Midterm exam

Exam covers the following chapters: Ch1, Ch2, Ch3(Sections 1-3), Ch4(section 1- 9)

**Part1: This part is a practice for Ch1 and CH2(Questions on the exam will be similar to these)**

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| --- | --- |
| Question | Answer |
| 1. Which of the following best describes data? 2. Numeric information 3. Textual information 4. Visual or Audio Information 5. All of the above | d |
| 1. True or false: database is a collection of data organized in files. 2. True 3. False | b |
| 1. Which of the following is a software that reads and writes data in a database? 2. Database application 3. Database administrator 4. Database system 5. Database designer | c |
| 4, Which of the following is true about query languages?   1. Query languages are used for general purpose programming. 2. Query languages are similar to python, C++ and java. 3. Query languages are designed specially for database systems. 4. Query languages are not efficient for reading writing data in database system | c |
| 1. Which of the following statements accurately describes a database application? 2. It is a programming language used specifically for database systems. 3. It is a tool designed to directly access and manipulate databases without any intermediary software. 4. It is software that assists business users in interacting with database systems, simplifying user experience and ensuring efficient and secure data access. 5. It is a type of database management system used to organize and store data efficiently. | c |
| 1. What is the primary responsibility of a database administrator?    1. Writing computer programs that utilize a database    2. Determining the format of data elements in the database    3. Securing the database system against unauthorized users    4. Balancing priorities such as storage and response time in database design | c |
| 1. What is the primary responsibility of a database designer?    1. Writing computer programs that utilize a database    2. Determining the format of data elements in the database    3. Securing the database system against unauthorized users    4. Balancing priorities such as storage and response time in database design | b and d |
| 1. What is the primary responsibility of a database programmer?    1. Writing computer programs that utilize a database    2. Determining the format of data elements in the database    3. Securing the database system against unauthorized users    4. Balancing priorities such as storage and response time in database design | a |
| 1. What distinguishes **database programming** from **general-purpose programming**? 2. Database programmers combine database query languages and general-purpose programming languages 3. Database programmers only use general-purpose programming languages 4. Database programmers do not write applications 5. Database programmers are responsible for securing the database system | a |
| 1. Database users access the database by?    1. Writing complex database query languages    2. Directly manipulating the database structure    3. Applications that simplify user experience    4. enforcing procedures for user access and availability | c |
| 1. True or False: Text files and spreadsheets are suitable for managing large, complex databases shared by many users.    1. True    2. False | b |
| 1. True or false a transaction is a group of query that must be completed or rejected as a whole.    1. True    2. False | a |
| 1. What is the role of the **Query Processor** in a database system?    1. Interpreting queries and creating a plan to modify the database    2. Translating instructions into low-level file-system commands    3. Ensuring transactions are properly executed    4. Maintaining a complete record of all database operations | a |
|  |  |
| 1. What is the role of the **Storage Manager** in a database system?    1. Interpreting queries and creating a plan to modify the database    2. Translating instructions into low-level file-system commands    3. Ensuring transactions are properly executed    4. Maintaining a complete record of all database operations | b |
| 1. What is the role of the **Transaction Manager** in a database system?    1. Interpreting queries and creating a plan to modify the database    2. Translating instructions into low-level file-system commands    3. Ensuring transactions are properly executed    4. Maintaining a complete record of all database operations | c |
