

Experiment 1.4

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Branch: BE-CSE

Semester: 6th

**Subject Name: Project Based Learning in
Java with Lab**

UID: 22BCS14390

Section/Group: 22BC_IOT-639/A

Date of Performance: 14/02/25

Subject Code: 22CSH-359

EASY:

1. **Aim:** 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.

2. **Implementation/Code:**

```
package Java;  
import java.util.ArrayList;  
import java.util.Scanner;
```

```
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 setName(String name) { this.name = name; }  
    public void setSalary(double salary) { this.salary = salary; }
```

```
@Override  
    public String toString() {  
        return "Employee [ID=" + id + ", Name=" + name + ", Salary=" + salary + "];"  
    }  
}
```

```
public class EmployeeManagement {  
    private static ArrayList<Employee> employees = new ArrayList<>();  
    private static Scanner scanner = new Scanner(System.in);
```

```
public static void main(String[] args) {
    while (true) {
        System.out.println("\n1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit");
        switch (scanner.nextInt()) {
            case 1 -> addEmployee();
            case 2 -> updateEmployee();
            case 3 -> removeEmployee();
            case 4 -> searchEmployee();
            case 5 -> displayAllEmployees();
            case 6 -> { System.out.println("Exiting..."); return; }
            default -> System.out.println("Invalid choice.");
        }
    }
}

private static void addEmployee() {
    System.out.print("ID: "); int id = scanner.nextInt();
    System.out.print("Name: "); String name = scanner.next();
    System.out.print("Salary: "); double salary = scanner.nextDouble();
    employees.add(new Employee(id, name, salary));
    System.out.println("Employee added.");
}

private static void updateEmployee() {
    System.out.print("ID to update: "); int id = scanner.nextInt();
    for (Employee e : employees) {
        if (e.getId() == id) {
            System.out.print("New Name: "); e.setName(scanner.next());
            System.out.print("New Salary: "); e.setSalary(scanner.nextDouble());
            System.out.println("Employee updated."); return;
        }
    }
    System.out.println("Employee not found.");
}

private static void removeEmployee() {
    System.out.print("ID to remove: "); int id = scanner.nextInt();
    employees.removeIf(e -> e.getId() == id);
    System.out.println("Employee removed.");
}

private static void searchEmployee() {
    System.out.print("ID to search: "); int id = scanner.nextInt();
    employees.stream().filter(e -> e.getId() == id).forEach(System.out::println);
}

private static void displayAllEmployees() {
    if (employees.isEmpty()) System.out.println("No employees found.");
}
```

```

        else employees.forEach(System.out::println);
    }
}

```

3. Output

```

Problems @ Javadoc Declaration Console x
<terminated> EmployeeManagement [Java Application] C:\Users\Lenovo\p2\l

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit

1
ID: 1001
Name: Pragyan
Salary: 200000
Employee added.

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
1
ID: 1002
Name: Niyati
Salary: 350000
Employee added.

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
1
ID: 1003
Name: Ankur
Salary: 80000
Employee added.

```

```

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
2
ID to update: 1002
New Name: Lara
New Salary: 320000
Employee updated.

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
3
ID to remove: 1003
Employee removed.

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
4
ID to search: 1001
Employee [ID=1001, Name=Pragyan, Salary=200000.0]

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
5
Employee [ID=1001, Name=Pragyan, Salary=200000.0]
Employee [ID=1002, Name=Lara, Salary=320000.0]

1. Add 2. Update 3. Remove 4. Search 5. Display 6. Exit
6
Exiting...

```

MEDIUM:

- Aim:** 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.

2. Implementation/Code:

```

package Java;
import java.util.*;

class Card {
    String symbol, value;
    Card(String symbol, String value) { this.symbol = symbol; this.value = value; }
    public String toString() { return value + " of " + symbol; }
}

public class CardCollection {
    static Collection<Card> cards = new ArrayList<>();
    static Scanner scanner = new Scanner(System.in);

    public static void main(String[] args) {
        addCard("Hearts", "A"); addCard("Spades", "K"); addCard("Hearts", "10");
    }
}

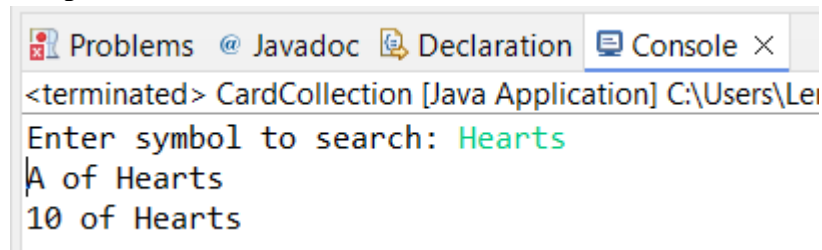
```

```

        System.out.print("Enter symbol to search: ");
        String symbol = scanner.next();
        cards.stream().filter(c -> c.symbol.equalsIgnoreCase(symbol)).forEach(System.out::println);
    }
    static void addCard(String symbol, String value) { cards.add(new Card(symbol, value)); }
}

