Lab 05 – Generics and Collections

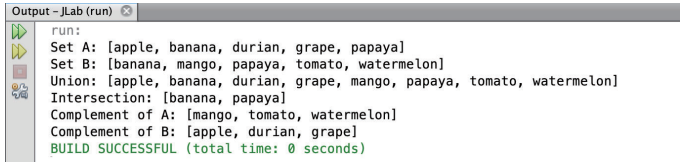
Objectives:

- Learn to define generics classes with parametric type
- Learn to apply Java Collections Framework to solve practical problems

1. Given a generic interface Stack<E> which defines a linear LIFO data structure, you are asked to create an implementation of this interface and name it `MyStack<E>`. The driver program ***TestMyStack*** can be run to test against your implementation.

2. Given two sets of fruits, ***A*** and ***B***, write a program to find out their union, intersection and complements of each set.

```
Set A: [apple, banana, durian, grape, papaya]
Set B: [banana, mango, papaya, tomato, watermelon]
```



Discuss the following items with your classmates:

a. Compare the difference between using ***HashSet*** and ***TreeSet*** in the program above.
b. Why is it a good practice to immediately assign a newly created collection (e.g. HashSet) to its correspondingly interface type (e.g Set)?

3. Given the class ***Card.java***, write a program to do the following tasks using JCF and print out the result of each task.
   a. Initialize a normal 52-card deck in its ***natural order*** as shown below.
   b. Shuffle the deck
   c. Deal four hands of cards and sort each hand in its natural order

The ***natural order*** (first line) and a sample output is shown as below.

```
Initial:       [♠2, ♠3, ♠4, ♠5, ♠6, ♠7, ♠8, ♠9, ♠10, ♠J, ♠Q, ♠K, ♠A, ♥2, ♥3, ♥4, ♥5, ♥6, ♥7, ♥8,
♥9, ♥10, ♥J, ♥Q, ♥K, ♥A, ♣2, ♣3, ♣4, ♣5, ♣6, ♣7, ♣8, ♣9, ♣10, ♣J, ♣Q, ♣K, ♣A, ♦2, ♦3, ♦4, ♦5, ♦6,
♦7, ♦8, ♦9, ♦10, ♦J, ♦Q, ♦K, ♦A]

After shuffle: [♥3, ♦4, ♠Q, ♥7, ♣2, ♥10, ♠9, ♦3, ♣8, ♣3, ♦6, ♦7, ♦Q, ♦8, ♣J, ♥6, ♠3, ♦2, ♠7, ♠8,
♥4, ♥2, ♠10, ♦10, ♥K, ♠A, ♦9, ♦5, ♥J, ♣Q, ♣10, ♣5, ♣K, ♠J, ♠K, ♥9, ♥5, ♥8, ♠2, ♣6, ♠6, ♥A, ♣A, ♠5,
♣4, ♦K, ♣7, ♥Q, ♦J, ♣9, ♦A, ♠4]

Hand 1: [♠9, ♠Q, ♥3, ♥7, ♥10, ♣2, ♣3, ♣8, ♦3, ♦4, ♦6, ♦7, ♦Q]
Hand 2: [♠3, ♠7, ♠8, ♠10, ♠A, ♥2, ♥4, ♥6, ♥K, ♣J, ♦2, ♦8, ♦10]
Hand 3: [♠2, ♠J, ♠K, ♥5, ♥8, ♥9, ♥J, ♣5, ♣10, ♣Q, ♣K, ♦5, ♦9]
Hand 4: [♠4, ♠5, ♠6, ♥Q, ♥A, ♣4, ♣6, ♣7, ♣9, ♣A, ♦J, ♦K, ♦A]
```

- END -