**CSI 300: Database Management Systems**

**Final Exam Study Guide**

|  | **Note:**   * **You are allowed to bring one handwritten cheat sheet that includes SQL queries and CREATE TABLE statements only.** * **Do not include any theory or answers to multiple-choice questions on the cheat sheet.** * **Cheat sheets will be checked before the exam and which the instructor will staple to your completed exam before submission** |
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| **Part A**  **(20 Points)** | 20 Multiple choice questions from PowerPoint Presentations |
| **Part B**  **(25 Points)** | * Given tables and set of questions, you will be asked to write SQL queries. * Given tables and set of queries, you will be asked to give the result. |
| **Part C**  **(30 Points)** | * You will be given a scenario and asked to create a UML diagram that includes relationships and keys. * Then, you will introduce one or more many-to-many relationships and revise the UML diagram accordingly. * Finally, you will give create table statements with constraints for the updated UML diagram. |
| **Part D**  **(25 Points)** | You will be given a table and asked to:   * Identify the 3 anomalies (one for each). * Normalize the table. |

| **Part A**  **Expect a minimum 15 questions from the below set of 38-45 questions,**  **if each student frame’s at least one question.**  **(If the questions are not skewed, expect 20 Questions)** |
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| **Power Point** | **Number of Questions** | **Questions** |
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| **Database Basics** | 7 - 9 | | 1. Data is \_\_\_\_\_ information that describes real-world systems   1. Numeric 2. Textual 3. Visual, or Audio 4. **All of the above** | | --- | | 2. What is the significance of the A in ACID.   1. Absolute: databases should all conform to their specified size 2. Absolute: The system should never fail 3. **Atomicity: All operations succeed or none are applied** 4. Atomicity: All operations should be as succinct as possible, as small as an atom | | 3. What is the significance of the C in ACID.   1. Consistency: Every table should have the same amount of rows and columns 2. **Consistency: Transactions leave the database in a valid state** 3. Compatibility: All Databases should be compatible and easy to import into a new system 4. Compatibility: New data should never interfere with old data | | 4. What is the significance of the I in ACID?   1. **Isolation: Transactions cannot interfere with other transactions** 2. Isolation: Connections to databases must be filtered to prevent outside interference 3. Integrity: Data must not be lost in case of interruption or shutdown 4. Integrity: Data cannot be altered without proper authorization | | 5. What is the significance of the D in ACID   1. Digital: Database will always be stored digitally. 2. Digital: Data should be compatible with a digital database. 3. Durability: The system will never fail. 4. **Durability: Changes persist even after a system failure.** | | 6. Which of the following is **NOT** a key consideration for database systems?   1. **Query aesthetics** 2. Scalability 3. Cost 4. Maintainability | | 7. In database applications, what component is responsible for controlling concurrency between users?   1. Database Server 2. Application Server 3. Network 4. **Database Management System** | | 8. Database application programs are responsible for several tasks. Which of the following is **NOT** one of them?   1. Create and process forms 2. **Provide security** 3. Process user queries 4. Execute application logic | |  | |
| **Database Types** | 9 - 10 | | 1. What property is characteristic of relational databases?   1. Flexible schema 2. Stores key-value pairs 3. **Enforces ACID properties** 4. Lacks query language support | | --- | | 2. What is a major limitation of structured data systems?   1. Inflexibility in querying 2. **Poor performance with unstructured data** 3. Difficulty in creating relationships between entities 4. Inability to use SQL | | 3. Which of the following is an example of a **non-relational** database?   1. MySQL 2. **MongoDB** 3. SQLite 4. PostgreSQL | | 4. Which type of database is intended for individual users with small-scale requirements?   1. Columnar 2. Analytical 3. Mobile 4. **Personal** | | 5. An example of unstructured data is:   1. **An audio file** 2. A JSON file 3. An excel spreadsheet 4. An XML document | | 6. A **database model** consists of:   1. Data structures that prescribe how data is organized 2. Operations that manipulate data structures 3. Rules that govern valid data 4. **All of the above** | | 7. A computer’s file system is most similar to which database model:   1. **Hierarchical** 2. Key-Value 3. Relational 4. Network | | 8. Of the following database types, which is best suited for analysis:   1. Mobile 2. **Columnar** 3. Object-Oriented 4. Operational | | 9. What type of database is best suited for handling interconnected data points (like social networks):   1. Relational 2. **Graph** 3. Columnar 4. Key-Value | |  | |
