

Exp-4

1. Write a Java program to implement an ArrayList that stores employee details (ID, Name, and Salary). Allow users to add, update, remove, and search employees.(Easy)

Code –

```
import java.util.*;

class Employee {
    private int id;
    private String name;
    private double salary;

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

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public double getSalary() {
        return salary;
    }

    public void setSalary(double salary) {
        this.salary = salary;
    }

    @Override
    public String toString() {
        return "ID: " + id + ", Name: " + name + ", Salary: " + salary;
    }
}

public class EmployeeManagement {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        List<Employee> employees = new ArrayList<>();

        while (true) {
            System.out.println("\n1. Add Employee\n2. Update Employee\n3. Remove Employee\n4. Search Employee\n5. Display Employees\n6. Exit");
            System.out.print("Choose an option: ");
            int choice = scanner.nextInt();
            scanner.nextLine();
        }
    }
}
```

```

switch (choice) {
    case 1:
        System.out.print("Enter ID: ");
        int id = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter Salary: ");
        double salary = scanner.nextDouble();
        employees.add(new Employee(id, name, salary));
        System.out.println("Employee added successfully.");
        break;

    case 2:
        System.out.print("Enter Employee ID to update: ");
        int updateId = scanner.nextInt();
        for (Employee emp : employees) {
            if (emp.getId() == updateId) {
                System.out.print("Enter new Salary: ");
                emp.setSalary(scanner.nextDouble());
                System.out.println("Employee salary updated.");
                break;
            }
        }
        break;

    case 3:
        System.out.print("Enter Employee ID to remove: ");
        int removeId = scanner.nextInt();
        employees.removeIf(emp -> emp.getId() == removeId);
        System.out.println("Employee removed.");
        break;

    case 4:
        System.out.print("Enter Employee ID to search: ");
        int searchId = scanner.nextInt();
        for (Employee emp : employees) {
            if (emp.getId() == searchId) {
                System.out.println(emp);
                break;
            }
        }
        break;

    case 5:
        System.out.println("\nEmployee List:");
        for (Employee emp : employees) {
            System.out.println(emp);
        }
        break;

    case 6:
        System.out.println("Exiting...");
        scanner.close();
        return;

    default:
        System.out.println("Invalid choice. Please try again.");
}

```

```

    }
}
}
}

```

Output—

```

Choose an option: 1
Enter ID: 56
Enter Name: vaibhavi
Enter Salary: 70000
Employee added successfully.

1. Add Employee
2. Update Employee
3. Remove Employee
4. Search Employee
5. Display Employees
6. Exit
Choose an option: 5

Employee List:
ID: 56, Name: vaibhavi, Salary: 70000.0

```

2. Create a program to collect and store all the cards to assist the users in finding all the cards in a given symbol using Collection interface.(Medium)

Code –

```

import java.util.*;

class PlayingCard {
    private String suit;
    private int value;

    public PlayingCard(String suit, int value) {
        this.suit = suit;
        this.value = value;
    }

    public String getSuit() {
        return suit;
    }

    public int getValue() {
        return value;
    }

    @Override

```

```

        public String toString() {
            return "[Suit: " + suit + ", Value: " + value + "]";
        }
    }

    public class CardCollection {
        public static void main(String[] args) {
            Scanner scanner = new Scanner(System.in);
            Map<String, List<PlayingCard>> cardGroups = new TreeMap<>();

            System.out.print("Enter the number of cards: ");
            int cardCount = scanner.nextInt();
            scanner.nextLine();

            for (int i = 1; i <= cardCount; i++) {
                System.out.println("Enter details for card " + i + ":");
                System.out.print("Suit: ");
                String suit = scanner.nextLine();
                System.out.print("Value: ");
                int value = scanner.nextInt();
                scanner.nextLine();

                cardGroups.computeIfAbsent(suit, k -> new ArrayList<>()).add(new
PlayingCard(suit, value));
            }

            displayCardDetails(cardGroups);
            scanner.close();
        }

        private static void displayCardDetails(Map<String, List<PlayingCard>> cardGroups) {
            System.out.println("\nUnique Suits and Their Card Details:");
            for (Map.Entry<String, List<PlayingCard>> entry : cardGroups.entrySet()) {
                String suit = entry.getKey();
                List<PlayingCard> cards = entry.getValue();
                int totalValue = cards.stream().mapToInt(PlayingCard::getValue).sum();

                System.out.println("Suit: " + suit);
                cards.forEach(System.out::println);
                System.out.println("Total Cards: " + cards.size());
                System.out.println("Sum of Values: " + totalValue);
            }
        }
    }
}

