IS 2110 - Data Structures & Algorithms II
Assignment 01
Deadline: 11:55 PM, 30th November 2020

Group Assignment: Three (3) students per group. Groups are given in a separate sheet.

i. The file **PhoneBook.txt** is a simple phone book manager. It should be able to process the following types of user's queries: It means that the user looks for a person with a phone number. The manager should reply with the appropriate name, or with '0', if there is no such person in the book. You are required to implement the hash table-based algorithm to determine the above queries.

   Input : 997768
   Output: Mother

   Input : 112234
   Output: 0

ii. An anagram is a word or phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once. Given a list of words in a text file as the input, implement a hash table-based algorithm to determine all the groups of anagrams in the file. In the input file each word is given in a separate line (see the sample input file: WordList.txt). In the output, each group of anagrams should be printed in a new line. For example, if the file contains 3 groups of anagrams, output should be as follows.

   Output:
   arc car
   care acre race
   teach cheat

iii. During the pandemic crisis, the government decided to ban all the imports of non-essential items. However, considering the functioning of manufacturing companies, it has been decided to relax the regulations. After analysing the requirements by the companies, authorities have identified a list of different machines and spare parts of different models and brands. Each company is allowed to import two (2) items from the list which consists of 100,000 items.The price of each item is between 1 and 1,000,000 rupees and those are listed in a separate file PriceList.txt. The i th row of the file gives you the ith entry of the array. Given the amount of money n companies are able to afford on buying these items, as a list of n integers; it is required to identify whether there exist

two items in the list, which can be bought utilizing the total amount affordable by each company. Assume that importing each item in the list is equally important to every company. You are required to implement the hash table-based algorithm to determine the solution. Your answer should be in the form of a n-bit string, with 1 indicating "yes" for the corresponding to each company and 0 indicating "no".

Example: Consider that there are six companies, the amount of money each can afford to spend is given as a list of six integers. If all the companies except the 2nd and 6th company can find two items to import, utilizing the full amount, output should be "101110" (without the quotes).

Input: 331552 534756 796873 248219 726312 561237
Output: 101110

The Task

With respect to the questions given above, the following should be submitted

- **Executable programs** (using either Java or C++ languages) with the above functionality given under questions (i), (ii), and (iii) however, without any runtime errors.
- A **report** (not more than 5 pages) along with test cases clearly illustrating important code segments of each algorithm.

The executable program files (with your program code) and the report should be submitted electronically to the LMS in **one Zip file**. It is important that you **use the group number to name the zip file (Example: Group01_assignment01.zip).** The cover page should contain the index numbers and the email addresses of the group members. State the execution procedure of your executable files if a special procedure has to be followed to execute them.

The marks will be allocated for the group as given below:

i. Programming solutions (using either Java or C++ languages)
ii. A group report illustrating your approach and algorithms used for the solutions the questions given above. Plagiarism All programming work must be your own.