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Grade	<b>77.00</b> out of 80.00 ( <b>96.25%</b> )

**Question 1**

Correct

Mark 1.00 out of 1.00

Static query optimization removes runtime overhead but might result in suboptimal execution strategies.

- True   
 False

**Question 2**

Correct

Mark 1.00 out of 1.00

In the two-phase locking protocol, a transaction can release its locks before it has obtained all the locks it needs.

- True  
 False 

**Question 3**

Correct

Mark 2.00 out of 2.00

Which method is used to avoid the high cost of exhaustive search in query optimization?

Select one:

- A. Static optimization
- B. Dynamic optimization
- C. Heuristic-based methods 
- D. Genetic algorithms
- E. Randomized strategies

**Question 4**

Correct

Mark 2.00 out of 2.00

The MapReduce programming model is designed for:

Select one:

- A. Handling large datasets on a single machine
- B. Enhancing SQL query performance
- C. Simplifying relational database operations
- D. Real-time data processing
- E. Distributed computation over large datasets 

**Question 5**

Correct

Mark 1.00 out of 1.00

Data localization is the process of distributing query fragments to the appropriate local databases.

- True 
- False

**Question 6**

Correct

Mark 1.00 out of 1.00

Replication transparency in a DDBS allows users to interact with data as if there is a single copy of the data, even if multiple copies exist.

- True   
 False

**Question 7**

Correct

Mark 3.00 out of 3.00

**Match the following terms with their definitions:**

Quantifies the degree of communication between different sites in a query plan.

Query Localization Cost (QLC)



Concerned with database relations stored on a local site and selectivity of database operators.

Local Processing Cost (LPC)



Indicates the degree of heterogeneity in a query equivalent plan on the number of sites accessed.

Query Affinity Cost (QAC)

**Question 8**

Correct

Mark 2.00 out of 2.00

What does the term "degree 3 consistency" ensure in a transaction?

Select one:

- A. Other transactions do not dirty any data read by T before T completes.  
 B. Transaction T does not commit any writes until it completes all its writes.  
 C. All the choices apply   
 D. Transaction T does not overwrite dirty data of other transactions.  
 E. Transaction T does not read dirty data from other transactions.

**Question 9**

Correct

Mark 2.00 out of 2.00

What is the primary purpose of a semantic integrity constraint in a database?

Select one:

- A. To manage database transactions
- B. To reduce data redundancy
- C. To facilitate data replication
- D. To ensure database consistency 
- E. To improve query performance

**Question 10**

Correct

Mark 2.00 out of 2.00

Which of the following is NOT a major characteristic of a distributed database system?

Select one:

- A. Global perspective
- B. Centralized data storage 
- C. Data management at multiple sites
- D. interconnected by a computer network
- E. Local requirements management

**Question 11**

Correct

Mark 1.00 out of 1.00

In distributed query processing, the global query plan is always executed at the central site.

- True
- False 

**Question 12**

Correct

Mark 3.00 out of 3.00

Consider the following constraints defined on the database. Choose the correct constraint type from the drop down.

CHECK ON PROJ (BUDGET >= 500000 AND BUDGET <= 1000000)

Individual constraints

CHECK ON g:ASG, j:PROJ (SUM(g.DUR WHERE g.PNO=j.PNO)<100 IF j.PNAME="CAD/CAM")

Constraints involving aggregates

PNO IN ASG REFERENCES PNO IN PROJ

Set-oriented constraints

**Question 13**

Correct

Mark 1.00 out of 1.00

A dirty read occurs when a transaction reads data that has been modified by another transaction but not yet committed.

True

False

**Question 14**

Correct

Mark 10.00 out of 10.00

Match the following concepts with their descriptions:

Transforms the distributed query into a query on fragments.

Data localization

Break down a calculus query into an algebraic query on global relations

Query decomposition

Express basic semantic properties inherent to a model.

Structural constraints

Regulate the application behavior.

Behavioral constraints

Finding the best execution strategy for the query

Query optimization

**Question 15**

Correct

Mark 2.00 out of 2.00

In distributed databases, data is “delivered” from the sites where they are stored to where the query is posed. Which of the following correctly refers to the hybrid delivery mode?

Select one:

- A. Data is transferred from the server to the client only when the client explicitly requests it.
- B. Data is delivered based on the client's network bandwidth availability.
- C. Data is pushed to the client based on a predefined schedule without any request from the client.
- D. Data is sent to the client periodically after the transfer is first initiated by specific client requests. ✓
- E. Data is never automatically sent to the client and must always be manually retrieved by the client.