| 1. What is the role of the **Log** in a database system?    1. Interpreting queries and creating a plan to modify the database    2. Translating instructions into low-level file-system commands    3. Ensuring transactions are properly executed    4. Maintaining a complete record of all database operations | d |
| 1. What information does the catalog, or data dictionary, contain?    1. A complete record of all inserts, updates, and deletes    2. Low-level file-system commands for modifying data    3. Directories of tables, columns, indexes, and other database objects    4. Instructions for query optimization to enhance efficiency | c |
| 1. The query processor has direct access to the database data on storage media.    1. True    2. False | b |
| 1. Which of the following components are part of a database model framework?    1. Data organization, database manipulation, and data validation    2. Data structures, operations, and rules    3. Data retrieval, data storage, and data security    4. Data modeling, database design, and database implementation | b |
| 1. Which of the following best describes the Relational Model?    1. It is based on the Hierarchal data structure    2. It is used to organize data with big size like files and videos    3. It based on tabular data structure    4. None of the above | c |
| 1. True or False: the original purpose of Relational database is to analyze big data?    1. True    2. False | b |
| 1. One of the following is not an example of a database Model?    1. Hierarchal    2. Audio    3. Object    4. Graph | b |
| 1. True or False: The relational data structure is based on set theory.    1. True    2. False | a |
| 1. What is the fundamental structure used to organize data in a relational database?    1. Rows    2. Columns    3. Data types    4. Tables | d |
| 1. What are the difference between sets and tables?    1. Sets are ordered collections, while tuples are unordered.    2. Tuples are enclosed in braces, while sets are enclosed in parentheses.    3. Sets are unordered, while tuples are ordered.    4. Tuples can contain duplicate elements, while sets cannot. | c |
| 1. True or False: a result of a relational operation is always a table.    1. True    2. False | a |
| 1. What is the purpose of rules in relational database?    1. To ensure data integrity and validity    2. To organize data into tables and column    3. To enhance the user interface of database application    4. All of the above | a |
| 1. True or False: in relational database Different columns of the same table have different names.    1. True    2. False | a |
| 1. True or False: In a relational database duplicate rows are not allowed.    1. True    2. False | a |
| 1. “When a row is deleted, all related rows should be deleted”. This is an example on:    1. Business rule    2. Relational rule    3. Both    4. none | a |
| 1. “All tables must have a primary key with no repeated values.” This is an example on:    1. Business rule    2. Relational rule    3. Both    4. None | b |
| 1. “StudentID should start from number 1” This is an example on:    1. Business rule    2. Relational rule    3. Both    4. None | a |
| 1. True or False: A ***database system instance*** is a single executing copy of a database system.    1. True    2. False | a |
| 1. How does the number of database instances typically vary between personal computers and shared computers?    1. Personal computers usually run multiple instances, while shared computers typically run just one instance.    2. Both personal computers and shared computers usually run just one instance of a database system.    3. Personal computers usually run just one instance, while shared computers typically run multiple instances.    4. Both personal computers and shared computers usually run multiple instances of a database system. | c |
| 1. Which statement shows all tables in the database EcommerceStore?    1. SHOW TABLES;    2. SHOW TABLE;    3. SHOW DATABASES;    4. SHOW DATABASE; | a |
| 1. What is the primary unit of organization for data in a relational database?    1. Cell    2. Table    3. Row    4. Column | b |
| 1. In a relational database, what is the purpose of a primary key?    1. To ensure that no two rows have identical values in all columns.    2. To specify the data type of a column.    3. To uniquely identify each row in a table.    4. To define the sequence of columns in a table. | c |
| 1. In a relational database, what is the primary purpose of a foreign key?    1. It uniquely identifies each row in a table.    2. It ensures that each column in a table has a unique value.    3. It establishes a relationship between two tables.    4. It defines the structure of the database schema. | c |
