University of Calgary
Department of Computer Science
CPSC 471 Database Management Systems

Closed book First Quiz- Winter 2021 **Duration**:75 Minutes

Please read these carefully before you start:

- Solve the TWO questions and write your solutions on your own white papers in clean and well-organized manner. Scan or take a photo of each sheet which contains your answers.
- You may also use an editor/tool to produce your solutions
- Combine your answers in one PDF file and upload on D2L.

- Late submission is not allowed. In case you have internet problems then send the PDF file as attached by email to alhajj@ucalgary.ca. However, your email must be stamped by the end of provided time, that is, you should hit send before the D2L closes to be fair to all students.

- Only students who have special permission issued by the students center are allowed to take the extra time allowed and to send their solutions as attachment by email because the D2L will be close by the end of the time permitted to the general quiz.

Q1. You are asked to work as database designer to consider the following problem description (Note that X and Y are specific to every student):

A transportation company hires drivers to drive buses between stations. A driver drives buses from a source station to a destination station. It is necessary to keep track of all the stations visited while moving from the source to the destination. Each station has a director (who may be a driver), a location and registered passengers who may be classified into various categories like X, Y and Z (*here, replace X, Y, Z with three types of passengers of your choice (like students) and specify two or three attributes for each type of passengers you choose*). A station also runs different projects to improve its services. A driver has equipment in each bus he/she drives. Each equipment has serial number, name, color and may be shared by several drivers to serve passengers. A driver has an ID, name, phone, and at least one hoppy. A driver has multiple insurance coverages (we need only names of the insurance company and its phone number) and gives preferential treatment to passengers in category Y; we need to keep the time of the special treatment and the satisfaction level of the passenger. A bus gets regular checkup and maintenance at the mechanic shop. Each visit to the mechanic may lead to replacing some parts with an associated cost per part. We need to keep the part number, price (other than the replacement cost), manufacturer and life-time.

(09 points) a) Draw Extended Entity Relationship diagram by identifying entities, relationships, and their attributes.

- Only when it is obvious from the above description, decide on relationship cardinality.
- State any constraints you may find necessary; but make sure your constraints do not contradict with the problem specifications as described above.

(07 points) b) Transform your EERD from part (a) into the relational model. (**Note**: this will marked based on your answer to part (a), that is, if your answer to part (a) is not complete and you do full transformation to whatwever you have then you get full mark here in order to be fair and avoid deducting marks twice)

(04 points) Q2. Consider the following table R with four attributes A,B, C, D and its current five instances as enumerated in the adjacent table

Find all candidate keys of R by considering only its current content and assume future content will follow the same trend, that is your keys will continue to be valid in the future.

A	B	C	D
a1	b1	c2	d1
a2	b2	c2	d2
a3	b2	c3	d2
a2	b1	c2	d1
a1	b2	c1	d2

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