

LESSON

09

DATABASE SECURITY, BACKUP, AND RECOVERY

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LEARNING OBJECTIVES

- define database security;
- discuss the importance of database performance;
- discuss the importance of database backup and recovery; and
- identify different backup and recovery mechanisms.

DATABASE SECURITY

- Limit data access to qualified users.
- Restrict table modifications to admin users.
- Define accessibility to rows/columns for specific users.

3 Concept of SQL Security

- **Users:** Represent people/programs performing actions.
- **Objects:** The things defined by SQL standards in the database that users can manipulate.
Tables, views, columns, domains.
- **Privileges:** refers to rights of users to manipulate objects.
SELECT, INSERT, DELETE, UPDATE, etc.

User IDs and Privileges

- User IDs are essential for security.
- Privileges granted via GRANT command.
- Privileges revoked via REVOKE command.

Types of Privileges

- **System privileges** are privileges that allow database users to perform administrative actions within the database.
- **Object privileges** are authority levels on objects, which means, a user must be granted appropriate privileges in order to perform certain actions on the database objects by the object's owner.

DATABASE MONITORING

Why Database

Performance is Important?

- ❖ Response time affects business operations.
- ❖ Slow databases can cause delays or failures.

Performance Analysis Tools

- **LocalDB (MSI installer)** is a lightweight version of Express which has all its programmability characteristics, yet runs in user mode and has a speedy, zero configuration installation and short list of pre-requisites.

Performance Analysis Tools

- **Express with Tools** (with LocalDB includes the database engine and SQL Server Management Studio Express).
- **SQL Server Management Studio Express** (Tools only) does not include the database, but only the tools to manage SQL Server instances, including LocalDB, SQL Express, SQL Azure, etc.

Performance Analysis Tools

- **Express with Advanced Services** (contains the database engine, Express Tools, Reporting Services, and Full Text Search) package includes all the elements of SQL Express .

DATABASE BACKUP

The Need for Database Backup

- ❖ Backup regularly as a protective measure.
- ❖ Use SQL, DBMS tools, or full system backups.

Log Files & Checkpointing

- Log File: is a special file that keeps track of database transactions. It contains information about all updates to the database. Tracks all transactions.
- Checkpointing: Syncs Database with transaction logs.

Why Recovery is Important

Some causes of failures are as follows:

- System crashes
- Media failures
- Application Software errors
- Natural physical disasters
- Carelessness
- Sabotage.

RECOVERY TECHNIQUES

- A **backup mechanism** – which makes periodic backup copies of the database.
- A **logging facilities** – which keep track of the current state of transactions and database changes.
- A **checkpoint facility** – which enables updates to the database that are in progress to be made permanent.
- A **recovery manager** – which allows the system to restore the database to a consistent state following a failure.

DEFERRED VS IMMEDIATE UPDATE

- In the **deferred update protocol**, the updates are not written to the database until after a transaction has reached its commit point. Update database only after commit.
- In the **immediate update protocol**, the updates are applied to the database as they occur without waiting to reach the commit point. Update Database as actions occur.

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