



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 4

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Branch: BE-CSE

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Subject Name: Project based learning with Java

UID: 22BCS10402

Section/Group: 643/B

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- 1. Aim:** Easy level : 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.

Medium level: 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.

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.

- 2. Objective:** Following are the objectives:

- **Understanding List Operations:** To learn how to manipulate lists and understand basic list operations.
- **Application of Switch-Case:** Learn and apply the switch-case statement to determine specific outputs based on given conditions.
- **Developing Problem-Solving Skills Objective:** To enhance problem-solving and logical thinking by implementing simple algorithms to manipulate data in a list.
- **Dynamic Data Retrieval:** Simulate a real-world scenario of retrieving and displaying data dynamically based on input criteria.

- 3. Implementation/Code:**

Easy level:

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



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

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

    public static void addEmployee()
    {
        System.out.print("Enter Employee ID: ");
        int id = scanner.nextInt();
        scanner.nextLine(); // consume newline
        System.out.print("Enter Employee Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter Employee Salary: ");
        double salary = scanner.nextDouble();
        employees.add(new Employee(id, name, salary));
        System.out.println("Employee added successfully!\n");
    }

    public static void updateEmployee()
    {
        System.out.print("Enter Employee ID to update: ");
        int id = scanner.nextInt();
        for (Employee emp : employees)
        {
            if (emp.id == id) {
```

```
        scanner.nextLine(); // consume newline
        System.out.print("Enter new Name: ");
        emp.name = scanner.nextLine();
        System.out.print("Enter new Salary: ");
        emp.salary = scanner.nextDouble();
        System.out.println("Employee updated successfully!\n");
        return;
    }
}
System.out.println("Employee not found!\n");
}

public static void removeEmployee()
{
    System.out.print("Enter Employee ID to remove: ");
    int id = scanner.nextInt();
    employees.removeIf(emp -> emp.id == id);
    System.out.println("Employee removed successfully!\n");
}

public static void searchEmployee()
{
    System.out.print("Enter Employee ID to search: ");
    int id = scanner.nextInt();
    for (Employee emp : employees)
    {
        if (emp.id == id) {
            System.out.println(emp + "\n");
            return;
        }
    }
    System.out.println("Employee not found!\n");
}

public static void displayEmployees()
{
    if (employees.isEmpty()) {
        System.out.println("No employees found!\n");
        return;
    }
    for (Employee emp : employees)
    {
        System.out.println(emp);
    }
}
```

```
    }  
    System.out.println();  
}  
  
public static void main(String[] args)  
{ while (true) {  
    System.out.println("Employee Management System");  
    System.out.println("1. Add Employee");  
    System.out.println("2. Update Employee");  
    System.out.println("3. Remove Employee");  
    System.out.println("4. Search Employee");  
    System.out.println("5. Display Employees");  
    System.out.println("6. Exit");  
    System.out.print("Enter your choice: ");  
    int choice = scanner.nextInt();  
  
    switch (choice) {  
        case 1: addEmployee(); break;  
        case 2: updateEmployee(); break;  
        case 3: removeEmployee(); break;  
        case 4: searchEmployee(); break;  
        case 5: displayEmployees(); break;  
        case 6: System.out.println("Exiting...\n"); return;  
        default: System.out.println("Invalid choice!\n");  
    }  
}  
}
```

Medium Level:

```
import java.util.*;  
  
class Card {  
    private String symbol;  
    private String name;  
  
    public Card(String symbol, String name) {
```



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```
        this.symbol = symbol;
        this.name = name;
    }

    public String getSymbol()
    { return symbol;
    }

    @Override
    public String toString() {
        return "Card{" + "symbol=" + symbol + "\" + ", name=" + name + "\" + '}'";
    }
}

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

    public static void addCard()
    { System.out.print("Enter Card Symbol: ");
      String symbol = scanner.next();
      System.out.print("Enter Card Name: ");
      String name = scanner.next();
      cards.add(new Card(symbol, name));
      System.out.println("Card added successfully!\n");
    }

    public static void removeCard()
    { System.out.print("Enter Card Symbol to remove:
    "); String symbol = scanner.next();
      cards.removeIf(card -> card.getSymbol().equals(symbol));
      System.out.println("Card removed successfully!\n");
    }

    public static void searchCardsBySymbol()
    { System.out.print("Enter symbol to search: ");
      String symbol = scanner.next();
      boolean found = false;
```

```
        for (Card card : cards) {
            if (card.getSymbol().equals(symbol))
                { System.out.println(card);
                  found = true;
                }
        }
        if (!found) {
            System.out.println("No cards found with the given symbol!\n");
        }
    }

    public static void displayCards()
    { if (cards.isEmpty()) {
        System.out.println("No cards available!\n");
        return;
      }
      for (Card card : cards)
          { System.out.println(card);
            }
        System.out.println();
    }

    public static void main(String[] args)
    { while (true) {
        System.out.println("Card Collection Manager");
        System.out.println("1. Add Card");
        System.out.println("2. Remove Card");
        System.out.println("3. Search Cards by Symbol");
        System.out.println("4. Display All Cards");
        System.out.println("5. Exit");
        System.out.print("Enter your choice: ");
        int choice = scanner.nextInt();

        switch (choice) {
            case 1: addCard(); break;
            case 2: removeCard(); break;
            case 3: searchCardsBySymbol(); break;
            case 4: displayCards(); break;
        }
    }
}
```