| **Relational Database** | 4 - 5 | | 1. Which of the following statements is **FALSE** regarding database keys?   1. **A table can have multiple primary keys** 2. Foreign keys establish relationships between different tables in a database 3. Candidate keys are potential options that could be selected as the primary key 4. Primary keys cannot contain NULL values | | --- | | 2. If a table has five columns, we can say that:   1. It has a cardinality of 5 2. **It has a degree of 5** 3. The domain is 5 4. None of the above | | 3. A candidate key is:   1. Another term for foreign key 2. The next value to be assigned in an AUTO\_INCREMENT column 3. The person’s social security number 4. **A minimal set of attributes that can uniquely identify a record in a table** | | 4. Which of the following represents individual data entries?   1. Record 2. Tuple 3. Row 4. **All of the above** | | 5. In a relational database table, which of the following is **not allowed** for two rows?   1. Holding data about an entity 2. Holding data about attributes of an entity 3. Being of the same kind 4. **Holding identical sets of data values** | |
| **SQL Joins** | 4 - 5 | | 1. During a left join, what happens to data in the right table that doesn’t have a match in the left table?   1. The data will be set to null 2. **The data will be excluded** 3. Null values in the left table will be created in order to match 4. The query will fail | | --- | | 2. What is the most commonly used join?   1. Left Join 2. Right Join 3. **Inner Join** 4. Outer Join | | 3. In a **FULL OUTER JOIN** of a and b what parts of a and b are returned   1. All of a 2. None of a 3. **Everything** 4. Everything but the outer parts of a and b | | 4. In a **SELECT** statement, which of the following clauses should come after the **GROUP BY** clause if one is present:   1. **ORDER BY** 2. WHERE 3. JOIN 4. All of the above | |  | |
| **Relationships** | 6 - 7 | | 1. Which of the following is not a real key in a relational database?   1. Primary Key 2. Candidate Key 3. **Domestic Key** 4. Foreign Key | | --- | | 2. A junction table is needed to represent which relationship?   1. **Many to Many** 2. One to One 3. One to Many 4. Primary to Foreign | | 3. What is ensured through relationships in DBMS?   1. Database aesthetics 2. Data duplication 3. Table dependencies 4. **Data consistency and integrity** | | 4. Another name for a junction table is:   1. A linking table 2. A join table 3. **Both A and B** 4. None of the above | | 5. The foreign key constraint ensures:   1. The foreign key is unique 2. The data is from another country 3. The candidate key is not too specific to prevent its use in a query 4. **The foreign key matches an existing primary key in another table** | | 6. Which relationship type should you use when a single record in Table A can connect to many records in Table B?  A. One-to-One  **B. One-to-Many**  C. Many-to-Many  D. None | |  | |
| **Normalization** | 6 - 7 | | 1. What is the distinctive factor for a database to be in 3NF?   1. No fields depend on a primary key 2. There is no redundant data across multiple rows of data 3. Each value has a primary key 4. **All non-key attributes depend on the entire primary key** | | --- | | 2. Database Normalization was first proposed by:   1. **Edgar F. Codd** 2. Charles Bachman 3. Carlo Strozzi 4. Michael Stonebreaker | | 3. Which of the following is true regarding keys in UML diagrams?   1. A table can only have one foreign key 2. The primary key of one table can be the primary key of another 3. **Multiple attributes can be used as a single primary key** 4. None of the above | | 4. Which of the following is **NOT** required for a database to be in 2NF?   1. Each table has a primary key 2. The values in each column of a table are atomic (No multi-value attributes allowed) 3. There are no repeating groups: two columns do not store similar information in the same table 4. **Redundant data across multiple rows of a table must be moved to a separate table.** | | 5. Achieving 2NF involves:   1. Eliminating partial dependencies 2. Eliminating redundancy 3. **Both A and B** 4. None of the above | | 6. Which of the following best describes First Normal Form (1NF)?   1. A table with no duplicate rows 2. **A table where each column contains only atomic (indivisible) values** 3. A table with a primary key 4. A table with no null values | |  | |

**I will add sample questions on Part B, C, D to practice once the above table is complete.**

| **Part B**  **Expect 3-4 query questions and 3-4 output of query questions.**  **(Similar to Quiz 3, Quiz 4, and EC1)** |
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| **Part C** |
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| Example: |

| **Part D** |
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| Example: |