| 1. True or False: A table must have at least one row    1. True    2. False | b |
| 1. Which of the following is not a relational rule that tables in a database must obey?    1. Exactly one value per cell    2. No duplicate column names    3. No duplicate rows    4. Duplicate column names are allowed within same table | d |
| 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_allows database administrators to change the organization of data on storage devices without affecting query results.    1. Data Model    2. Data base    3. Data structure    4. Data independence | d |
| 1. To delete a table from the database we use:    1. DELETE TableName;    2. DROP TableName;    3. DELETE TABLE TableName;    4. DROP TABLE TableName; | d |
| 1. Which statement below can be used to add a column in an exciting table we use:    1. ALTER TABLE TableName ADD ColumnName Datatype;    2. ALTER TableName ADD ColumnName Datatype;    3. CHANGE TABLE TableName ADD ColumnName Datatype;    4. CHANGE TableName ADD ColumnName Datatype; | a |
| 1. Which SQL data type is most suitable for storing a person's gender information?    1. CHAR    2. INT    3. FLOAT    4. None of the above | a |
| 1. Which datatype should we use to store the annual gain or loss in a city's population, which ranges from -1 million to 1 million.    1. Signed SMALLINT    2. Unsigned SMALLINT    3. Signed MEDIUMINT    4. Unsigned MEDIUMINT | c |
| 1. Which data type we can use to Store a student's assigned letter grade, like A or D.    1. VARCHAR(1)    2. CHAH(1)    3. TINYINT    4. None of the above | b |
| 1. True or False: Foreign key might accept NULL values    1. True    2. False | a |
| 1. True Or False: Values in a foreign key must be unique.    1. True    2. False | b |
| 1. Which of the statements below is **false** about foreign key?    1. Multiple foreign keys may refer to the same primary key.    2. A foreign key may refer to the primary key of the same table.    3. The foreign key must be single-column.    4. All columns of the composite foreign key must match some primary key value. | c |
| 1. What do we call this rule: a relational rule that requires foreign key values are either fully NULL or match some primary key value.    1. Referential integrity    2. Data independence    3. a and b    4. none | a |
| 1. Which **referential integrity** action automatically corrects violations by setting invalid foreign keys to NULL?    1. RESTRICT    2. SET DEFAULT    3. CASCADE    4. SET NULL | d |
| 1. Which of the following actions rejects an insert, update, or delete that violates referential integrity?    1. RESTRICT    2. SET DEFAULT    3. CASCADE    4. SET NULL | a |
| 1. Which **referential integrity** action automatically corrects referential integrity violations by propagating primary key changes to foreign keys?    1. RESTRICT    2. SET DEFAULT    3. CASCADE    4. SET NULL | c |
| 1. Which referential integrity action automatically sets invalid foreign keys to the default value specified for the foreign key column?    1. RESTRICT    2. SET DEFAULT    3. CASCADE    4. SET NULL | b |
| 1. Which of the following is not a type of constraint used in databases?    1. NOT NULL    2. DEFAULT    3. PRIMARY KEY    4. INSERT KEY | d |
| 1. The PRIMARY KEY constraint ensures:    1. All values in a column are unique    2. No NULL values are allowed in a column    3. Default values are applied to a column    4. Foreign keys are properly referenced | a |
| 1. Which of the following statements about the UNIQUE constraint is true?    1. It allows duplicate values in a column.    2. It can only be applied to primary key columns.    3. It ensures that values in a column are unique.    4. It does not create an index for each constraint. | c |
| 1. Which of the following statements about the CHECK constraint is true?    1. It allows NULL values in the specified columns.    2. It is violated when the expression evaluates to NULL.    3. It can only be applied to a single column in a table.    4. It ensures that the specified expression evaluates to TRUE or NULL. | d |
| 1. Which of the following statements about an entity-relationship model is **false**?    1. An entity represents a person, place, product, concept, or activity.    2. A relationship is a statement about two entities.    3. An attribute is a descriptive property of a relationship.    4. An entity-relationship model guides implementation in a specific database system. | d |
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Part2: This part is practice for Ch4

