Experiment 4.1

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Subject Name: PBLJ **Subject Code: 22CSH-359**

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. Objective:

The objective of this Java program is to implement an **ArrayList** to store and manage employee details, including **Employee ID, Name, and Salary**. The program will provide functionalities for users to:

1. **Add** new employees.
2. **Update** existing employee details.
3. **Remove** an employee by ID.
4. **Search** for an employee by ID or Name.
5. **Display** all employees.

This program demonstrates the use of **ArrayList**, **OOP principles (Encapsulation and Classes)**, and **basic CRUD operations** in Java.

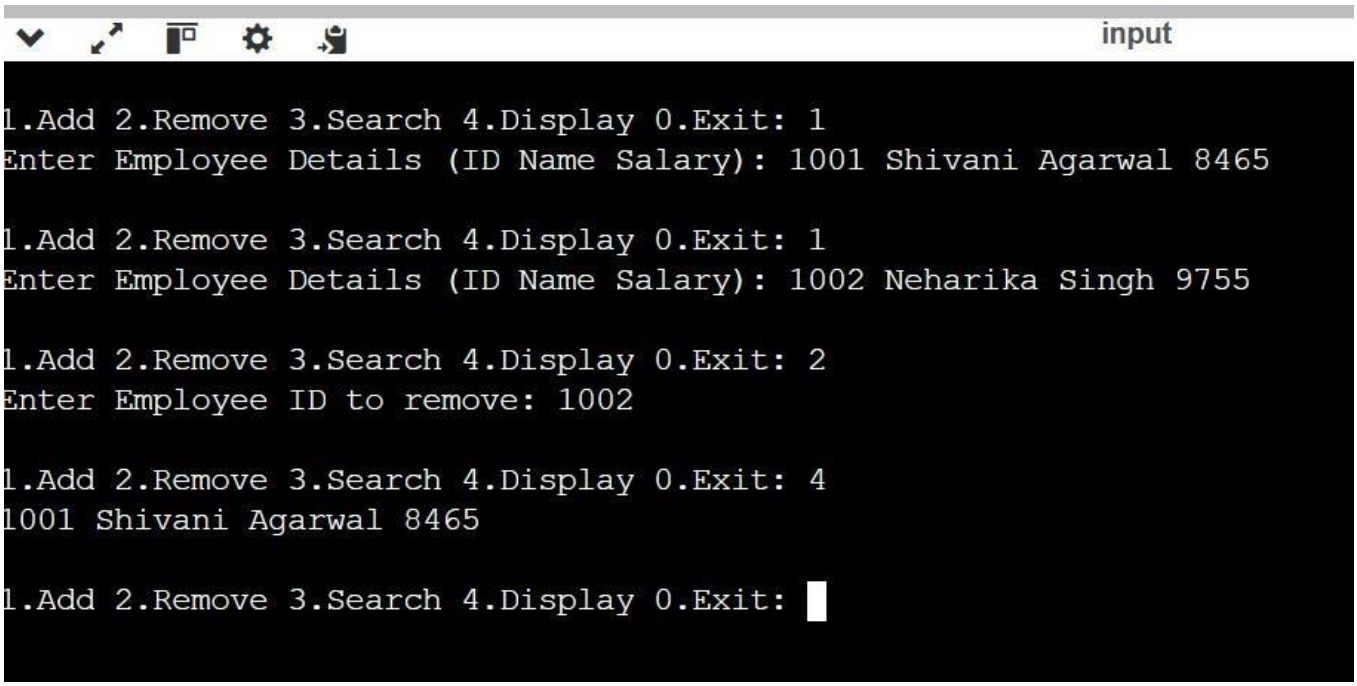
3. Implementation/Code:

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

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

   static void addEmployee() {
      System.out.print("Enter Employee Details (ID Name Salary): ");
employees.add(scanner.nextLine());
   }

   static void displayEmployees() {
      if (employees.isEmpty()) {
```

```
            System.out.println("No employees found.");
        } else {
            for (String emp : employees) {
                System.out.println(emp);
            }
        }
    }

    static void removeEmployee() {
        System.out.print("Enter Employee ID to remove: ");
String id = scanner.next();
        employees.removeIf(emp -> emp.startsWith(id));
    }

    static void searchEmployee() {
        System.out.print("Enter Employee ID to search: ");
        String id = scanner.next();
for (String emp : employees) {
if (emp.startsWith(id)) {
System.out.println(emp);
return;
            }
        }
        System.out.println("Employee not found.");
    }

    public static void main(String[] args) {
        while (true) {
            System.out.print("\n1.Add 2.Remove 3.Search 4.Display 0.Exit:
");             int choice = scanner.nextInt();             scanner.nextLine(); //
Consume newline

            if (choice == 1) addEmployee();
else if (choice == 2) removeEmployee();
else if (choice == 3) searchEmployee();
else if (choice == 4) displayEmployees();
else if (choice == 0) break;
            else System.out.println("Invalid choice.");
```