```

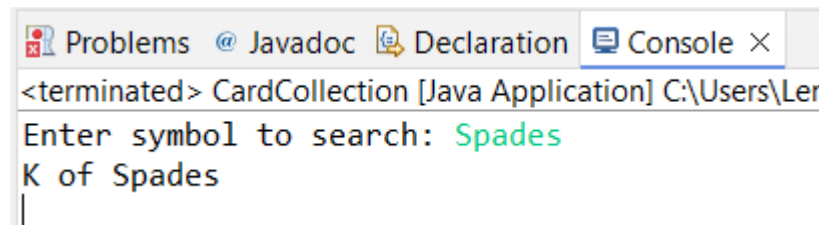
3. Output:



```

<terminated> CardCollection [Java Application] C:\Users\Le
Enter symbol to search: Hearts
A of Hearts
10 of Hearts

```



```

<terminated> CardCollection [Java Application] C:\Users\Le
Enter symbol to search: Spades
K of Spades

```

HARD:

1. **Aim:** 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.

2. Implementation/Code:

```

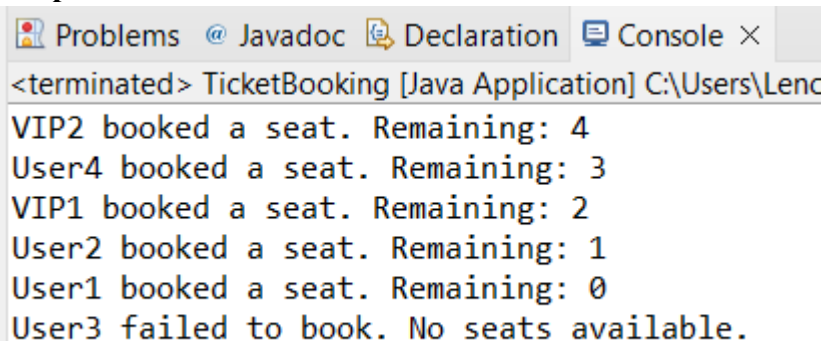
package Java;
class TicketBookingSystem {
    private int availableSeats = 5;
    public synchronized void bookTicket(String name) {
        if (availableSeats > 0) {
            System.out.println(name + " booked a seat. Remaining: " + (--availableSeats));
        } else {
            System.out.println(name + " failed to book. No seats available.");
        }
    }
}
class Passenger extends Thread {
    private TicketBookingSystem system;
    private String name;
}

```

```
public Passenger(TicketBookingSystem system, String name, int priority) {
    this.system = system;
    this.name = name;
    setPriority(priority);
}
public void run() {
    system.bookTicket(name);
}
}
public class TicketBooking {
    public static void main(String[] args) {
        TicketBookingSystem system = new TicketBookingSystem();
        Passenger p1 = new Passenger(system, "VIP1", Thread.MAX_PRIORITY);
        Passenger p2 = new Passenger(system, "VIP2", Thread.MAX_PRIORITY);
        Passenger p3 = new Passenger(system, "User1", Thread.NORM_PRIORITY);
        Passenger p4 = new Passenger(system, "User2", Thread.NORM_PRIORITY);
        Passenger p5 = new Passenger(system, "User3", Thread.NORM_PRIORITY);
        Passenger p6 = new Passenger(system, "User4", Thread.MIN_PRIORITY);

        p1.start();
        p2.start();
        p3.start();
        p4.start();
        p5.start();
        p6.start();
    }
}
```

3. Output:



The screenshot shows an IDE window with tabs for Problems, Javadoc, Declaration, and Console. The Console tab is active, displaying the output of the Java application. The output shows the execution of the TicketBooking class, where six passengers attempt to book seats. The output is as follows:

```
<terminated> TicketBooking [Java Application] C:\Users\Lenc
VIP2 booked a seat. Remaining: 4
User4 booked a seat. Remaining: 3
VIP1 booked a seat. Remaining: 2
User2 booked a seat. Remaining: 1
User1 booked a seat. Remaining: 0
User3 failed to book. No seats available.
```

4. Learning Outcome

- a) Learned how to use ArrayList and Collection interfaces to manage employee records and card collections.
- b) Implemented synchronized methods to prevent race conditions in a multi-threaded environment.
- c) Explored how thread priority affects execution order, ensuring VIP bookings are processed first.
- d) Improved skills in handling user input and managing errors in real-world applications.
- e) Utilized Java Streams and lambda expressions for efficient searching and filtering.