```

Output –

```

PS C:\Users\Vaibhavi\dsa coding> & '
ionMessages' '-cp' 'C:\Users\Vaibhavi
dCollection'
Enter the number of cards: 3
Enter details for card 1:
Suit: heart
Value: 6
Enter details for card 2:
Suit: diamond
Value: 13
Enter details for card 3:
Suit: spades
Value: 12

Unique Suits and Their Card Details:
Suit: diamond
[Suit: diamond, Value: 13]
Total Cards: 1
Sum of Values: 13
Suit: heart
[Suit: heart, Value: 6]
Total Cards: 1
Sum of Values: 6
Suit: spades
[Suit: spades, Value: 12]
Total Cards: 1
Sum of Values: 12
PS C:\Users\Vaibhavi\dsa coding>

```

3. 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.(Hard)

Code –

```

import java.util.*;

class SeatBookingSystem {
    private final boolean[] seats;

    public SeatBookingSystem(int totalSeats) {
        this.seats = new boolean[totalSeats];
    }

    public synchronized boolean bookSeat(int seatNumber) {
        if (seatNumber < 0 || seatNumber >= seats.length || seats[seatNumber]) {

```

```

        return false; // Seat already booked or invalid
    }
    seats[seatNumber] = true;
    return true;
}
}

class BookingThread extends Thread {
    private SeatBookingSystem system;
    private int seatNumber;

    public BookingThread(SeatBookingSystem system, int seatNumber, int priority) {
        this.system = system;
        this.seatNumber = seatNumber;
        setPriority(priority);
    }

    @Override
    public void run() {
        if (system.bookSeat(seatNumber)) {
            System.out.println(Thread.currentThread().getName() + " successfully booked
seat " + seatNumber);
        } else {
            System.out.println(Thread.currentThread().getName() + " failed to book seat " +
seatNumber);
        }
    }
}

public class TicketBookingSystem {
    public static void main(String[] args) {
        SeatBookingSystem system = new SeatBookingSystem(10);
        List<Thread> threads = new ArrayList<>();

        // Creating threads with different priorities
        for (int i = 0; i < 10; i++) {
            int priority = (i % 3 == 0) ? Thread.MAX_PRIORITY : Thread.MIN_PRIORITY; //
VIPs get highest priority
            Thread thread = new BookingThread(system, i, priority);
            threads.add(thread);
        }

        // Start all threads
        for (Thread thread : threads) {
            thread.start();
        }

        // Wait for all threads to finish
        for (Thread thread : threads) {
            try {
                thread.join();
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }

        System.out.println("All bookings processed.");
    }
}

```

```
}
```

Output—

```
Thread-2 successfully booked seat 2  
Thread-1 successfully booked seat 1  
Thread-6 successfully booked seat 6  
Thread-8 successfully booked seat 8  
Thread-0 successfully booked seat 0  
Thread-7 successfully booked seat 7  
Thread-3 successfully booked seat 3  
Thread-4 successfully booked seat 4  
Thread-5 successfully booked seat 5  
Thread-9 successfully booked seat 9  
All bookings processed.  
PS C:\Users\Vaibhavi\dsa coding>
```