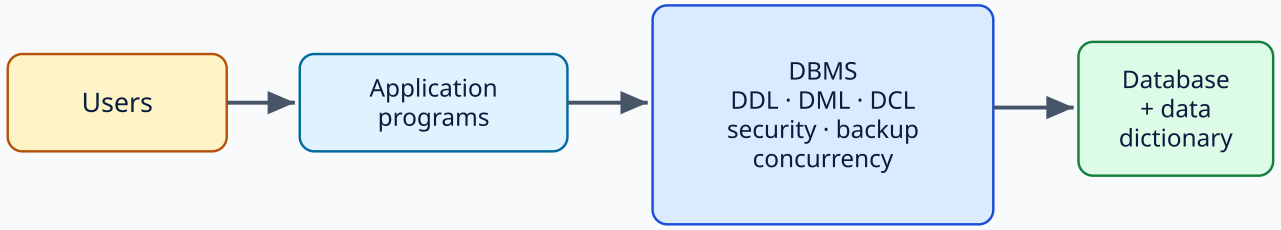
Grade 13 A/L ICT · Lesson 8

8.3 DBMS and SQL: DDL and DML

Syllabus 8.3. A **Database Management System (DBMS)** is the software between users and the stored data. We talk to it with **SQL**. **DDL** (CREATE, ALTER, DROP) defines the structure; **DML** (INSERT, SELECT, UPDATE, DELETE) works with the data, including queries on one table and **inner joins** on several tables.

1. Components of a database system

Database system: users → applications → DBMS → database



DDL: CREATE, ALTER, DROP – define structure

DML: INSERT, SELECT, UPDATE, DELETE – work with data

DBA controls the DBMS; SQL is the language for both

Users, applications, DBMS and database

- **Hardware** and **software** (the DBMS, e.g. MySQL).
- **Data** and the **data dictionary** (metadata).
- **Users**: end users, programmers and the **database administrator (DBA)**.
- **Procedures**: rules for backup, security and access.

2. SQL and its classification

Group	Purpose	Commands
DDL	Define structure	CREATE, ALTER, DROP
DML	Work with data	INSERT, SELECT, UPDATE, DELETE
DCL	Control access	GRANT, REVOKE

3. DDL: creating and changing structure

DDL commands (SQL)

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```
CREATE DATABASE SchoolDB;
USE SchoolDB;
-- add and remove a column
ALTER TABLE Student ADD Phone VARCHAR(10);
ALTER TABLE Student DROP COLUMN Phone;
-- add and remove keys (MySQL style)
ALTER TABLE Student ADD PRIMARY KEY (StudentID);
ALTER TABLE Student ADD CONSTRAINT fk_class
  FOREIGN KEY (ClassID) REFERENCES Class(ClassID);
ALTER TABLE Student DROP FOREIGN KEY fk_class;
ALTER TABLE Student DROP PRIMARY KEY;
-- remove objects
DROP TABLE Marks;
DROP DATABASE SchoolDB;
```

When we added Phone in sqlite3 the Student columns became **StudentID, Name, ClassID, Phone**; after DROP COLUMN they were **StudentID, Name, ClassID**; after DROP TABLE Marks the tables left were **Class, Student**.

4. DML: inserting, updating and deleting

DML commands (SQL)

```
INSERT INTO Student (StudentID, Name, ClassID) VALUES ('S006', 'Dilini', 'C12B');
UPDATE Marks SET Mark = Mark + 5 WHERE SubjectCode = 'ICT' AND Mark < 50;
DELETE FROM Marks WHERE SubjectCode = 'MATH' AND Mark < 60;
```

🧱 **Worked example: How many rows does each statement change on the sample data?**
INSERT adds **1** row (students now 6). UPDATE changes **2** rows (S002 45→50, S005 39→44). DELETE removes **1** row (S003 MATH 55), leaving **7** mark rows.

5. SELECT queries

Single-table queries

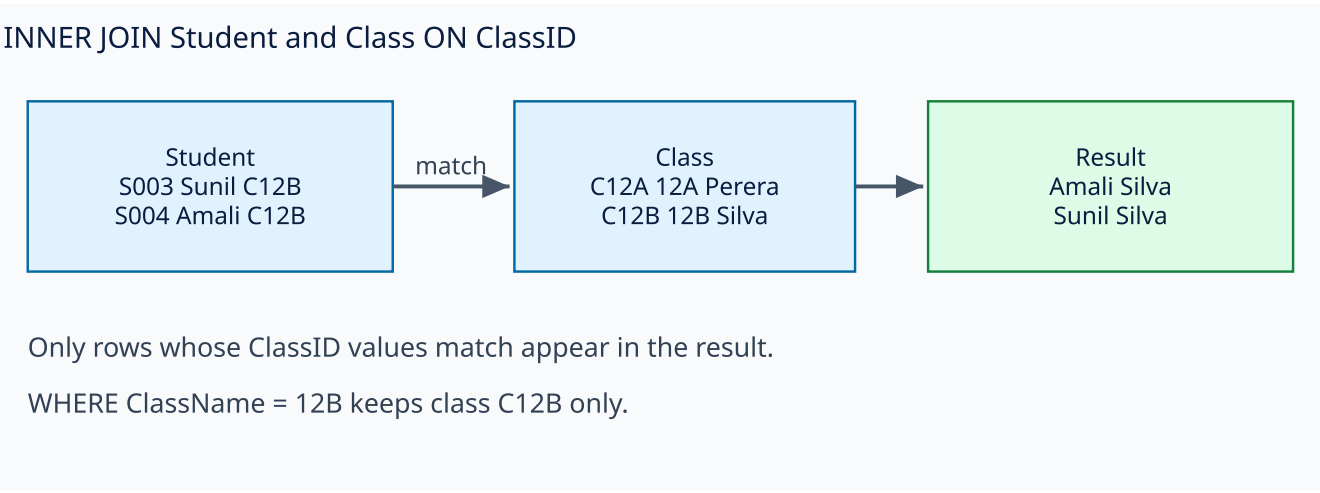
```
SELECT Name FROM Student WHERE ClassID = 'C12A' ORDER BY Name;

