Reading 02: Microsoft SQL Server and Oracle Database and more

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1. What are the similarities between Microsoft SQL Server and Oracle DB?

    - They are both powerful Relational database management systems (RDBMS)
    - License: Commercial
    - Have XML support, secondary index
    - Both have same user concepts: fine grained access rights according to SQL-standard

2. Point the difference in Requirements on both MS and OR

	Microsoft SQL Server	Oracle DB
Operating system	Only compatible with Windows and Linux	Any operating system
Transaction Control	Perform and commit each job or query separately	Each new database link is interpreted as a new transaction
Organization	Organize by object	Objects are grouped by schema
Transaction control	Executes each command individually, and it will be extremely difficult to make changes if any errors are encountered along the way	Treats each new database connection as a new transaction.

3. Advantage and Disadvantage of both Microsoft SQL Server and Oracle DB?

	Microsoft SQL Server	Oracle DB
Advantage	. Ease of general use (in comparison to other databases) . Tools like SQL Server Profiler, SQL Server Management Studio, BI tools, and Database Tuning Advisor . Plenty of online support and documentation, plus live product support . Option for enterprise-level professional management software . Ease of data recovery (in comparison to other databases)	. Ability to upgrade without complete system overhaul . Option for enterprise-level professional management software . Ease of data recovery (in comparison to other databases) . Can handle large amounts of data
Disadvantage	. Doing transactions in an SQL server, every user has their redo stream; at the same time . Lacks some built-in plugins, necessitating the purchase of third-party plugins	. Has adequate file capacity . Complex to use because its syntax is a bit complicated . Takes a long time to solve your problem. . Expensive

4. Describe some important steps when installing Microsoft SQL Server and Oracle DB process, that affect directly to the security problem.

    - Choosing the Installation Location: Select a secure and dedicated server or machine for the installation. Ensure it has the necessary hardware resources and is physically protected.
    - Verify System Requirements: Before installation, check the system requirements provided by Microsoft or Oracle. Ensure the operating

system, hardware, and software prerequisites are met. Using outdated or unsupported components can introduce security vulnerabilities.

- Secure Network Configuration: During installation, configure network settings carefully. Disable or restrict unnecessary protocols, services, and ports to minimize the attack surface. Utilize firewalls and ensure the database server is accessible only to authorized systems and users.
- Secure Authentication: Set strong passwords for administrative accounts during installation. Consider using complex passwords with a combination of uppercase and lowercase letters, numbers, and special characters. Avoid using default or easily guessable credentials.
- Patch and Update: After installation, promptly apply the latest security patches and updates provided by the database vendors. Regularly check for new releases and security bulletins to stay up to date with any security fixes.
- Secure Backup and Recovery: Implement a robust backup and recovery strategy. Ensure that backups are encrypted and stored securely to prevent unauthorized access to sensitive data. Test the restoration process regularly to validate the backups' integrity.

5. What is DBMS? What are its different types?
    - Database Management System (DBMS) is software for storing and retrieving users' data while considering appropriate security measures. It consists of a group of programs that manipulate the database
    - There are 3 main types of DBMS data model:
        + Relational data model: Data is organized as logically independent tables.
        + Network data model: All entities are organized in graphical representations.
        + Hierarchical data model: Data is organized into a tree-like structure.

6. What is OLTP?

   OLTP is an operational system that supports transaction-oriented applications in a 3-tier architecture. It administers the day to day transaction of an organization. OLTP is basically focused on query processing, maintaining data integrity in multi-access environments as well as effectiveness that is measured by the total number of transactions per second. The full form of OLTP is Online Transaction Processing.

7. What is the difference between NoSQL & SQL?

SQL	NoSQL
Stands for Structured Query Language	Stands for Not Only SQL
Relational database management system (RDBMS)	Non-relational database management system
Suitable for structured data with predefined schema	Suitable for unstructured and semi-structured data
Data is stored in tables with columns and rows	Data is stored in collections or documents
Supports JOIN and complex queries	Does not support JOIN and complex queries
Requires vertical scaling to handle large volumes of data	Horizontal scaling is possible to handle large volumes of data
Examples: MySQL, PostgreSQL, Oracle, SQL Server, Microsoft SQL Server	Examples: MongoDB, Cassandra, Couchbase, Amazon DynamoDB, Redis

8. What is SQL Injection?

SQL injection, also known as SQLI, is a common attack vector that uses malicious SQL code for backend database manipulation to access information that was not intended to be displayed. This information may include any number of items, including sensitive company data, user lists or private customer details.