Managing Relational and Non-Relational Data

Duration: 90 minutes

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Student Name:	**Student Nr.:**

GROUP I

Grading: 7,0

(ATTENTION: each wrong answer discounts its value divided by the number of options)

1 Below is the output of 'Orders' table. We want to find the total sum (total order) of each customer. Which t-SQL statement should be used?

Table output including headers:

OrderID	OrderDate	OrderPrice	Customer
1	2018/11/23	1000	Harry
2	2018/12/04	1100	Nancy
3	2019/01/23	550	Harry
4	2018/12/23	500	Peter

( ) SELECT Customer, SUM(OrderPrice) FROM Orders
GROUP BY OrderPrice

(x) SELECT Customer, SUM(OrderPrice) FROM Orders
GROUP BY Customer

( ) SELECT Customer, SUM(OrderPrice) FROM Orders
GROUP BY Orders

( ) SELECT OrderID, SUM(OrderPrice) FROM Orders
GROUP BY OrderID

2 What is the expected dataset that will be returned after executing t-SQL query below?

Note: Please assume that table 'Product' in scope of 'Production' schema already exists and has one data row. Also, that one of the table columns is named ListPrice having int as column data type.

```
DECLARE @Discount INT = 0;
BEGIN TRY
        UPDATE Production.Product
        SET ListPrice = ListPrice / @Discount
END TRY
BEGIN CATCH
        PRINT ERROR_MESSAGE();
        THROW 50001, 'An error occurred', 0;
END CATCH;
```

( ) (0 rows affected)

( ) (0 rows affected)
Msg 50001, Level 16, State 0, Line 8
An error occurred

(x) (0 rows affected)
Divide by zero error encountered.
Msg 50001, Level 16, State 0, Line 8
An error occurred

( ) (1 rows affected)
Divide by zero error encountered.
Msg 50001, Level 16, State 0, Line 8
An error occurred

3 Which of the following statement **is false**?

( ) SQL Server Database must involve at least two files (data file and transaction log file)
(x) SQL Server Database recovery model cannot be modified after database has been created
( ) SQL Server Database can contain more than one transaction log file
( ) SQL Server Database must have the PRIMARY filegroup

4 Below is the output of 'persons' table. What is the expected dataset that will be returned after executing t-SQL query below?

Table output including headers:

CustomerID	FirstName	LastName
1	João	*NULL*
2	P.	Teixeira
3	Marta	Gomez

Query:

```
SELECT FirstName + ' ' + LastName
FROM persons
ORDER BY CustomerID desc
```

(x) Marta Gomez
P. Teixeira
NULL

( ) *NULL*
P. Teixeira
Marta Gomez

( ) Marta Gomez
João
P. Teixeira

( ) João
Marta Gomez
P. Teixeira

5 Which of the following statement **is false**?

A table can have one of the following index configurations:

( ) A non-clustered index
( ) A clustered index and many non-clustered indexes
( ) A clustered index
(x) Many clustered indexes and many non-clustered indexes

6 Below is the output of 'SalesOrderDetail' table. What is the expected dataset that will be returned after executing t-SQL query below?

Table output including headers:

SalesOrderID	UnitPrice	OrderQty	LineTotal
1	4	6	1
2	50	7	3
3	25	5	2

Query:

```
SELECT   SalesOrderID,
      SUM(UnitPrice * OrderQty) AS TotalPrice
FROM    SalesOrderDetail
GROUP BY SalesOrderID
HAVING   SUM(UnitPrice * OrderQty) > 100 AND LineTotal > 2
```

( ) 2 350

( ) 2 350
3 125

( ) 3 125
2 350

(x) Msg 8121, Level 16, State 1, Line 5
Column 'SalesOrderDetail.LineTotal' is invalid in the HAVING clause because it is not contained in either an aggregate function or the GROUP BY clause.

7 Which of the following SQL Server data types cannot be implicit (automatically) converted by SQL Server engine?

( ) float to int
(x) nvarchar to binary
( ) smallint to int
( ) int to smallint

8 Which of the following statement **is false?**

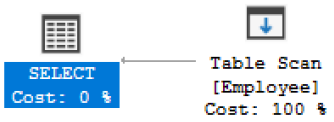
( ) CTEs are named table expressions defined in a query
( ) CTEs are similar to derived tables in scope and naming requirements
(x) CTEs cannot be used in a CREATE VIEW statement, as part of the view's SELECT query
( ) Unlike derived tables, CTEs supports multiple references and recursion

9 Assuming table named ‘Employee’ is populated with 10 million data rows and SocialSecurityNumber column is set as unique. Which execution plan is expected to be more efficient from performance point of view for this particular t-SQL query?

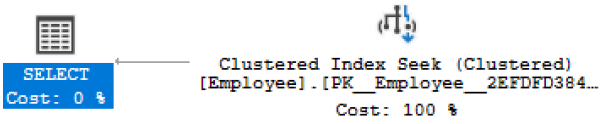
Query:

```
select * from Employee
where SocialSecurityNumber = 1121212
```

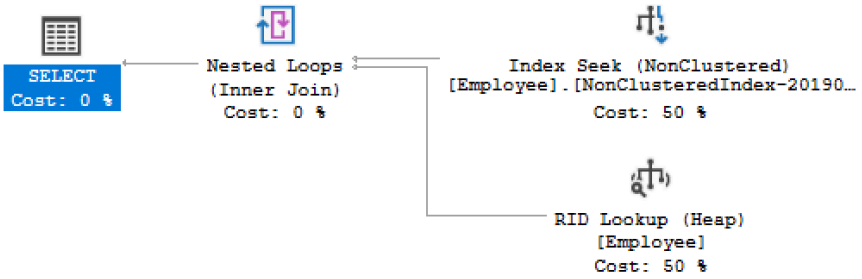
( )



