Topic 7: Stored Procedure

Faculty of
Computer Science
& Mathematics

Learning Outcomes

- Define stored procedures

- Explain syntax and structure

- Compare with normal SQL queries

- Describe advantages and disadvantages

What is a Stored Procedure?

A precompiled block of SQL code stored inside the database.

Executed by calling its name — similar to a function in programming.

Example

```
CREATE PROCEDURE GetAllStudents()
BEGIN
SELECT * FROM Students;
END;
CALL GetAllStudents();
```

Why Use Stored Procedures?

- Reduce repetition of SQL code

- Improve performance through precompilation

- Enhance security and consistency

Basic Syntax

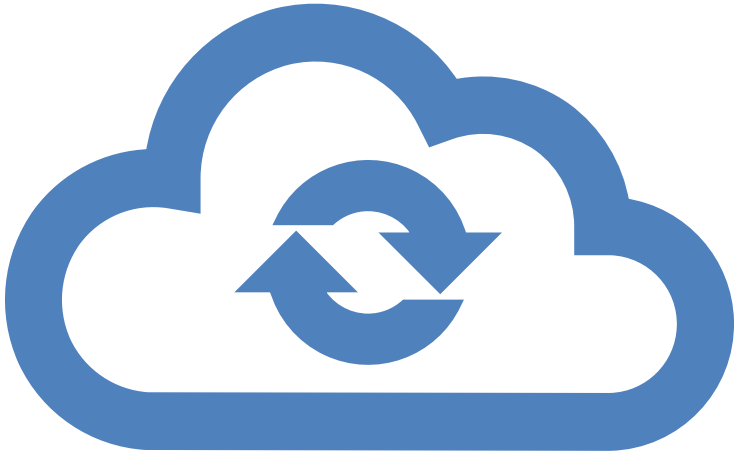
```
CREATE PROCEDURE
procedure_name()

BEGIN

SQL statements;

END;
```

Procedure with Parameters

```
CREATE PROCEDURE GetStudentByID(IN studID INT)

BEGIN

SELECT * FROM Students WHERE ID = studID;

END;
```

Parameter Types

- • IN – Input parameter (default)
- • OUT – Output parameter (returns value)
- • INOUT – Used for both input and output



Example: Output Parameter

```
CREATE PROCEDURE CountStudents(OUT total INT)

BEGIN

SELECT COUNT(*) INTO total FROM Students;

END;

CALL CountStudents(@total); SELECT @total;
```

Types of Stored Procedures

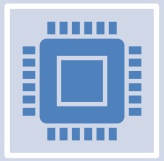
- System Stored Procedures – Built-in by DBMS (sp_help, sp_who)
- User-Defined Procedures – Created by users for custom logic
- Temporary Procedures – Exist only for current session
- Recursive Procedures – Call themselves repeatedly
- Parameterized Procedures – Use input parameters

Comparison: SQL vs Stored Procedure

SQL Query: Written and executed manually each time

Stored Procedure: Saved and reused by calling its name

Feature Comparison



Reusability: SQL (Low) vs Stored Procedure (High)

Speed: SQL (Parsed each time) vs Stored Procedure (Precompiled)

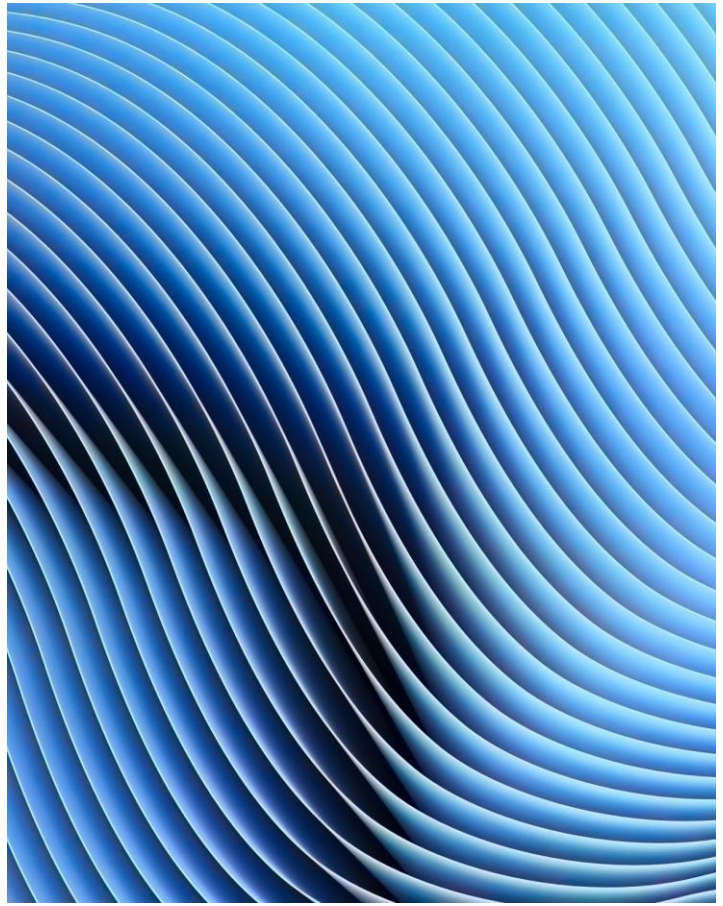
Security: SQL (Direct table access) vs Stored Procedure (Controlled)