Answer questions below based on the requirement listed before each question:

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| 1. “Our state maintains a database of colleges. Each college has a name and an identification code. Each college has a number of departments. Each department has a name, an address, and the phone number of its main office. Each faculty member works in one or more departments. The database includes the name and rank of each faculty member.”  * What are the entities? |
| 1. “Our state's Department of Education maintains a database of colleges in the state. Each college has a name, a code, and the count of students currently enrolled. Each college may have more than one campus. Each campus has a name that is unique within the college and has an address. More than one campus of a college may be located in the same city. Cities are identified by name. A city may contain campuses of more than one college.”  * List all entities and their attributes? |
| 1. “Many people must live in a state. Each person must be a resident of just one state.  * Determine the relationship maxima, and minima? |
| 1. “A database tracks municipal construction projects. Each project has a different code and many orders for materials. Each order is named with the project code and an order number, beginning at 1000 for all projects. Orders have one or more line items, numbered sequentially, beginning at 1 for all orders. “     Select the correct dependency relationship for each entity. Here are the options: **"Stron", or "Weak".**   * Entity Project is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Entity Order \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 1. Rivers, lakes, and oceans are bodies of water. Each river, ocean, and lake has a name. Each river has a length. Each lake has an area and a depth. Each ocean has a volume.  * Which entity is a supertype entity? |
| 1. Assume the following rules:  * Many people can have the same name. * A name may be long and hard to type. * Every person has a name. * A person's name does not include any information. * The name of a person may be changed through a legal procedure.   Which of the following properties does the Name attribute have?   * 1. Unique   2. Required   3. Stable   4. Simple   5. Meaningless |
| 1. Assume the following rules:  * An orchard can take orders from many wholesalers, and a wholesaler can submit orders to many orchards. * A shipping company has a database with tables Orchard, Order, and Wholesaler. * The primary key of Orchard is OrchardID, and the primary key of Wholesaler is WholesalerID. * A wholesaler can place only one order per day with a particular orchard.   What is the best primary key for the Order table? |
| 1. In the above relationship, the foreign key placed in the following table : \_\_\_\_\_\_\_\_\_\_\_\_   The name of the new foreign key is \_\_\_\_\_\_\_. NULLs ( or are not) \_\_\_\_\_\_\_\_\_allowed in the foreign key column. |
| 1. Some cities are a capital of a state. The City table tracks information on all cities in each state.  * In the relationship given above, the foreign key usually be placed in the following table: \_\_\_\_\_\_\_\_\_. The name of the new foreign key is: \_\_\_\_\_\_\_\_. NULLs (are or are not) \_\_\_\_\_\_\_\_ allowed in the foreign key column. |
| 1. A wholesaler sells to a retailer once. Given is the following relationship (many-many) between the Retailer and Wholesaler entities.      * The foreign key(s) in the new table is (are): \_\_\_\_\_\_\_\_\_\_\_\_. * The possible primary key(s) of the new table is (are) \_\_\_\_\_\_\_\_. |
| 1. Rivers, lakes, and oceans are bodies of water. Each river, ocean, and lake has a name. Each river has a length. Each lake has an area and a depth. Each ocean has a volume.  * List attributes for each entity |

Answers:

**Part2:**

1. The entities are College, Department, and FacultyMember.
2. Below are the the entities and their attributes:
   1. Collages: CollegeCode, CollegeName, StudentCount
   2. Campus: Address, CampusName
   3. City: CityName
3. The cardinalities:
   1. Maxima: Many-to-One : many people live in one State
   2. Minima: One to one (Mandatory) (must is used in both sides)
4. Answers:
   1. Stron ,
   2. Weak
5. Water
6. Required and Meaningless.
7. OrchadID, WholeSalerID, OrderDate
8. Taxi, TaxiFleetID, are
9. State, CityCode, are not
10. (RetailerID, WholesalerID),( RetailerID, WholesalerID)
11. Attributes:
    1. Water: name
    2. River: Length
    3. Lake: Area
    4. Ocean: volume

Part 3: Chapter 3 sections 1-3

**Topic Summary:**

Below is a summary of the topics covered in Chapter 3 that have potential to be on the midterm exam:

1. Special Operators and Clauses
   1. The IN operator
   2. The BETWEEN Operator
   3. The LIKE operator
      1. With BINARY
      2. With Special Characters (Regular Expressions)
      3. DISTINCT clause
      4. ORDER BY clause
2. Simple Functions
   1. Common Numeric Functions
      1. ABS(n)
      2. LOG(n)
      3. POW(x,y)
      4. RAND()
      5. ROUND(n,d)
      6. SQRT(n)
   2. Common String Functions
      1. CONCAT(s1,s2,…)
      2. LOWER(s)
      3. REPLACE(s,from,to)
      4. SUBSTRING(s,pos,len)
      5. TRIM(s)
      6. UPPER(s)
   3. Date and time functions
      1. CURDATE()
      2. CURTIME()
      3. NOW()
      4. DATE(expr)
      5. TIME(expr)
      6. DAY(d)
      7. MONTH(d)
      8. YEAR(d)
      9. HOUR(t)
      10. MINUTE(t)
      11. SECOND(t)
      12. DATEDIFF(expr1, expr2)
      13. TIMEDIFF(expr1, expr2)
3. Aggregate Functions
   1. COUNT()
   2. MIN()
   3. MAX()
   4. SUM()
   5. AVG()
   6. GROUP BY clause
   7. HAVING clause
   8. Aggregate Functions and NULL Values

**Sample Questions to test your knowledge:**

1) Refer to the Product table. How many rows appear in the query's result table?

