Faculty of Engineering, University of Jaffna

Department of Computer Engineering

EC4070: Data Structures and Algorithms

Lab – 05

Hash Table

Date: 23rd March2022 **Duration: 3 hour**

1. Maximum occurrence **[50 Marks]**

You are given a string which comprises of lower case alphabets (a-z), upper case alphabets (A-Z), numbers (0-9), and special characters like !,-.; etc. You are supposed to find out which character occurs the maximum number of times and the number of its occurrence, in the given string. If two characters occur equal number of times, you have to output the character with the lower ASCII value. For example, if your string was: aaaaAAAA, your output would be: A 4, because A has lower ASCII value than a.

Note: You are not allowed to use Java library classes which uses hashing technique to solve this problem. You need to implement a Hash Table named **CustomHashTable** with the use of Array and/or LinkedList.

Input format:

The input will contain a string.

Output format:

You have to output two things which will be separated by a space:

i) The character which occurs the maximum number of times.

ii) The number of its occurrence.

Constraints:

- The maximum length of the string can be 1000.
- You cannot use in-build Java classes for key-value mapping. Implement a Hash table from scratch.

Sample Input:

Pulkit is a dog????????

Sample output:

? 8

2. Favorite Game **[50 Marks]**

Max likes football very much. In order to check the popularity of the game, he decided to talk to random people and ask them about their favorite game and note it down in a list. Given a list of name of people and their favorite sport, help Max in finding the sport liked by most of the people, and also how many people like football. He could have met same people more than once, he will only count response of his first meet with any person.

Note: The name of person as well as sport is a single string in uppercase. The length of the name of people as well as sport is less than 12.

Input:

- First line will contain number of entries in the list. (i.e. N)
- Next N lines will contain two strings, person's name and sports he/she likes.

Output:

- In first line, name of sport liked by most number of people (in case of more than one game is liked by highest number of people, output the first one in lexicographical order).
- In second line, number of people having football as their favorite game.

Constraints:

- $1 \leq N \leq 100000$
- $1 \leq$ length (person name), length (sport name) ≤ 12
- You can use in-build Java classes for key-value mapping.

Sample Input:

7
A cricket
B football
C cricket
D cricket
E chess
F chess
G chess

Sample output:

Chess
Football 1

Instructions:

- Implement Java programs for questions using best coding practices. You should name your classes using appropriate names.
- Create a zip file named 201x_E_xxx_L5 which contains all the Java programs and upload the zip file on/before given deadline via team.
- Any plagiarized work will end up in 0 marks.