

**Design a Java program to implement a Collection Management System that manages different types of collections such as lists, sets, and maps. The program should allow users to perform the following operations for each type of collection:**

- c) Lists:
  - i) Add an element: The user can add an element to the list.
  - ii) Remove an element: The user can remove an element from the list.
  - iii) Display all elements: The user can view all elements in the list.
- d) Sets:
  - i) Add an element: The user can add an element to the set.
  - ii) Remove an element: The user can remove an element from the set.
  - iii) Display all elements: The user can view all elements in the set.
  - iv) Implement exception handling to handle possible errors (e.g., element not found in the list/set, duplicate keys in the map).
  - v) Provide a user-friendly console interface for the user to interact with the Collection Management System.

**Implementation:** May collection management system can be consist different types of collection like List, Set, Map, etc. Each collection methodology comes with their own implementation, to manage those different types of collection and their different implantation methodology needs type of system to manage everything, here I created consolidated system to manage Collection management system.

```
package com.Assignments.CollectionManagementSystem;

import java.util.ArrayList;
import java.util.HashMap;
import java.util.HashSet;
import java.util.List;
import java.util.Map;
import java.util.Scanner;
import java.util.Set;

public class CollectionManagementSystem {

    private static List<String> list = new ArrayList<>();
    private static Set<String> set = new HashSet<>();
    private static Map<String, String> map = new HashMap<>();
    private static Scanner scanner = new Scanner(System.in);

    public static void main(String[] args) {
        while (true) {
            System.out.println("\n" + "Choose the collection type : ");
            System.out.println("1. List");
            System.out.println("2. Set");
            System.out.println("3. Map");
```

```

        System.out.println("4. Exit");
        System.out.print("Choose the option : ");
        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                manageList();
                break;
            case 2:
                manageSet();
                break;
            case 3:
                manageMap();
                break;
            case 4:
                System.out.println("Exiting...");
                return;
            default:
                System.out.println("Invalid choice. Try again.");
        }
    }

    private static void manageList() {
        while (true) {
            System.out.println("\n" + "List Operations : ");
            System.out.println("1. Add an element");
            System.out.println("2. Remove an element");
            System.out.println("3. Display all elements");
            System.out.println("4. Back to main menu");
            System.out.print("Choose the option : ");
            int choice = scanner.nextInt();
            scanner.nextLine();

            switch (choice) {
                case 1:
                    System.out.print("Enter element to add : ");
                    String elementToAdd = scanner.nextLine();
                    list.add(elementToAdd);
                    System.out.println("Element added successfully.");
                    break;
                case 2:
                    System.out.print("Enter element to remove:");
                    String elementToRemove = scanner.nextLine();
                    if (list.remove(elementToRemove)) {
                        System.out.println("Element removed success-
fully.");
                    } else {
                        System.out.println("Element not found.");
                    }
                }
            }
        }
    }
}

```

```

        }
        break;
    case 3:
        System.out.println("Elements in the list as follow :
");
        for (String element : list) {
            System.out.println(element);
        }
        break;
    case 4:
        return;
    default:
        System.out.println("Invalid choice. Try again.");
    }
}

private static void manageSet() {
    while (true) {
        System.out.println("\n" + "Set Operations : ");
        System.out.println("1. Add an element");
        System.out.println("2. Remove an element");
        System.out.println("3. Display all elements");
        System.out.println("4. Back to main menu");
        System.out.print("Choose the option : ");
        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                System.out.print("Enter element to add : ");
                String elementToAdd = scanner.nextLine();
                if (set.add(elementToAdd)) {
                    System.out.println("Element added success-
fully.");
                } else {
                    System.out.println("Element already exists.");
                }
                break;
            case 2:
                System.out.print("Enter element to remove : ");
                String elementToRemove = scanner.nextLine();
                if (set.remove(elementToRemove)) {
                    System.out.println("Element removed success-
fully.");
                } else {
                    System.out.println("Element not found.");
                }
                break;
            case 3:

