2019 Spring DBMS Qualify Exam

1. (10%) A relation, R(A, B, C, D, E, F, G), whose attributes satisfy the following functional dependencies:

   (BC → A, D, E, F, G), (C → E), (D → F, G), (D→B)

   Normalize the above relation to make it satisfy

   (a) 2NF

   (b) 3NF

   Note: Don't make unnecessary normalization if it is not required.

2. (40%) Consider the following schema of a suppliers-and-parts database.

   SUPPLIER(SupNo, SName, Status, City)
   PART(PartNo, Color, Weight, City)
   PROJECT(ProjNo, PName, City)
   SHIPMENT(SupNo, PartNo, ProjNo, Qty)

   Answer the following queries in SQL.

   (a) Get the total weight for the parts that are NOT a "red" part.

   (b) Get the supplier numbers for those suppliers that either supply no parts to any project or supply one same part to all projects.

   (c) Get the part numbers for parts supplied to more than five projects.

   (d) For each project, list the project name, the number of parts used in this project, and the number of suppliers that supply these parts used in this project.

3. (20%) Answer the questions.

   (a) Draw the ER diagram of the relational schema given in Question 2.

   (b) If two more relations are added to Question 2's schema, what will the ER schema be?   The two added relations are as follows.

   Store(SNo, SName, City)
   Sale(SNo, PartNo, Price)

4. (20%) Answer the following questions.
   (a) Why can the two-phase locking protocol guarantee serializability?
   (b) What is the problem of impedence mismatch?
   (c) What is union compatibility?
   (d) What is NoSQL?

5. (10%) Give a <u>formal definition</u> of the full-outer join operation.