```
    }
  }
   }
```

4. Output:



Experiment 4.2

1. **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. **Objective :**

The objective of this program is to design a system that collects and stores all cards using the **Collection interface** in Java. The program will allow users to efficiently search and retrieve all cards associated with a given symbol.

By implementing this, users can:

1. **Store** different types of cards in a collection.
2. **Retrieve** all cards corresponding to a given symbol.
3. **Utilize** Java's Collection framework for efficient storage and retrieval.
4. **Enhance** usability by providing a structured way to manage and search cards.

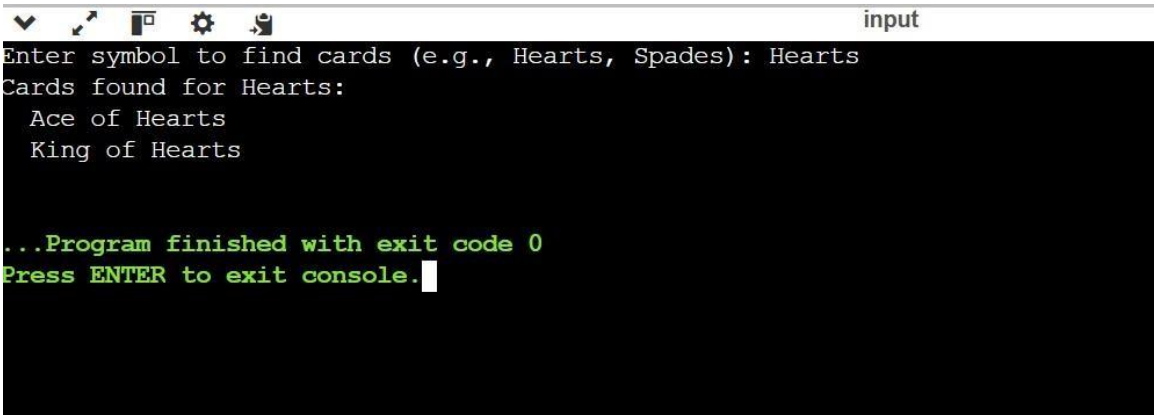
3. Implementation /Code : import java.util.*;

```
// Card class to represent a playing card
class Card {     private String symbol;
   private String value;

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

   public String getSymbol() {
      return symbol;
   }

   public String getValue() {
      return value;
   }

   @Override     public
String toString() {
      return value + " of " + symbol;
   }
}
```

```
// CardCollection class to manage and store cards class
CardCollection {
    private Map<String, Collection<Card>> cardMap;

    public CardCollection() {
        cardMap = new HashMap<>();
    }

    public void addCard(Card card) {
        cardMap.putIfAbsent(card.getSymbol(), new ArrayList<>());
cardMap.get(card.getSymbol()).add(card);
    }

    public Collection<Card> getCardsBySymbol(String symbol) {
return cardMap.getOrDefault(symbol, Collections.emptyList());
    }

    public void displayAllCards() {
        for (Map.Entry<String, Collection<Card>> entry : cardMap.entrySet()) {
            System.out.println("Symbol: " + entry.getKey());
            for (Card card : entry.getValue()) {
                System.out.println("  " + card);
            }
        }
    }
}

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

        collection.addCard(new Card("Hearts", "Ace"));
collection.addCard(new Card("Hearts", "King"));
collection.addCard(new Card("Spades", "Queen"));
collection.addCard(new Card("Diamonds", "Jack"));
collection.addCard(new Card("Clubs", "10"));

        Scanner scanner = new Scanner(System.in);
```

```
        System.out.print("Enter symbol to find cards (e.g., Hearts, Spades): ");
String symbol = scanner.nextLine();