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```
        case 5: System.out.println("Exiting...\n"); return;
        default: System.out.println("Invalid choice!\n");
    }
}
}
```

Hard level:

```
import java.util.Scanner;
import java.util.concurrent.locks.*;

class TicketBookingSystem
{
    private int availableSeats;
    private final Lock lock = new ReentrantLock();

    public TicketBookingSystem(int seats)
    {
        this.availableSeats = seats;
    }

    public void bookSeat(String customerType, int seats)
    {
        lock.lock();
        try {
            if (availableSeats >= seats) {
                System.out.println(customerType + " booked " + seats + " seat(s)
successfully.");
                availableSeats -= seats;
            } else {
                System.out.println(customerType + " failed to book. Not enough seats
available.");
            }
        } finally
        {
            lock.unlock();
        }
    }
}

class Customer extends Thread {
```

```
private TicketBookingSystem system;
private int seats;
private String customerType;

public Customer(TicketBookingSystem system, int seats, String customerType, int
priority) {
    this.system = system;
    this.seats = seats;
    this.customerType = customerType;
    setPriority(priority);
}

@Override
public void run()
{ system.bookSeat(customerType,
seats);
}
}

public class Main {
    public static void main(String[] args)
    { Scanner scanner = new
Scanner(System.in);
System.out.print("Enter total number of available seats: ");
int totalSeats = scanner.nextInt();
TicketBookingSystem system = new TicketBookingSystem(totalSeats);

System.out.print("Enter number of customers: ");
int numCustomers = scanner.nextInt();

for (int i = 0; i < numCustomers; i++)
{ System.out.print("Enter customer type (VIP/Regular): ");
String type = scanner.next();
System.out.print("Enter number of seats to book: ");
int seats = scanner.nextInt();
int priority = type.equalsIgnoreCase("VIP") ? Thread.MAX_PRIORITY :
Thread.NORM_PRIORITY;
new Customer(system, seats, type + " Customer " + (i + 1), priority).start();
}
}
```




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```
        scanner.close();  
    }  
}
```

4. Output:

Easy:

```
Employee Management System  
1. Add Employee  
2. Update Employee  
3. Remove Employee  
4. Search Employee  
5. Display Employees  
6. Exit  
Enter your choice: 1  
Enter Employee ID: 1  
Enter Employee Name: harleen  
Enter Employee Salary: 50000  
Employee added successfully!  
  
Employee Management System  
1. Add Employee  
2. Update Employee  
3. Remove Employee  
4. Search Employee  
5. Display Employees  
6. Exit  
Enter your choice: 4  
Enter Employee ID to search: 1  
Employee ID: 1, Name: harleen, Salary: 50000.0  
  
Employee Management System  
1. Add Employee  
2. Update Employee  
3. Remove Employee  
4. Search Employee  
5. Display Employees  
6. Exit  
Enter your choice: 5  
Employee ID: 1, Name: harleen, Salary: 50000.0  
  
Employee Management System  
1. Add Employee  
2. Update Employee  
3. Remove Employee  
4. Search Employee  
5. Display Employees  
6. Exit  
Enter your choice:
```



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Medium:

```
Card Collection Manager
1. Add Card
2. Remove Card
3. Search Cards by Symbol
4. Display All Cards
5. Exit
Enter your choice: 1
Enter Card Symbol: @
Enter Card Name: ace
Card added successfully!

Card Collection Manager
1. Add Card
2. Remove Card
3. Search Cards by Symbol
4. Display All Cards
5. Exit
Enter your choice: 1
Enter Card Symbol: #
Enter Card Name: heart
Card added successfully!

Card Collection Manager
1. Add Card
2. Remove Card
3. Search Cards by Symbol
4. Display All Cards
5. Exit
Enter your choice: 4
Card{symbol='@', name='ace'}
Card{symbol='#', name='heart'}

Card Collection Manager
1. Add Card
2. Remove Card
3. Search Cards by Symbol
4. Display All Cards
5. Exit
Enter your choice: 3
Enter symbol to search: @
Card{symbol='@', name='ace'}
Card Collection Manager
1. Add Card
2. Remove Card
3. Search Cards by Symbol
4. Display All Cards
5. Exit
Enter your choice:
```

Hard:

```
Enter total number of available seats: 4
Enter number of customers: 4
Enter customer type (VIP/Regular): vip
Enter number of seats to book: 4
vip Customer 1 booked 4 seat(s) successfully.
Enter customer type (VIP/Regular): regular
Enter number of seats to book: 5
Enter customer type (VIP/Regular): regular Customer 2 failed to book. Not enough seats available.
```

5. Learning Outcomes: Following are the learning outcomes:

- **Understanding Java Fundamentals:** I developed Improved understanding of basic Java concepts such as arrays, strings,, and conditionals.
- **Working with Data Structures:** I Learnt how to store and manipulate data using data structures or related information.
- **Switch Case Usage :** I Developed skills in using switch-case statements to determine designations and calculate allowances based on specific conditions.
- **Command-Line Applications :** I Learnt how to build simple command-line applications that can take user inputs dynamically and produce desired outputs.