What are SQL Stored Procedures?

SQL Stored Procedures are a collection of SQL statements bundled together to perform a specific task.
These processes can be reached by users, applications, or other processes and are stored in the database.

Benefits of Using SQL Stored Procedures

1. **Better Performance:** Because stored procedures are precompiled, they run more quickly than running several separate queries.

2. **Enhanced Security:** Permission to run stored procedures without direct access to the underlying tables can be given to users.

3. **Code Reusability:** Code can be updated and maintained more easily thanks to stored procedures.

4. **Decreased Network Traffic:** Stored procedures enhance application performance and lessen network load by combining several SQL statements into a single call.

5. **Improved Error Handling:** Using TRY...CATCH blocks, SQL stored procedures offer an organized method of handling errors.

Types of SQL Stored Procedures

1. System Stored Procedures

The SQL Server offers these predefined stored procedures for handling administrative duties like system configuration, database management, and troubleshooting.
Among the examples are:

- To view database object information, use **sp_help**.
- To rename database objects, use **sp_rename**.

2. User-Defined Stored Procedures (UDPs) These are user-created custom stored procedures that carry out particular tasks like processing orders, creating reports, or calculating totals, user-defined stored procedures can be customized to meet the needs of a company.

3. Extended Procedures Stored

These make it possible to run external functions, which could be written in C or C++ or another language. In order to integrate third-party tools into SQL Server.

4. Stored Procedures in CLR

These are SQL Server-based stored procedures that are written in.NET languages, such as C#. When complex functionality is required that is difficult to implement with T-SQL alone, such as interacting with external APIs or complex string manipulation, CLR stored procedures can be helpful.

Why Use SQL Stored Procedures?

- Performance Optimization
- Security and Data Access Control
- Code Reusability and Maintainability
- Reduced Network Traffic
- Maintainability

Real-Life Use Cases for SQL Stored Procedures

1. **System for Processing Orders**

A stored procedure can automate the creation of invoices, updating stock levels, and adding new orders in an e-commerce application.

2. **System for Employee Management**

Employee salaries, tax deductions, and the creation of monthly salary slips can all be done using a stored procedure.

3. **Validation of Data**

Before data is entered into the database, it should be verified using stored procedures. For instance, before adding a new user, make sure the email address already exists.

4. **Logs of Audits**

For security and auditing reasons, create a stored procedure that automatically records modifications to sensitive data, such as adjustments to user roles or permissions.