Uses of Stored Procedures

- Automate repetitive tasks (reports, updates)
- Enforce business rules
- Validate data before insertion
- Secure data access
- Handle transactions safely

Example: Insert Operation

```
CREATE PROCEDURE AddStudent(IN name VARCHAR(50), IN age INT)
BEGIN

INSERT INTO Students(Name, Age)
VALUES(name, age);

END;
```

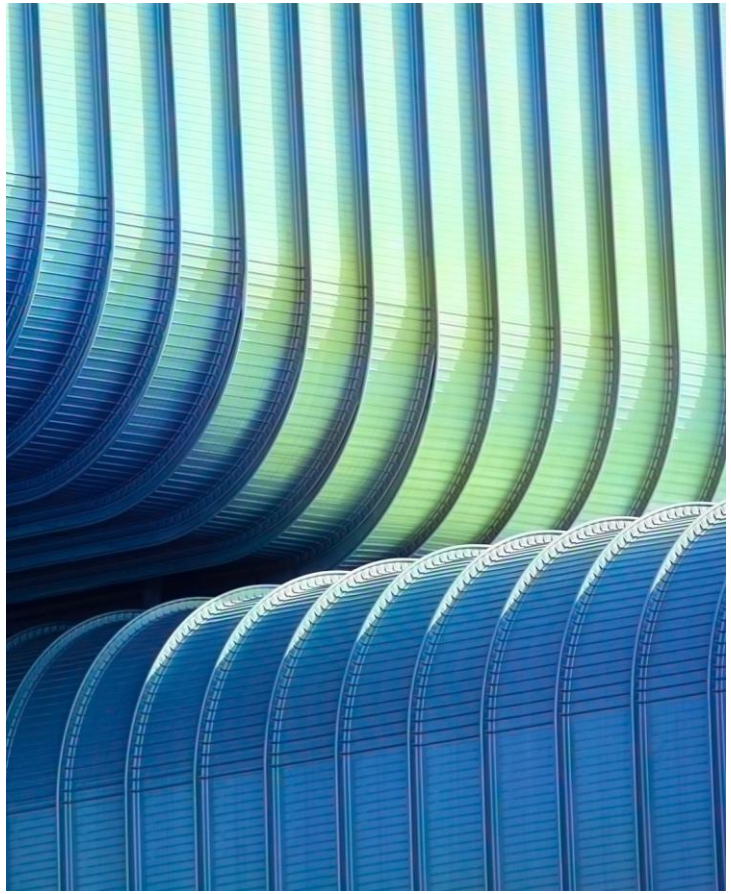


- CREATE PROCEDURE UpdateMark(IN id INT, IN mark INT)
- BEGIN
- UPDATE Results SET Mark = mark WHERE StudentID = id;
- END;

Example: Update Operation

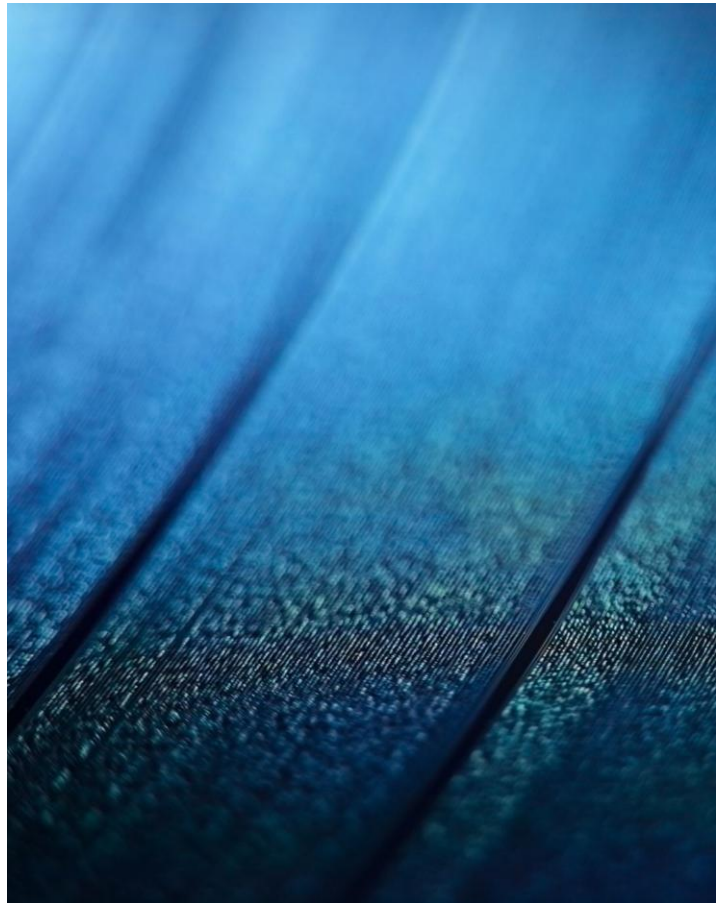
Advantages

- Code reusability and modularity
- Faster execution (compiled once)
- Enhanced data security
- Centralized business logic
- Reduced network traffic



Disadvantages

- Harder to debug compared to app code
- Limited portability across DBMSs
- Harder to manage version control
- Can increase server load if overused



Summary

Stored procedures are reusable, precompiled SQL blocks.

They improve performance, security, and maintainability.

Best used for repetitive or sensitive database tasks.

Practice Questions

1

1. Define a stored procedure in your own words.

2

2. Write a stored procedure to update student GPA.

3

3. List two advantages and one disadvantage.