```

```

        System.out.println("Elements in the set as follow :
");
        for (String element : set) {
            System.out.println(element);
        }
        break;
    case 4:
        return;
    default:
        System.out.println("Invalid choice. Try again.");
    }
}

}

public static void manageMap() {
    while (true) {
        System.out.println("\n" + "Map Operations : ");
        System.out.println("1. Add an element");
        System.out.println("2. Remove an element");
        System.out.println("3. Display all elements");
        System.out.println("4. Back to main menu");
        System.out.print("Choose the option : ");
        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                System.out.print("Enter the Kay : ");
                String key = scanner.nextLine();

                System.out.print("Enter the Value : ");
                String value = scanner.nextLine();

                map.put(key, value);
                System.out.println("Element added successfully..");
                break;
            case 2:
                System.out.println("Enter the key of the element to
remove : ");

                String key = scanner.nextLine();
                if (map.containsKey(key)) {
                    map.remove(key);
                    System.out.println("Element removed success-
fully.");
                } else {
                    System.out.println("Element not found.");
                }
                break;
            case 3:

```

```

        if (map.isEmpty()) {
            System.out.println("The map is empty.");
        } else {
            System.out.println("Current elements in the map
as follow :");
            for (Map.Entry<String, String> entry : map.en-
trySet()) {
                System.out.println("Key: " + entry.get-
Key() + ", Value: " + entry.getValue());
            }
        }
        break;
    case 4:
        return;
    default:
        System.out.println("Invalid choice. Try again.");
    }
}
}
}

```

### OUTPUT:

Main menu of Collection management system:

Choose the collection type :

1. List
2. Set
3. Map
4. Exit

Choose the option :

This output shows the functionality of List and their sub operations:

Choose the collection type :

1. List
2. Set
3. Map
4. Exit

Choose the option : 1

List Operations :

1. Add an element
2. Remove an element
3. Display all elements

```
4. Back to main menu
Choose the option : 1
Enter element to add : java
Element added successfully.
```

```
List Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 1
Enter element to add : Python
Element added successfully.
```

```
List Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 3
Elements in the list as follow :
java
Python
```

```
List Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 2
Enter element to remove : Python
Element removed successfully.
```

```
List Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 3
Elements in the list as follow :
java
```

```
List Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option :
```

This output shows the functionality of Set and their sub operations:

```
Choose the collection type :
1. List
2. Set
3. Map
4. Exit
Choose the option : 2

Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 1
Enter element to add : Tigger
Element added successfully.

Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 1
Enter element to add : Lion
Element added successfully.

Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 3
Elements in the set as follow :
Lion
Tigger

Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 2
Enter element to remove : Lion
Element removed successfully.

Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
```

```
Choose the option : 3
Elements in the set as follow :
Tigger
```

```
Set Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option :
```

This output shows the functionality of Map and their sub operations, as we know Map store the element into key and value pair that pair called it as entry they are as follows:

```
Choose the collection type :
1. List
2. Set
3. Map
4. Exit
Choose the option : 3
```

```
Map Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 1
Enter the Kay : 1991
Enter the Value : JAVA
Element added successfully..
```

```
Map Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 1
Enter the Kay : 1989
Enter the Value : PYTHON
Element added successfully..
```

```
Map Operations :
1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu
Choose the option : 3
Current elements in the map as follow :
Key: 1991, Value: JAVA
```



Key: 1989, Value: PYTHON

Map Operations :

1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu

Choose the option : 2

Enter the key of the element to remove :

1989

Element removed successfully.

Map Operations :

1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu

Choose the option : 3

Current elements in the map as follow :

Key: 1991, Value: JAVA

Map Operations :

1. Add an element
2. Remove an element
3. Display all elements
4. Back to main menu

Choose the option : 4

Choose the collection type :

1. List
2. Set
3. Map
4. Exit

Choose the option : 4

Exiting...