

Chapter 2

Relational query languages:

Multiple Choice Questions:

1. We have _____ and _____ to query instances of relational database.
 - a. Relational algebra, Expression algebra
 - b. Relational algebra, Relational calculus
 - c. Domain algebra, Tuple calculus
 - d. Relational calculus, Expression algebra
2. Set intersection is _____ operation
 - a. Fundamental
 - b. Basic
 - c. Additional or derived
 - d. None of the above
3. _____ commands are used to add, retrieve, update data in database.
 - a. TCL
 - b. DDL
 - c. DQL
 - d. DML
4. DELETE command is used to _____ from table.
 - a. Delete records from table
 - b. Drop the table
 - c. Delete the table
 - d. Delete and drop the records of table
5. Relational calculus tells _____.
 - a. How to do
 - b. What to do
 - c. How and what to do
 - d. All of the above
6. In tuple relational calculus filtering variable uses:
 - a. Attributes of relation
 - b. The whole relation
 - c. Tuples of the relation
 - d. It depends on condition given
7. In domain relational calculus filtering variable uses:
 - a. Tuples of the relation
 - b. Domain of attributes
 - c. Attributes and tuples of relation



- d. (a) and (b)
- 8. SQL depends upon:
 - a. Relational algebra and relational calculus
 - b. Tuple and domain
 - c. Domain algebra, Tuple calculus
 - d. Relational calculus, Expression algebra
- 9. TRUNCATE command is:
 - a. DQL
 - b. DML
 - c. TCL
 - d. DDL
- 10. MySQL is:
 - a. Commercial DBMS
 - b. Open source DBMS
 - c. Both (a) and (b)
 - d. None of the above
- 11. Sybase and Oracle are:
 - a. Commercial DBMS
 - b. Open source DBMS
 - c. Both (a) and (b)
 - d. None of the above

Fill in the blanks:

- 1. Relational algebra is _____ language.
- 2. In Relational algebra we have _____ fundamental operations.
- 3. Cartesian product is _____ operation.
- 4. Rho, ρ , is symbol used for _____
- 5. Relational calculus is _____ language.
- 6. Relational calculus has _____ sub-types.
- 7. Domain relational calculus _____ operators.
- 8. Relational algebra is basis for _____.
- 9. DBMS with SQL3 support are known as _____.
- 10. INSERT is _____ command.

Short answer questions:

- 1. What is relational algebra?

2. What is Relational calculus?
3. What are the fundamental relational operations?
4. Explain tuple and domain relational calculus.
5. What is SQL3? Answer in brief.
6. Explain DDL and give its examples.
7. Explain DML and give its examples.
8. How domain and tuple relational calculus different.
9. Explain unary relational operations.
10. Explain binary relational operations.

Long answer questions:

1. Differentiate between DML and DDL
2. Explain SQL3 and its features.
3. .
4. Explain both the types of relational calculus and give the difference between the two.
5. Explain relational algebra and give explain its fundamental types with examples.
6. .
7. Explain SQL and its types of commands.

Relational Database Design:

Multiple Choice Questions:

1. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. $F = \{CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG\}$ is a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?
 - (a) 3
 - (b) 4
 - (c) 5
 - (d) 6

2. Consider the following relational schema:

Suppliers(sid:integer, sname:string, city:string, street:string)

Parts(pid:integer, pname:string, color:string)

Catalog(sid:integer, pid:integer, cost:real)

Assume that, in the suppliers relation above, each supplier and each street within a city has a unique name, and (sname, city) forms a candidate key. No other functional dependencies are implied other than those implied by primary and candidate keys. Which one of the following is TRUE about the above schema?

- (a) The scheme is in BCNF
 - (b) The scheme is in 3NF but not in BCNF.
 - (c) The scheme is in 2NF but not in 3NF.
 - (d) The scheme is not in 2NF.
3. Consider the relation scheme $R = \{E, F, G, H, I, J, K, L, M, N\}$ and the set of functional dependencies $\{ \{E, F\} \rightarrow \{G\}, \{F\} \rightarrow \{I, J\}, \{E, H\} \rightarrow \{K, L\}, K \rightarrow \{M\}, L \rightarrow \{N\} \}$ on R. What is the key for R?
- (a) $\{E, F\}$
 - (b) $\{E, F, H\}$
 - (c) $\{E, F, H, K, L\}$
 - (d) $\{E\}$
4. The maximum number of superkeys for the relation schema $R(E, F, G, H)$ with E as the key is
- (a) 5
 - (b) 6
 - (c) 7
 - (d) 8
5. The relation scheme Student Performance (name, courseNo, rollNo, grade) has the following functional dependencies:

name, courseNo \rightarrow grade

rollNo, courseNo \rightarrow grade

name \rightarrow rollNo

rollNo \rightarrow name

The highest normal form of this relation scheme is:

- (a) 2 NF
 - (b) 3 NF
 - (c) BCNF
 - (d) 1 NF
6. Relation R is decomposed using a set of functional dependencies, F and relation S is decomposed using another set of functional dependencies G. One decomposition is definitely BCNF, the other is definitely 3NF, but it is not known which is which. To make a guaranteed identification, which one of the following tests should be used on the decompositions? (Assume that the closures of F and G are available).
- (a) Dependency Preservation.
 - (b) Lossless-join
 - (c) BCNF definition
 - (d) 3NF definition
7. Which of the following FD can't be implied from FD set: $\{A \rightarrow B, A \rightarrow BC, C \rightarrow D\}$?
- (a) $A \rightarrow C$
 - (b) $B \rightarrow D$
 - (c) $BC \rightarrow D$
 - (d) All of the above
8. Consider a schema R(A, B, C, D) and following functional dependencies.
- $A \rightarrow B, B \rightarrow C, C \rightarrow D, D \rightarrow B$. then decomposition of R into R1 (A, B), R2(B, C) and R3(B, D) is:



- (a) Dependency Preserving and lossless join.
 - (b) Lossless join but not dependency Preserving.
 - (c) Dependency Preserving but not lossless join.
 - (d) Not Dependency Preserving and not lossless join.
9. Which of the following statements is TRUE? D_1 : The decomposition of the schema $R(A, B, C)$ into $R_1(A, B)$ and $R_2(A, C)$ is always lossless. D_2 : The decomposition of the schema $R(A, B, C, D, E)$ having $AD \rightarrow B, C \rightarrow DE, B \rightarrow AE$ and $AE \rightarrow C$, into $R_1(A, B, D)$ and $R_2(A, C, D, E)$ is lossless.
- (a) Both D_1 and D_2
 - (b) Neither D_1 nor D_2
 - (c) Only D_1
 - (d) Only D_2
10. The set of attributes X will be fully functionally dependent on the set of attributes Y if the following conditions are satisfied.
- (a) X is functionally dependent on Y .
 - (b) X is not functionally dependent on any subset of Y .
 - (c) Both (a) and (b)
 - (d) None of these.

Fill in the blanks.

1. Normalization is used to eliminate _____.
2. $X \rightarrow Y$ is _____ FD if Y is a subset of X .
3. Attributes of relations which are part of candidate key are known as _____.
4. _____ normal form is considered adequate for normal relational database design.
5. Minimal Super key is known as _____



Short Questions:

1. What is functional dependency? Explain trivial and non trivial functional dependency with example.
2. Given $R = (A, B, C, G, H, I)$. The following set F of functional dependencies holds $A \rightarrow B$, $A \rightarrow C$, $CG \rightarrow H$, $CG \rightarrow I$, $B \rightarrow H$. Compute AG^+ . Is AG a candidate key?

Long Questions:

1. What is meant by normalization? Write its need. List and discuss database anomaly during database design.
2. Consider schema $EMPLOYEE(E-ID, E-NAME, E-CITY, E-STATE)$ and

$FD = \{E-ID \rightarrow E-NAME, E-ID \rightarrow E-CITY, E-ID \rightarrow E-STATE, E-CITY \rightarrow E-STATE\}$

(1) Find attribute closure for: $(E-ID)^+$ (2) Find $(E-Name)^+$

Query Processing and Query Optimization

Multiple Choice Questions:

1. In external sorting, the number of runs that can be merged in every pass are called
 - a. Degree of sorting
 - b. Degree of runs
 - c. Degree of passing
 - d. Degree of merging
2. The results of each intermediate operation are created and then are used for evaluation of the next-level operations. This is called
 - a. Materialized evaluation
 - b. Expression evaluation
 - c. Tree evaluation
 - d. Tree materialization
3. Pipelines can be executed in
 - a. 4
 - b. 3
 - c. 2
 - d. 5

4. In a _____ the system makes repeated requests for tuples from the operation at the top of the pipeline.
- Demand-driven pipeline
 - Producer-driven pipeline
 - Demand pipeline
 - All of the mentioned
5. In a _____ operations do not wait for requests to produce tuples, but instead generate the tuples eagerly.
- Demand-driven pipeline
 - Producer-driven pipeline
 - Demand pipeline
 - All of the mentioned
6. Tuples are generated _____ in producer-driven pipelining, they are generated _____ on demand, in demand-driven pipelining.
- Lazily, Eagerly
 - Eagerly, Lazily
 - Slowly, Eagerly
 - Eagerly, Slowly
7. In a _____ the system scans each file block and tests all records to see whether they satisfy the selection condition.
- Index Search
 - Linear search
 - File scan
 - Access paths

Long Questions:

1. Explain evaluation expression process in query optimization.
2. Explain steps in Query Processing.