National University of Computer and Emerging Sciences 0091

Software Construction & Development (SE3001)

Sessional-I Exam

Date: September 23, 2024

Course Instructor(s)

Dr. Farooq Ahmed, Mr. Waqas Ali

Total Time: 1 hour
Total Marks: 30
Total Questions: 3

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Attempt all questions on the answer sheet

CLO 1: Apply software engineering concepts to construct (i.e. design, develop,and test) software in team setting

Question 1 **[10 marks]**

Implement a **generic** class **FrequencyCounter** to support calculation of frequency of elements occurring in an array. Following operations need to be supported:

1. **countFrequency**: Takes data and a specific value as an argument and returns the frequency (count of occurrences) for the given value. For instance, in an array {2, 1, 3, 4, 2, 3, 2}, frequency of 2 is 3.
2. **mostFrequentValue**: Takes data as argument and returns the value with the highest frequency. For instance, in an array {'b', 'a', 'c', 'd', 'b', 'c', 'b'}, most frequent value is 'b'.

Question 2 **[10 marks]**

You are provided with a file named cart.txt, where each line contains a user ID followed by a list of product IDs separated by commas. The format of each line is as follows:

```
User_id, product1_id, product2_id, product3_id, product4_id, ...
```

Each line represents a unique user and the products they wish to purchase. Write a Java program that performs the following task:

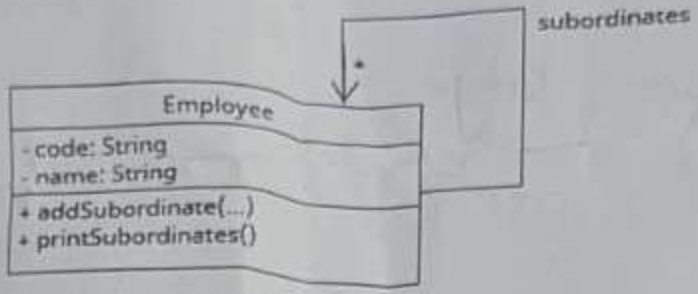
- **Display Stats:** Display the user ids in descending order depending upon the number of products they are purchasing.

Make proper use of file and exception handling.

CLO 2: Implement software design patterns as a part of software construction activity

Question 3 **[10 marks]**

Reflexive Association is a common occurrence in UML class diagrams. Consider the following UML diagram showing an Employee – Subordinate relationship using reflexive association.



Implement the above diagram using Java code.