CSE 370– Database Systems

Assignment 3

Summer 2024

Submission Instructions:

1. Write your name, id, section on top of the first page
2. Your answer should be handwritten, take pictures and create a single pdf.
3. **Submit the pdf in the following form**: https://forms.gle/ZwjMgtsB4cEeX5Y16
4. **Submission Deadline**: 26th September (Thursday), 2024 11:59 pm (midnight)
5. **NO LATE SUBMISSION WILL BE ACCEPTED**

Question 1 **[10 Marks]**

.Consider the following relation:

Computer_Repair(Comp_ID, Engineer_ID, Date_Assigned, Customer_name, Customer_phone, Engineer_Name, Engineer_phone, Date_Repaired, Issue, Priority_Level, Service_Charge, Commission_Percentage, Total_Repairs)

The primary key of the relation is underlined

The relation has the following additional functional dependencies:

FD1: Engineer_ID → Engineer_Name, Total_Repairs, Commission_Percentage, Engineer_phone

FD2: Comp_ID, Date_Assigned → Issue, Priority_Level, Service_Charge

FD3: Comp_ID → Customer_name, Customer_phone

FD4: Priority_Level → Service_Charge

FD5: Total_Repairs → Commission_Percentage

i. Explain if this is in 1NF or not. If not, apply normalization to decompose it to 1NF. [2]

ii. Explain if this is in 2NF or not. If not, apply normalization to decompose it to 2NF. [4]

iii. Explain if this is in 3NF or not. If not, apply normalization to decompose it to 3NF [4]

Question 2

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Suppose you have the table below for "Instructors" for a School Database with columns ID, Name, Subject and Salary respectively:

76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
45565	Katz	Comp. Sci.	75000
83821	Brandt	Comp. Sci.	92000
98345	Kim	Elec. Eng.	80000
12121	Wu	Finance	90000
76543	Singh	Finance	80000
32343	El Said	History	60000
58583	Califieri	History	62000
15151	Mozart	Music	40000
22222	Einstein	Physics	95000
33465	Gold	Physics	87000

A. To speed up access to the data, you want to create an Index using B+ tree with the ID column as the search key value. **Construct** a B+ tree of order n = 3. The search key values are inserted in the same order as shown in the above table. Show the expansion of the tree for each insertion and the final tree. [10]

B. Now, you want to create an Index using B+ tree with the Name column as the search key value. **Construct** a B+ tree of order n = 5. The search key values are inserted in the same order as shown in the above table. Show the expansion of the tree for each insertion and the final tree. [10]