National University of Computer and Emerging Sciences

FAST School of Computing | Fall 2020 | Islamabad Campus

Assignment-02

Deadline: 2nd Nov, 2020

Submission guidelines:

1. Your code must include templates.
2. Assignment will be evaluated on test cases to assign marks.
3. In case of any discrepancy (test case failed, incomplete assignment, cheating case), you will be called for demo.
4. There is zero tolerance for the cheating cases so don't try for that.

{Implementation of Citizens Database System in C++}

Develop a Database of Citizens for the Country. The System consists of following parts:

1. Citizens Basic Information Database (CBID).
2. Citizens Criminal Information Database (CCID).
3. Citizens Cell Network Database (CCND).
4. Aliens Database (AD).

Citizens Basic Information Database (CBID):

CBID is the centralized system which means CCID and CCND would be connected to it. Each record would be identified by CNIC in CBID, then further linked to CCID and CCND related record. CBID record contains following information of each citizen.

i. CNIC (4-digit unique number)
ii. Name
iii. Father Name

iv. Gender

v. Address

vi. Nationality

CBID must have following features:

i. Data Structure must be strongly connected that each node contains address of its next node as well as previous node.

ii. List must be maintained in Ascending order based on CNIC upon new Record entry.

iii. Locating and Updating Record must be based on CNIC.

iv. Upon declaring a citizen 'Alien' by the state, citizen Nationality would be updated to "Alien" and Record should be moved from the CBID to a Stack named Aliens Database (AD).

Citizens Criminal Information Database (CCID):

CCID is to keep Citizens criminal record. Each record contains following information of each citizen.

i. CNIC (4-digit unique number)

ii. Crimes

   a. Details of each Crime.

   b. Charges

   c. Punishment

   d. Fine

CCID must have following features:

i. Data Structure must be strongly connected and also the last node can access head of the list

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ii. List must be maintained in Ascending order based on CNIC upon new Record entry.

iii. Locating and Updating Record must be based on CNIC.

iv. "Crimes" is a Singly Linked List, each Node of a List contains all the information related to that Crime/Case.

v. As, CBID is the centralized Database; So, Node in CBID and CCID having same CNIC must have a two-way relationship i.e. If pointer is at some Node in CBID and wants to access criminal record of that person, it should be able to directly access that Node in CCID without the need of searching the whole Criminal Database to locate and see criminal record against concerned CNIC and vice-versa.

vi. Upon declaring a citizen Alien by the state in CBID as it should be moved to a Stack named AD, the relationship between Node in CBID and CCID must remain intact.

Citizens Cell Network Database (CCND):

CCND is to maintain citizens cell number related data. Each record contains following information of each citizen.

i. CNIC (4-digit unique number)

ii. Numbers

   a. Network

   b. Activation Date

   c. Deactivation Date

   d. Status

CCND must have following features:

i. Data Structure must be connected in a way that each node has address of next node and the last node of list can access head of list.

ii. List must be maintained in Ascending order based on CNIC upon new Record entry.

iii. Locating and Updating Record must be based on CNIC.

    a. Add, Delete and Update numbers.

iv. "Numbers" is a Singly Linked List, each Node of a List contains all the information related to that Number.

v. Citizen can only have four numbers registered on his/her CNIC.

vi. As, CBID is the centralized Database; So, Node in CBID and CCND having same CNIC must have a two-way relationship i.e. If pointer is at some Node in CBID and wants to access cell numbers record of that person, it should be able to directly access that Node in CCND without the need of searching the whole Citizens Cell Network Database to locate and see cell numbers record against concerned CNIC and vice-versa.

vii. Upon declaring a citizen Alien by the state in CBID as it should be moved to a Stack named AD, the relationship between Node in CBID and CCND must remain intact but the status of every number should be changed to Inactive and Deactivation date be updated.

Aliens Database (AD):

AD is to maintain data of citizens declared as Aliens by the state. It should be implemented using Linked-List-Based-Stack.

General Functionalities to Include:

i. Upon running the program, it should read data for each Database from related Data Files and store it in a Linked-List-Based-Queue following FIFO rule. After loading all data into

Queue, program should start populating each Database with related Queue Data following First-In-First-Out Rule i.e. FIFO.

ii. Search person by CNIC in CBID and display all Record from CBID, CCID, and CCND

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iv. Search person by CNIC in CCND and display all Record from CBID, CCID, and CCND

v. Update record in CBID i.e. Getter and Setter functions for: Name, F. Name, Address, Nationality.

vi. Upon changing Nationality to Alien, refer to CBID point “iv”.

vii. Add new crime and related data into Crimes-List of CCID.

viii. Delete crime from Crimes-List of CCID.

ix. Update Crimes-List record data i.e. Details, Charges, Punishment, Fine. Identify it on CNIC and Crime.

x. Add cell-number into Numbers-List, if number of registered cell-no. are 4, exception should be thrown that no more can be registered on this CNIC.

xi. Upon adding a cell-number, display all available numbers in Database, and ask for a different number, when entered check whether it is already assigned to someone, if not allow to proceed otherwise ask for new number.

xii. Include functionality to swap ownership of two registered numbers. Take CNIC of 2-citizens and numbers to be exchanged, then proceed with functionality.

xiii. Print count of cell phone numbers registered on each network. For example: (Telenor= 10, Jazz= 5, Ufone= 8, Zong= 9, Total= 32)

xiv. Display data of each person in Alien Database using following rules:

a. Create a Linked-List-Based-Queue following LIFO structure.

b. Pop each record from AD Stack, and add it into Queue.

c. Proceed with second record of Stack and same goes for all records.

d. When all data is inserted into Queue now get each Record from Queue following LIFO method and display all basic info., CCID, and CCND record of that Node. Finally push it back into AD Stack, so they are stored back in same order as they were initially.