A table with text and numbers

Description automatically generated with medium confidence

SELECT DISTINCT Size  
FROM Product;

a. None

b. Three rows

c. Five rows

d. Four rows

2) Refer to the Product table. Complete the SQL statement to select all products with sizes 0-3M, 3-6M, and 6-9M.

A table with text and numbers

Description automatically generated with medium confidence

SELECT ProductName, Quantity  
FROM Product  
WHERE Size \_\_\_\_\_ ('0-3M', '3-6M', '6-9M');

a. IN

b. BETWEEN

c. =

d. NOT IN

3) Refer to the Product table. Complete the SQL statement to select all products sold as a set.

A screenshot of a product list

Description automatically generated

SELECT ProductName, Quantity   
FROM Product   
WHERE ProductName LIKE \_\_\_\_\_;

a. %s'

b. \_set'

c. \_set%'

d. %set'

4) Refer to the tables. Complete the ORDER BY clause to produce the result table below.

A screenshot of a table

Description automatically generated

SELECT \*   
FROM Product   
ORDER BY \_\_\_\_\_;

a. UnitPrice DESC

b. UnitPrice

c. ProductName DESC

d. ProductName

5) Complete the ORDER BY clause to sort the Products by ProductName alphabetically, then in decreasing Quantity.

SELECT ProductName, Size, Quantity, SupplierId   
FROM Product   
ORDER BY \_\_\_\_\_ ;

a. ProductName DESC, Quantity

b. ProductName, Quantity DESC

c. ProductName DESC, Quantity DESC

d. ProductName, Quantity

6) What does the following statement return?

SELECT ROUND(12.439, 1);

a. 12

b. 12.0

c. 12.4

d. 12.44

7) What does the following statement return?

SELECT SUBSTRING('Excellent', 3, 4);

a. 'ell'

b. 'cell'

c. 'elle

d. 'Exc'

8) What does the following statement return?

​​SELECT DATEDIFF('2020-11-04', '2020-11-09');

a. -5

b. 0

c. 5

d. '2020-11-05'

9) Refer to the Product table. Complete the SQL statement so the result table shows 63, which is the total quantity of all products.

A screenshot of a product list

Description automatically generated

SELECT \_\_\_\_\_   
FROM Product;

a. SUM(Quantity)

b. AVG(Quantity)

c. MIN(Quantity)

d. Quantity \* 5

10) Refer to the Product table. Complete the SQL statement so the result table shows 23.99.

A screenshot of a product list

Description automatically generated

SELECT \_\_\_\_\_   
FROM Product;

a. SUM(UnitPrice)

b. MAX(Quantity)

c. AVG(UnitPrice)

d. MAX(UnitPrice)

11) Refer to the Customer table. Which query returns the result table below?

A screenshot of a computer screen

Description automatically generated

a. SELECT RewardsMember, COUNT(\*)   
ORDER BY RewardsMember   
FROM Customer;

b. SELECT RewardsMember, COUNT(\*)  
FROM Customer   
ORDER BY RewardsMember;

c. SELECT RewardsMember, COUNT(\*)  
GROUP BY RewardsMember   
FROM Customer;

d. SELECT RewardsMember, COUNT(\*)   
FROM Customer   
GROUP BY RewardsMember;

12) Refer to the Customer table. Which query returns the result table below?

A screenshot of a computer

Description automatically generated

a. SELECT State, COUNT(\*)  
FROM Customer   
GROUP BY State  
WHERE SUM(CustomerId) > 1;

b. SELECT State, COUNT(\*)  
FROM Customer   
GROUP BY State  
WHERE COUNT(\*) > 1;

c. SELECT State, COUNT(\*)  
FROM Customer   
GROUP BY State  
HAVING COUNT(\*) > 1;

d. SELECT State, COUNT(\*)  
FROM Customer   
GROUP BY State  
HAVING MAX(CustomerId) > 1;

13) Evaluate the SQL statement and data below. What is correct result?

A screenshot of a graph

Description automatically generated

SELECT SUM(Cost) + SUM(Markup)  
FROM Profit;

a. 450, 35

b. 125, 200, 160

c. 485

d. 250, 35

Part 3: Chap3.1-3 Answer key

1) d

2) a

3) d

4) a

5) b

6) c

7) b

8) a

9) a

10) d

11) d

12) c

13) c