CS 445 Exam 2 Review Questions

Functional Dependencies & Normalization

Definitions (FD, key, super key, 3rd normal form, BCNF)
3NF vs BCNF

Describe the anomalies that can occur with redundant data in the database.

Given: R = {A, B, C, D, E}
and FD: A -> B, B->DE, C->DB
What are the keys?
Is the relation in BCNF or 3NF? If not, build a table of data and show the redundancy.
Put the Relation into BCNF, 3NF.

Given: R = {A, B, C, D, E, F, G}
and FD: A -> G, F->DE, G->DB, D->C, E->D
What are the keys?
Is the relation in BCNF or 3NF? If not, build a table of data and show the redundancy.
Put the Relation into BCNF, 3NF.

Build the minimal cover for each of the above relations.

19.4.1
19.7.1 Change part (b) to: Is R in 3NF? If no, put it into 3NF.
       Change part (c) to: Is R in BCNF? If no, put it into BCNF. Does this new breakdown
       preserve all dependencies and is it lossless?
19.8.2

Define loseless decomposition.

Define functional dependency preserving decomposition.

Advanced SQL:

Using your assignment one database:
       Feel free to add any Views to help you solve these queries.

       List all employees that earn more than $10,000 per product they work on.
       Determine how many employees work on each product (ignoring managers).
       Display the one product with the most employees working on it
              (show 1 row, if there is a tie at the top, display the product that is alphabetically first.).

       Determine how many clients use each product.

       Determine which products have more clients than workers.
       Determine which products have more workers than clients.

       List all employees that make less than the average employee salary.

List all employees as either WORKER, MANAGER, BOTH if the employee is only a worker, only a manager, or does both. Hint: use an IF
FOR EXAMPLE:

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| Aline      | Maddox   |   MANAGER
| Ursula     | Stewart  |   BOTH
| Emmanuel   | Pace     |   WOKER
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List all products that have 2 or more clients.

Relational Algebra

Take the above queries and build their relational algebra representation.

Given a Relation R = { A, B, C, D} and a set of FD, F= {A->B, B->CD, C->D}, built and example table containing data that shows the redundancy inherent in the relation. Explain each of the following anomalies: Update, Insertion, Deletion.

What is SQL injection? What is Cross Site Scripting?

Why do we need to salt and hash passwords we store in the database?

Explain what, in what direction, and how, data flows from a database to your web browser when PHP is used to dynamically generate a web page.