**Homework 1A – SQL 01 – Background to T-SQL**

1. **Give an informal definition of "database" as used in the expression “relational database management system.”**

I would informally define database with respect to the RDBMS as a collection of data that is ready to be retrieved, collated and compiled by similar or related properties. This implies that database contains raw data that is ready to be used and manipulated to provide insights and recommendations.

1. **Give an informal definition of "database" as used in the expression “Human Resources database.”**

With respect to “human resources databases”, I would informally define this type of database as a collection of employee information that is more sensitive in nature. Types of sensitive information that may be stored in a human resources database may include personal identifiable information, payroll information, work history, training certifications etc.

1. **Give an informal definition of entity integrity.**

Informal definition – “Entity Integrity”: The concept of ensuring or enforcing that the appropriate information type is stored in its appropriate data field.

Example: A database manager ensures that an employee’s name (text) is not stored in a social security number (numerical) field and vice versa.

1. **Give an informal definition of referential integrity.**

Informal definition – “Referential Integrity”: the concept of ensuring or enforced proper data storage procedures and naming conventions so the right information is presented when using SQL statements.

Example – Ensuring that “name” values are retrieved when a SQL command is given.

1. **What is a relation as defined in the textbook? A one-word answer to this question is sufficient.**

Relation is synonymous with *tables*

1. **Is this table in first normal form? Why or why not? If it is not, how would you change it?**

First Normal Form: States that the tuples (rows) in the relation (table) must be unique and attributes should be atomic.

Based off the picture provided, the table (relation) is not in 1NF because each there are multiple entries under the facCreds column. In order to make this 1NF, I would create parameters for the facCred table to only show the highest or most recent educational degree the faculty member earned.

1. **Is this table in second normal form? Why or why not? If it is not, how would you change it?**

No, the “Pets” table is not in 2NF because the table is using two primary keys (ownerID and petID).

In order to make this table more accurate and reduce confusion, we need to split the original table into two separate tables: [Owner Details] and [Pet details].

The [Owner details] table which should include the primary key of PetID that references the [Pet Table] information. The [Pet details] table should include the primary key from the [Owner table] in order to know which pet belongs to who.

1. **Is this table in third normal form? Why or why not? If it is not, how would you change it?**

This table is not in 3NF because the complete address values are dependent on each other when they should only be dependent on the primary key of the [friends] table.

In order to fix this, you need to create two tables: [FriendInfo] and [FriendAddress].

In the [FriendInfo] Table, you will have have the attributes of ID, FirstName and LastName, and create a reference using the primary key of the [FriendsAddress] table.

In the [FriendAddress] Table, you will have street, city, state and zip as the attributed of the table, and add a reference of the [FriendInfo] table by including the ID attribute.

1. **What is an OLTP database? What operations is it optimized for?**

Online Transactional Processing (OLTP) Database is one of the two main types of database systems in SQL. An OLTP system’s primary focus is data entry and NOT reporting (Insert, update and delete data). In a normalized database environment, each table represents a single entity and keeps data redundancy to a minimum. When you need to modify information in the table, you only have to do so in one spot. This results in optimized performance for data modifications.

1. **What is a star schema? What operations is it optimized for?**

Star Schema is the simplest data warehouse design. The star schema includes several “dimension tables” and one “fact table”. In a star schema, each dimension is implemented as a single table with redundant data. This type of data storage configuration is optimized for data retrieval and reporting.

**References**

1. Ben-Gan, Itzik. (2019). *T-SQL Fundamentals, Third Edition. Chapter 1 – Background to T-SQL querying and programming.* Microsoft Press Books. Pages 26 – 50.
2. StudyTonight. (2017). Basic Concepts of Database Normalization – Simple Explanation for Beginners. <https://www.youtube.com/watch?v=xoTyrdT9SZI>
3. Edureka!. (2019). What is Normalization in SQL | Database normalization forms – 1NF, 2NF, 3NF, BCNF | Edureka. <https://www.youtube.com/watch?v=ABwD8IYByfk>