



Managing Relational and Non-Relational Data

Duration: 90 minutes

GROUP I

Grading: 7,0

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

1 What is the correct statement execution order used by SQL Server engine to execute the following query? (number before each statement means execution order)

() 1 - SELECT SalesOrderID, SUM(LineTotal)
 2 - FROM SalesLT.SalesOrderDetail
 3 - WHERE OrderQty > 4
 4 - GROUP BY SalesOrderID
 5 - HAVING SUM(LineTotal) > 10000.00
 6 - ORDER BY SalesOrderID ;

(x) 5 - SELECT SalesOrderID, SUM(LineTotal)
 1 - FROM SalesLT.SalesOrderDetail
 2 - WHERE OrderQty > 4
 3 - GROUP BY SalesOrderID
 4 - HAVING SUM(LineTotal) > 10000.00
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2 Which of the following statement is **false**?

- () More than one SQL Server instance can be installed on same computer
- () Different versions of SQL Server can be installed on same computer
- () Each SQL Server instance can host multiples databases
- (x) More than one SQL Server default instance can be installed on same computer

3 Below is the output of 'Customers' table. What is the expected output of t-SQL query?

Table output including headers:

CustomerID	CustomerName	Country
1	Afonso Moreira	Portugal
2	Antonio Moreno	Mexico
3	Ana Trujillo	Mexico
4	Peter Wayne	UK

Query:

```
SELECT CustomerID, CustomerName, Country
FROM Customers
ORDER BY Country, CustomerName
```

- (x)

3	Ana Trujillo	Mexico
2	Antonio Moreno	Mexico
1	Afonso Moreira	Portugal
4	Peter Wayne	UK
- ()

2	Antonio Moreno	Mexico
3	Ana Trujillo	Mexico
1	Afonso Moreira	Portugal
4	Peter Wayne	UK
- ()

1	Afonso Moreira	Portugal
3	Ana Trujillo	Mexico
2	Antonio Moreno	Mexico
4	Peter Wayne	UK
- ()

4	Peter Wayne	UK
1	Afonso Moreira	Portugal
2	Antonio Moreno	Mexico
3	Ana Trujillo	Mexico

- 4 Which of the following statement **is true**?
- ☐ **LEFT JOIN** will return all results from the left table in your statement, matched against rows in the right table when possible.
 - ☐ **RIGHT JOIN** will return all results from the right table in your statement, matched against rows in the left table when possible
 - ☐ **INNER JOIN** returns a list of rows for which there is a match in both tables specified.
 - ☒ **All the above**
- 5 Which of the following SQL Server data types requires more storage space?
- ☐ Int
 - ☐ Bit
 - ☐ SmallInt
 - ☒ Money
- 6 Which of the following statement **is false**?
- ☒ There can be multiple clustered index per table
 - ☐ Non-clustered indexes have a structure separate from the data rows
 - ☐ Both clustered and non-clustered indexes can be unique
 - ☐ Indexes are automatically created when PRIMARY KEY and UNIQUE constraints are defined on table columns.
- 7 Which of the following is a property of transactions?
- ☐ Atomicity
 - ☐ Durability
 - ☐ Isolation
 - ☒ All the above
- 8 Which is the most restrictive isolation level in transaction?
- ☐ Repeatable Read
 - ☐ Read uncommitted
 - ☐ Read Committed
 - ☒ SERIALIZABLE
- 9 Which one of the following features is not new in SQL Server 2017?
- ☐ Python support
 - ☐ SQL Server on Linux (also considered as valid answer)
 - ☐ Graph Database
 - ☒ In-Memory tables

10 What is the result set of the following t-SQL query?

```
SET DATEFORMAT dmy;  
SELECT TRY_CAST('12/31/2010' AS datetime2) AS Result;  
GO
```

☐ Result

2010-31-12 00:00:00.0000000

☐ Result

2010-12-31 00:00:00.0000000

☐ Conversion failed when converting date and/or time from character string.

☒ Result

NULL

11 Assuming SQL Server stored procedure described below has been already created what is the expected result set by executing the following t-SQL: “exec doSomething @FirstName = 'Peter'”?

Stored procedure code:

```
CREATE PROCEDURE doSomething @FirstName VARCHAR(25)  
    ,@LastName VARCHAR(25) = 'NA'  
AS  
BEGIN  
    SELECT @LastName AS Column1  
        ,@FirstName AS Column2  
END
```

☐ Procedure or function 'doSomething' expects parameter '@LastName', which was not supplied.

