Fundamentals of Database Systems – ASSIGNMENT 1

PGDBA, First Year, 2020–2022

Deadline: December 15, 2020

Total: 5 marks

SUBMISSION INSTRUCTIONS

1. Submit all the solutions in a single file.

2. Naming convention for your submission file (assuming 20BM6JPxx is your roll number): `20BM6JPxx-assign1` (.rtf, .docx, .doc, .pdf, .tex, etc.).

3. To submit a solution file (say `20BM6JPxx-assign1.pdf`), ensure that it is not password protected and mail to `<assignisik@gmail.com>` with the subject line as follows: `PGDBA 2020-22 20BM6JPxx Assignment 1`.

NOTE: All the solutions must be self-sufficient and to the point.

Q1. Let there be two different relations $R1(X, Y)$ and $R2(X, Y)$ having $t1 > 0$ and $t2 > 0$ tuples, respectively. Without making any assumptions on the keys, find out the minimum and maximum possible number of tuples that may appear in the resulting relations provided by the following operations.

   (i) $(R1 - R2) \cup (R2 - R1)$

   (ii) $R1 \bowtie (R1 - R2)$

Q2. One day in a database class the students open up arguments discussing whether, given a pair of relations $R1(X, Y)$ and $R2(X, Y)$ having $t_1 > 0$ and $t_2 > 0$ tuples, respectively, the maximum number of tuples returned by $R1 \div \pi_Y(R2)$ can be better represented as $\min(t_1, t_2)$ or $t1/t2$. Assume that Y is a superkey in $R2$. Have your comments on this and formally prove the answer you support. Note that, $\min(t_1, t_2)$ is not necessarily lesser than $t1/t2$ and vice versa. Hence, consider the special cases too for making your final stand generic. You are also welcome to suggest a better alternative answer, if exists.

Q3. Give examples of the following scenarios with the help of entity-relationship (ER) diagram.

   (i) Attribute on a relationship

   (ii) Roles associated with a relationship

   (iii) Subsclass of an attribute

   (iv) A multi-attribute key

   (v) A foreign key