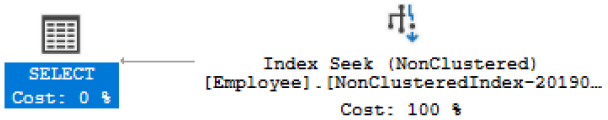
(x)



( )



( )



10 Indicate which one of the following SQL Server Isolation Levels might allow dirty reads?

( ) Repeatable Read
(x) Read uncommited
( ) Read Committed
( ) SERIALIZABLE

11 _____ marks the end of a successful implicit or explicit transaction

( ) ROLLBACK TRANSACTION
(x) COMMIT TRANSACTION
( ) IF
( ) All the above

12 Which of the following statements **is false**?

( ) Subqueries are nested queries. Basically, queries within queries.
( ) CROSS APPLY applies the right table expression to each row in left table
( ) Views may be referenced in a SELECT statement just like a table
(x) Scalar subquery returns multiple rows to outer query

13 Which of the following statements **is false**?

(x) UNION ALL removes duplicates during query processing
( ) Outer joins return all rows from one table and any matching rows from second table
( ) Self join compares rows in same table to each other
( ) Cross join combines each row from first table with each row from second table

14 Which SQL statement is not a DML (Data Manipulation Language) statement?

( ) UPDATE
(x) CREATE
( ) DELETE
( ) INSERT

GROUP II

Grading: 3,0

1) Describe what is a SQL Server blocking scenario versus SQL Server dead lock scenario and how you would resolve both issues.

2) What are the differences between a primary key and a foreign key, and why both are important to maintaining a relational database structure?

GROUP III

Grading: 6,0

(ATTENTION: each wrong answer discounts its value divided by the number of options)

1 What factor\factors should you consider when setting a consistency level (select all applicable)?

(x) How fast should write operations return a success status after saving data to persistent storage?
(x) Is it acceptable for two users to look up a set of columns by the same row ID and receive different data?
(x) If your application runs across multiple data centers and one of the data centers fails, must the remaining functioning data centers have the latest data?
( ) What is the amount of storage needed so that you build your data center accordingly?

2 Which of the following statement **is true?**

( ) NoSQL database guarantee Consistency, Availability or Partition Tolerance – you can't guarantee more than one at the same time.
( ) NoSQL have strict adherence to ACID properties.
(x) In NoSQL Consistency is traded in favor of Availability.
( ) In RDBMS Consistency is traded in favor of Availability.

3 Select all applicable reasons for choosing a key-value database for your application.

(x) There is a need for variable attributes.
(x) The problem domain requires a relatively simple data model.
( ) Send a banner ad to an area on a web page for millions of users at the same time.
( ) Find references for a specific person in different scanned books.

4 Select all applicable use cases for document databases.

(x) Product Catalog.
( ) Caching data from relational databases to improve performance.
(x) Managing highly related data.
( ) Fraud Detection.

5 Which statement is true (select all applicable)?

(x) In a Column-family database a row is composed of columns that are grouped by a row key.
( ) Column-family databases are appropriate to modeling data warehouses and data marts.
(x) Column-family databases are appropriate to work with Big Data and scale volumes of data.
(x) Column family databases are appropriate when a large number of servers are required to meet expected workloads.

6 What is an Unweighted Graph (select all applicable)?

( ) Graphs which Vertexes don't have a weight.
( ) Graphs which Edges don't have a weight.
(x) Graphs were both Edges and Vertexes don't have weights.
( ) Graphs where Edges have a direction.

7 Select all types of Graph Algorithms?

(x) Path finding
(x) Centrality
(x) Community detection
( ) Recurrence

8 You have a key-value entry with a reference to a file in blob storage, you need to modify the name of the file and ensure that the key-value entry is updated accordingly.
Which pattern should you use?)

( ) Compound key pattern.
( ) Denormalization pattern.
( ) Inter-partition secondary index.
(x) Eventually consistent transactions pattern.

9 When designing Azure Storage Tables which is the **least** read-efficient option?
( ) $filter= PartitionKey eq 'NovaIMS' and RowKey eq 75
( ) $filter=PartitionKey eq 'NovaIMS' and RowKey ge 10 and RowKey lt 80
( ) $filter=PartitionKey eq 'NovaIMS' and Unit eq 'edsa'
(x) $filter=Unit eq 'edsa'

10 Which of these object types are not part of a collection in an Azure Cosmos SQL API (select all applicable)?

( ) Attachment
( ) Document
( ) Stored Procedure
(x) Permission

11 Which of these stages belong to Map Reduce (select all applicable)?

(x) Map
(x) Reduce
(x) Shuffle
( ) Redistribute

12 Which of the following are motivating factors for database designers and other IT professionals to develop and use NoSQL databases (select all applicable)?

(x) Elastic Scaling
(x) Flexible Models0
(x) Large amounts of data
( ) Maturity

GROUP IV

Grading: 4,0

1) How does vertical partitioning differ from horizontal partitioning?

2) Name the four main NoSQL database types and their strengths for the following scenarios: webpage cache, social networks, product catalog, IoT telemetry.

3) Name two types of formats for storing data in a document database.

4) The E in BASE stands for eventually consistent. What does that mean?