☐ Column1 Column2

NULL Peter

☒ Column1 Column2

NA Peter

☐ None of the above

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

- ☐ Azure SQL database is based on the latest stable Enterprise Edition of SQL Server
- ☒ Your on-premises applications previously using SQL Server needs to be completely redesigned to support Azure SQL Database
- ☐ Azure SQL Database provides online change of resources (CPU/storage)
- ☐ Azure SQL Database is a relational database-as-a-service (DBaaS) hosted in the Azure cloud

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

- ☐ A UNIQUE constraint enforces the uniqueness of the values in a set of columns, so no duplicate values are entered.
- ☐ When one table's primary key field is added to related tables to create the common field which relates the two tables, it called a foreign key in the other tables.
- ☐ Primary key is column whose values uniquely identify every row in a table.
- ☒ Primary key allows only up to one value to be NULL

14 Which of the following statement is true?

- ☐ Common Table Expression (CTE) cannot be recursive
- ☐ Temporary tables can't be indexed (don't allow indexes creation)
- ☐ Using Common Table Expression (CTE) is always more performance than using temporary tables
- ☒ Common Table Expression (CTE) is alternative to a view when the general use of a view is not required. So, there is no need to store the definition in metadata.

GROUP II

Grading: 3,0

1) What are the main differences between clustered and a non-clustered index and in which cases these should be used?

2) What is Concurrency and how can we solve concurrency problems?

GROUP III

Grading: 6,0

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

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

- ☐ Vertical scaling entails upgrading an existing database server to add additional processors, memory, network bandwidth, or other resources that would improve performance on a database management system.
- ☐ Vertical scaling entail replacing an existing server with one that has more CPUs, memory, and so forth.
- ☐ Horizontal scaling entails adding more servers to a cluster.
- ☒ NoSQL databases will replace relational databases since they allow us to do horizontal scaling.

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

- ☐ NoSQL database guarantee Consistency, Availability and Partition Tolerance simultaneously.
- ☐ NoSQL have strict adherence to ACID properties.
- ☒ NoSQL follow the BASE properties.
- ☐ RDBMS is schema less.

3 Select all applicable use cases for key-value databases.

- ☒ Caching data from relational databases to improve performance
- ☒ Tracking transient attributes in a web application, such as a shopping cart
- ☐ Content Management Systems (CMS)
- ☒ Managing each player session on a massive multi-player on-line gaming.

4 Select all applicable reasons for choosing a document database for your application.

- ☐ Understand patterns in the data.
- ☒ Storing hierarchical data structures directly in the Database.
- ☒ Find references for a specific person in different scanned books.
- ☒ Send a banner ad to an area on a web page for millions of users at the same time.

5 Select all applicable use cases for column-family databases.

- ☐ Modeling computer networks.
- ☐ Modeling data warehouses and data marts.
- ☒ Work with Big Data and scale volumes of data.
- ☐ Store Electrical circuits.

6 What is an object in a Graph (select all applicable)?

- ☒ Vertice
- ☒ Edge
- ☒ Arc
- ☒ Node

7 What is a link in a Graph (select all applicable)?

- ☐ Vertice
- ☒ Edge
- ☒ Arc
- ☐ Node

8 When using Azure Storage Tables, which of the following statement **is false**?

- ☐ Entity Group Transactions (EGTs) are the only built-in mechanism for performing atomic updates across multiple entities.
- ☒ EGTs can only operate on entities stored in the same RowKey
- ☐ EGTs can only operate on entities stored in the same PartitionKey
- ☐ The Table service uses the last modified timestamp to manage optimistic concurrency.

9 When designing Azure Storage Tables which is the most read-efficient option?

- ☒ **Point Query** \$filter= PartitionKey eq 'Sales' and RowKey eq '2'
- ☐ **Range Query** \$filter=PartitionKey eq 'Sales' and RowKey ge 'S' and RowKey lt 'T'
- ☐ **Partition Scan** \$filter=PartitionKey eq 'Sales' and LastName eq 'Smith'
- ☐ **Table Scan** \$filter=LastName eq 'Jones'

10 Select all Resources listed below that are required to create a Document DB.

- ☒ Account
- ☒ Database
- ☒ Collection
- ☒ Document

11 Select all examples in which you can use graphs to model the domains:

- ☒ manage Transportation networks
- ☒ manage Social networks
- ☐ manage high volume of transactions
- ☒ Spread of infectious diseases

12 What properties could you associate with a vertex representing a city?

- ☒ City name
- ☒ Population
- ☒ Longitude and latitude
- ☒ Points of interest

GROUP IV

Grading: 4,0

1) Name four motivating factors for database designers and other IT professionals to develop and use NoSQL databases.

2) Discuss the need for both NoSQL and relational databases in enterprise data management.

3) Create a sample document for a small appliance with the following attributes: appliance ID, name, description, height, width, length, and shipping weight. Use the JSON format.

4) Identify one similarity between column family databases and relational databases.