        Collection<Card> foundCards = collection.getCardsBySymbol(symbol);

        if (foundCards.isEmpty()) {
            System.out.println("No cards found for symbol: " + symbol);
        } else {
            System.out.println("Cards found for " + symbol + ":");
for (Card card : foundCards) {                System.out.println("
" + card);
            }
        }

        scanner.close();
    }
}
```

4. Output :



Experiment 4.3

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. **Objective :**

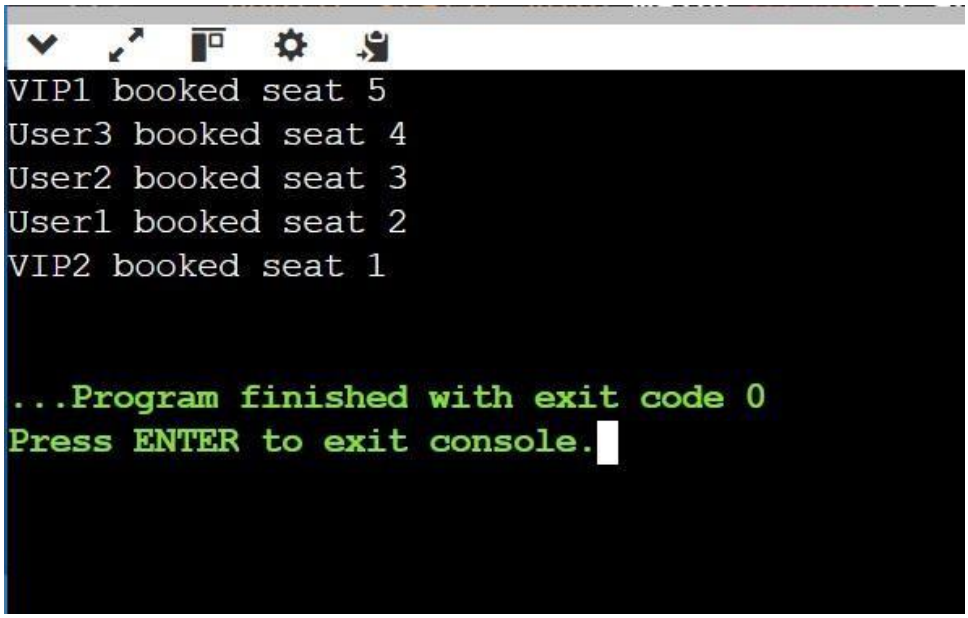
- Prevent Double Booking – Use thread synchronization to avoid multiple bookings for the same seat.
- VIP Priority – Assign higher thread priority to VIP users for faster processing.
- Efficient Seat Allocation – Dynamically update seat availability in real time.
- Concurrency Handling – Manage multiple booking requests safely using locks.
- Transaction Integrity – Ensure accurate booking records and handle failures gracefully.
- Scalability – Optimize for high-volume concurrent bookings.
- Logging & Monitoring – Track transactions and detect system issues.

3. **Implementation /Code :**

```
class TicketBookingSystem {
 private int availableSeats = 5; // Total seats available

 public synchronized boolean bookSeat(String name) {
if (availableSeats > 0) {
 System.out.println(name + " booked seat " + availableSeats);
availableSeats--; return true; } else {
 System.out.println(name + " booking failed. No seats available.");
return false;
 }
 }
}

class BookingThread extends Thread {
private TicketBookingSystem system;
private String customerName;

 public BookingThread(TicketBookingSystem system, String customerName, int
priority) {
```

```
        this.system = system;
        this.customerName = customerName;
setPriority(priority);
    }

    @Override
public void run() {
        system.bookSeat(customerName);
    }
}

public class TicketBookingApp {
public static void main(String[] args) {
        TicketBookingSystem system = new TicketBookingSystem();

        BookingThread vip1 = new BookingThread(system, "VIP1",
Thread.MAX_PRIORITY);
        BookingThread vip2 = new BookingThread(system, "VIP2",
Thread.MAX_PRIORITY);
        BookingThread normal1 = new BookingThread(system, "User1",
Thread.NORM_PRIORITY);
        BookingThread normal2 = new BookingThread(system, "User2",
Thread.NORM_PRIORITY);
        BookingThread normal3 = new BookingThread(system, "User3",
Thread.NORM_PRIORITY);

        vip1.start();
vip2.start();
normal1.start();
normal2.start();
normal3.start();
    }
}
```

4. **Output :**



5. Learning Outcomes :

- Learn about Thread Synchronization.
- Learn about Arraylist.
- Implementation of Arraylist.

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