Experiment No: 2.2

Student Name: Kamal Ale Magar **UID: 21BCS10155**
Branch: CSE **Section/Group: 616/B**
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Subject: Project Based Learning in Java with Lab **Subject Code: 21CSH-319**

1. Aim:

Create a program to collect unique symbols from a set of cards using set interface.

Task:

Collect Unique Symbols from Set of Cards

Playing cards during travel is a fun filled experience. For this game they wanted to collect all four unique symbols. Can you help these guys to collect unique symbols from a set of cards?

Create Card class with attributes symbol and number. From our main method collect each card details (symbol and number) from the user. Collect all these cards in a set, since set is used to store unique values or objects. Once we collect all four different symbols display the first occurrence of card details in alphabetical order.

Sample input output:

```
Enter a card:
a
1
Enter a card:
a
2
Enter a card:
a
7
Enter a card:
d
6
Enter a card:
c
2
Enter a card:
d
1
Four symbols gathered in 8 cards.
Cards in Set are:
a 1
b 2
c 2
d 6
```

2. Objectives:

- To learn about concept of sets of collection.
- To learn about HashSet, List in java.

3. Input/Apparatus Used:

Hardware Requirements: - Minimum 384MB RAM, 100 GB hard Disk, processor with 2.1 MHz
Software Requirements: - Eclipse, NetBeans, IntelliJ, VS Code etc.

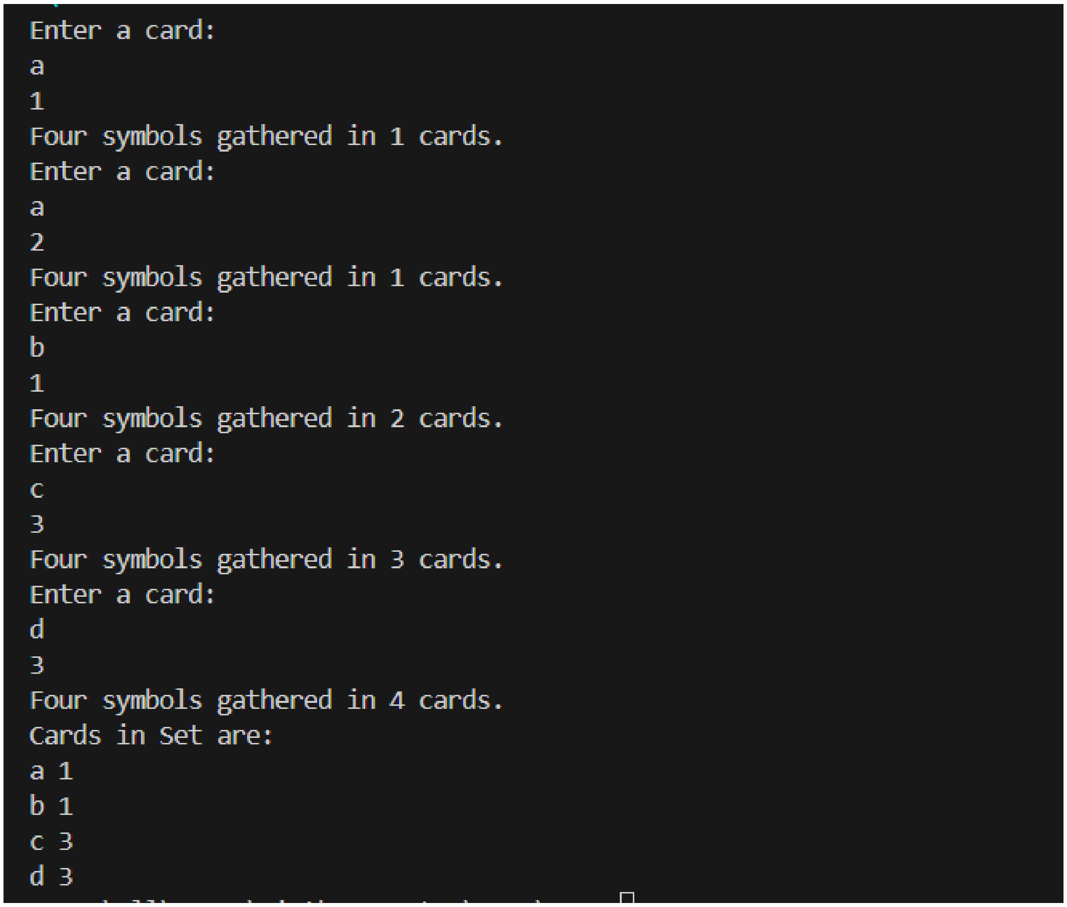
4. Procedure/Algorithm/Pseudocode:

```
Step 1: Import necessary classes from the java.util package.
Step 2: Create a TreeMap named t to store symbols as keys and corresponding numbers as values.
Step 3: Create a Scanner object named sc to read input from the user.
Step 4: Prompt the user to enter the total number of elements (n) and read the value of n using sc.nextInt().
Step 5: Inside the loop, prompt the user to enter a card followed by its corresponding number.
Step 6: Check if the TreeMap t contains the symbol (s) as a key. If not, add a new entry with an empty ArrayList.
Step 7: Add the entered number to the ArrayList corresponding to the symbol.
Step 8: Print the total number of symbols gathered and the total number of cards entered.
Step 9: Print the symbols along with the first number associated with each them close the Scanner object sc.
```

5. Code:

```
import java.util.*;

class Card {
    private char symbol;
    private int number;

    public Card(char symbol, int number) {
        this.symbol = symbol;
        this.number = number;
    }

    public char getSymbol() {
        return symbol;
    }

    public int getNumber() {
        return number;
    }

    @Override
    public boolean equals(Object obj) {
        if (obj == this) return true;
        if (!(obj instanceof Card)) return false;
        Card c = (Card) obj;
        return symbol == c.symbol && number == c.number;
    }

    @Override
    public int hashCode() {
        return Objects.hash(symbol, number);
    }

    @Override
    public String toString() {
        return symbol + " " + number;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Set<Character> uniqueSymbols = new HashSet<>();
        List<Card> cards = new ArrayList<>();

        while (uniqueSymbols.size() < 4) {
            System.out.println("Enter a card:");
            char symbol = scanner.next().charAt(0);
            int number = scanner.nextInt();

            if (uniqueSymbols.add(symbol)) {
                cards.add(new Card(symbol, number));
            }

            System.out.println("Four symbols gathered in " + cards.size() + " cards.");
        }

        Collections.sort(cards, (c1, c2) -> Character.compare(c1.getSymbol(), c2.getSymbol()));

        System.out.println("Cards in Set are:");
        for (Card card : cards) {
            System.out.println(card);
        }
    }
}
```

6. Result/Output:



```
Enter a card:
a
1
Four symbols gathered in 1 cards.
Enter a card:
a
2
Four symbols gathered in 1 cards.
Enter a card:
b
1
Four symbols gathered in 2 cards.
Enter a card:
c
3
Four symbols gathered in 3 cards.
Enter a card:
d
3
Four symbols gathered in 4 cards.
Cards in Set are:
a 1
b 1
c 3
d 3
```

7. Learning Outcomes:

- Learnt about the concept of sets and collections & the importance of sets and collections in organizing and manipulating data.
- Learn how to instantiate and manipulate HashSet objects in Java.
- Understand the performance characteristics of HashSet, including time complexity for common operations.
- Learn about different implementations of List in Java, such as Array List and LinkedList & its characteristics, including ordered collections with possible duplicates.
- Understand how to use List interfaces and their methods to add, remove, and access elements.