees.removeIf(emp -> emp.id == id);
    }

    public static Employee searchEmployee(int id) {
        for (Employee emp : employees) {
            if (emp.id == id) return emp;
        }
        return null;
    }
}
```

Problem 1.2: Card Collection Management

```
import java.util.*;

class CardCollection {
    private List<Card> cards = new ArrayList<>();

    class Card {
        String symbol;
        String cardName;

        Card(String symbol, String cardName) {
            this.symbol = symbol;
        }
    }
}
```

```
this.cardName = cardName;
}

@Override
public String toString() {
    return cardName;
}
}

public void addCard(String symbol, String cardName) {
    cards.add(new Card(symbol, cardName));
}

public List<String> getCardsBySymbol(String symbol) {
    List<String> result = new ArrayList<>();
    for (Card card : cards) {
        if (card.symbol.equals(symbol)) {
            result.add(card.cardName);
        }
    }
    return result;
}

public static void main(String[] args) {
    CardCollection collection = new CardCollection();

    collection.addCard("Hearts", "Ace of Hearts");
    collection.addCard("Hearts", "2 of Hearts");
    collection.addCard("Diamonds", "Ace of Diamonds");

    System.out.println("Hearts: " + collection.getCardsBySymbol("Hearts"));
    System.out.println("Diamonds: " + collection.getCardsBySymbol("Diamonds"));
}
```

Problem 1.3: Ticket Booking System with Synchronized Threads

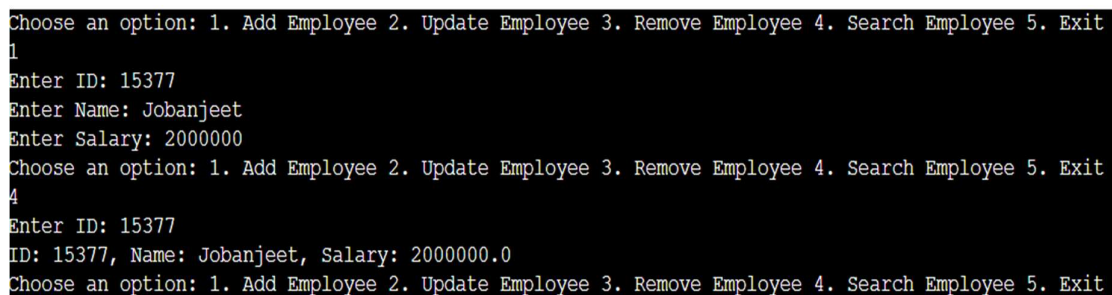
```
class TicketBookingSystem {
    private static int availableSeats = 10;
    private static Lock lock = new ReentrantLock();

    public void bookSeat(String customer) {
        lock.lock();
        try {
```

```
        if (availableSeats > 0) {  
            System.out.println(customer + " booked a seat. Remaining seats: " +  
(--availableSeats));  
        } else {  
            System.out.println("No seats available for " + customer);  
        }  
    } finally {  
        lock.unlock();  
    }  
}  
}
```

```
public class TicketBooking {  
    public static void main(String[] args) {  
        TicketBookingSystem system = new TicketBookingSystem();  
        Thread vip = new Thread(() -> system.bookSeat("VIP Customer"));  
        Thread normal = new Thread(() -> system.bookSeat("Normal  
Customer"));  
        vip.setPriority(Thread.MAX_PRIORITY);  
        normal.setPriority(Thread.MIN_PRIORITY);  
        vip.start();  
        normal.start();  
    }  
}
```

4. Output:



```
Choose an option: 1. Add Employee 2. Update Employee 3. Remove Employee 4. Search Employee 5. Exit  
1  
Enter ID: 15377  
Enter Name: Jobanjeet  
Enter Salary: 2000000  
Choose an option: 1. Add Employee 2. Update Employee 3. Remove Employee 4. Search Employee 5. Exit  
4  
Enter ID: 15377  
ID: 15377, Name: Jobanjeet, Salary: 2000000.0  
Choose an option: 1. Add Employee 2. Update Employee 3. Remove Employee 4. Search Employee 5. Exit
```

(Fig. 1 - Employee Management Output)

```
Cards of Heart: [A, 10]
Cards of Spade: [K]
Cards of Club: []

...Program finished with exit code 0
Press ENTER to exit console.
```

(Fig. 2 - Card Collection Output)

```
VIP Customer booked a seat. Remaining seats: 9
Normal Customer booked a seat. Remaining seats: 8

...Program finished with exit code 0
Press ENTER to exit console.█
```

(Fig. 3 - Ticket Booking System Output)

5. Learning Outcome:

1. Learn to manage collections dynamically using ArrayList and HashMap.
2. Understand thread synchronization and priority handling in Java.
3. Develop real-world applications with efficient data management techniques.