**Question 16**

Correct

Mark 1.00 out of 1.00

Discretionary access control in a database system is based on defining access rights for users, types of access, and objects to be accessed.

- True ✓
- False

**Question 17**

Correct

Mark 2.00 out of 2.00

Which component of the database management system (DBMS) is responsible for query decomposition?

Select one:

- A. Query processor ✓
- B. Storage manager
- C. Integrity manager
- D. Transaction manager
- E. Data dictionary

**Question 18**

Correct

Mark 2.00 out of 2.00

What is the dominant cost in distributed query processing?

Select one:

- A. Communication cost
- B. I/O cost
- C. CPU cost
- D. Storage cost
- E. Memory cost

**Question 19**

Correct

Mark 2.00 out of 2.00

What is a downside of data replication in distributed databases?

Select one:

- A. Decreased latency
- B. Data availability during catastrophic events
- C. Increased read performance
- D. Increased complexity of write operations
- E. Robustness against node failures

**Question 20**

Correct

Mark 2.00 out of 2.00

Which type of access involves a user connected to a site and accessing the data from another site?

Select one:

- A. Remote access
- B. Controlled access
- C. Global access
- D. User access
- E. Local access

**Question 21**

Partially correct

Mark 8.00 out of 11.00

**Fill the gaps in the following statements.**

1. A transaction that involves multiple database nodes is called a distributed  transaction.
2. The isolation  level ensures that a transaction does not see any intermediate state or uncommitted changes made by other transactions.
3. In the two-phase locking protocol, the growing  phase is where a transaction acquires all the locks it needs without releasing any locks.
4. The shrinking  phase in the two-phase locking protocol is where a transaction releases its locks but cannot acquire any new locks.
5. The term recovery  refers to the ability of a database system to recover and maintain consistency after a failure.
6. In a distributed system, the query home  site is the location where an update transaction is initially issued.
7. Most of the NoSQL databases can only provide eventual  consistency, which is a weaker type of consistency.
8. session  consistency is a subtype of read-your-writes consistency that only guarantees that a process can read its own written data during a session.
9. monotonic read  consistency assures that when a newly written value is read the first time, all subsequent reads on this data item will not return any older values
10. The main benefits of replication include increased read performance  performance and robustness against failure  of single nodes.

**Question 22**

Correct

Mark 2.00 out of 2.00

In the context of distributed databases, which of the following correctly describes "peer-to-peer systems"?

Select one:

- A. There is no differentiation in functionality between sites, and each site can function both as a client and a server.
- B. Clients are responsible for executing all queries, while servers only store the data.
- C. Multiple servers collaborate to form a single unified database, but each server can operate independently if needed.
- D. Each client manages its connection to multiple servers, handling all query optimizations locally.
- E. There is a single centralized server that manages all the data while clients only request data from it.

**Question 23**

Correct

Mark 2.00 out of 2.00

Which phase in query processing transforms a high-level query into a correct and efficient execution strategy?

Select one:

- A. Code generation
- B. Compilation
- C. Decomposition
- D. Execution
- E. Optimization 

**Question 24**

Correct

Mark 1.00 out of 1.00

In distributed DBMS, a materialized view is updated immediately after the base data is updated.

- True
- False 

**Question 25**

Correct

Mark 2.00 out of 2.00

In query normalization, which normal form gives precedence to the AND operator?

Select one:

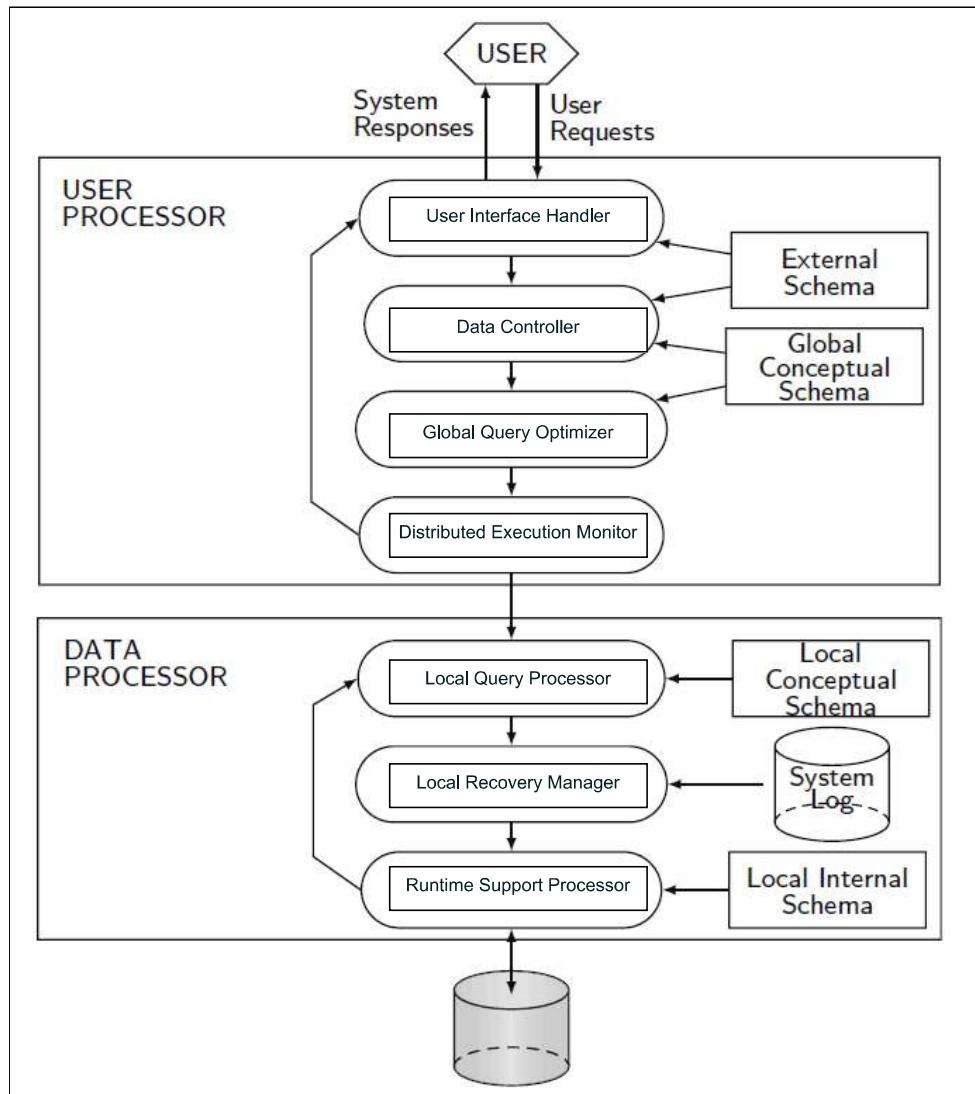
- A. Predicate Normal Form
- B. Disjunctive Normal Form
- C. Conjunctive Normal Form 
- D. Quantifier-Free Normal Form
- E. Fourth Normal Form

**Question 26**

Correct

Mark 7.00 out of 7.00

The detailed components of a distributed DBMS are shown below:



**Question 27**

Correct

Mark 5.00 out of 5.00

Which of the following are characteristics of NoSQL databases? **Select all that apply. 1 mark is deducted for each incorrect choice.**

Select one or more:

- A. Horizontal scaling
- B. ACID transactions
- C. Distributed computing
- D. Schema-free design
- E. Eventual consistency
- F. Limited horizontal scalability
- G. Strong consistency
- H. Complex joins
- I. High availability
- J. Complex query support

**Question 28**

Correct

Mark 2.00 out of 2.00

What is the primary function of the global query optimizer in distributed query processing?

Select one:

- A. To distribute queries to the appropriate local sites
- B. To manage data replication
- C. To encrypt the query data
- D. To compress the query results
- E. To maintain data consistency

**Question 29**

Correct

Mark 2.00 out of 2.00

What is the purpose of the analysis phase in query decomposition?

Select one:

- A. To generate equivalent operator trees.
- B. To reject normalized queries for which further processing is impossible or unnecessary.
- C. To rewrite the query using transformation rules.
- D. To combine projections on the same relation.
- E. To ensure the query is syntactically correct.

**Question 30**

Correct

Mark 1.00 out of 1.00

Semantic integrity control can reject update transactions that lead to inconsistent database states.

- True
- False

**Question 31**

Correct

Mark 2.00 out of 2.00

What type of consistency level prevents all three phenomena: dirty read, non-repeatable read, and phantom read?

Select one:

- A. Repeatable Read
- B. Snapshot Isolation
- C. Serializable
- D. Read Committed
- E. Read Uncommitted

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