SELECT AVG(Mark) FROM Marks WHERE SubjectCode = 'ICT';

SELECT ClassID, COUNT(*) FROM Student GROUP BY ClassID ORDER BY ClassID;
```

Query	Result
Students in C12A (by name)	Kamala; Nimal; Ruwan
Average ICT mark	62.4
Students per class	C12A, 3; C12B, 2

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Inner join of Student and Class

Inner join queries

```
SELECT Student.Name, Class.Teacher
FROM Student INNER JOIN Class
  ON Student.ClassID = Class.ClassID
WHERE Class.ClassName = '12B'
ORDER BY Student.Name;

SELECT Student.Name, Marks.Mark
FROM Student INNER JOIN Marks
  ON Student.StudentID = Marks.StudentID
WHERE Marks.SubjectCode = 'ICT' AND Marks.Mark >= 60
ORDER BY Marks.Mark DESC;
```

Query 1: Name	Teacher
Amali	Silva
Sunil	Silva

Query 2: Name	ICT mark
Sunil	88
Nimal	78
Amali	62

💡 Always write the join condition (ON …); without it every row joins every row.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 many DBMSs accept natural-language questions and turn them into SQL, but you must still check the generated query.

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Key Words

DBMS – Software that creates, manages and controls access to a database.

SQL – Standard language for defining and querying relational databases.

DDL – SQL commands that define database structure.

DML – SQL commands that insert, read, change and delete data.

DCL – SQL commands that grant or revoke access.

CREATE TABLE – Command that makes a new table with columns and types.

ALTER TABLE – Command that changes the structure of an existing table.

DROP TABLE – Command that deletes a whole table and its data.

SELECT – Command that retrieves rows and columns.

INNER JOIN – Combines rows of two tables where key values match.

UPDATE – Command that changes values in existing rows.

Database administrator – Person who manages security, backup and performance of a database.

Sample Q&A

1. List four components of a database system.

> **Answer:** Hardware, software (DBMS), data, users (and procedures).

2. Distinguish DDL and DML.

> **Answer:** DDL defines structure (CREATE/ALTER/DROP); DML handles data (INSERT/SELECT/UPDATE/DELETE).

3. Write SQL to add a Phone column to Student.

> **Answer:** ALTER TABLE Student ADD Phone VARCHAR(10);

4. What does the C12A query return?

> **Answer:** Kamala; Nimal; Ruwan.

5. What is the average ICT mark?

> **Answer:** 62.4.

6. Who are the 12B students and their teacher?

> **Answer:** Amali and Sunil; teacher Silva.

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MCQ

1. CREATE, ALTER and DROP belong to

A. DCL
B. DDL
C. HTML
D. TCL
E. DML

2. INSERT, UPDATE and DELETE belong to

A. CSS
B. XML
C. DML
D. DDL
E. DCL

3. The command that removes a whole table is

A. DELETE FROM
B. ALTER TABLE
C. REMOVE ROW
D. DROP TABLE
E. TRUNCATE COLUMN

4. Rows changed by the UPDATE (+5 to ICT marks under 50) are

A. 8
B. 2
C. 0
D. 3
E. 5

5. The average ICT mark of the sample data is

A. 78.0
B. 62.0
C. 60.0
D. 64.5
E. 62.4

6. The 12B join query returns

A. Amali Perera; Ruwan Silva
B. Nimal Perera; Kamala Perera
C. no rows
D. Sunil Perera
E. Amali Silva; Sunil Silva

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7. ICT marks of 60 or more, highest first, are

A. Sunil 88, Nimal 78, Amali 62
B. Kamala 45, Ruwan 39
C. Nimal 78, Sunil 88
D. Sunil 88 only
E. Amali 62, Sunil 88, Nimal 78

8. Who controls security and backup of a database?

A. web designer
B. end user
C. database administrator
D. compiler
E. network cable

9. Which term means: “Software that creates, manages and controls access to a database”?

A. DBMS
B. CREATE TABLE
C. UPDATE
D. DDL
E. DROP TABLE

10. Which term means: “Standard language for defining and querying relational databases”?

A. Database administrator
B. SQL
C. DML
D. ALTER TABLE
E. SELECT

11. Which term means: “SQL commands that define database structure”?

A. DDL
B. DBMS
C. DROP TABLE
D. DCL
E. INNER JOIN

12. Which term means: “SQL commands that insert, read, change and delete data”?

A. SQL
B. UPDATE
C. SELECT
D. CREATE TABLE
E. DML

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13. Which term means: “SQL commands that grant or revoke access”?

A. DDL
B. ALTER TABLE
C. INNER JOIN
D. DCL
E. Database administrator

14. Which term means: “Command that makes a new table with columns and types”?

A. DML
B. DBMS
C. DROP TABLE
D. CREATE TABLE
E. UPDATE

15. Which term means: “Command that changes the structure of an existing table”?

A. SELECT
B. SQL
C. ALTER TABLE
D. DCL
E. Database administrator

16. Which term means: “Command that deletes a whole table and its data”?

A. DROP TABLE
B. INNER JOIN
C. CREATE TABLE
D. DDL
E. DBMS

17. Which term means: “Command that retrieves rows and columns”?

A. SQL
B. UPDATE
C. SELECT
D. ALTER TABLE
E. DML

18. Which term means: “Combines rows of two tables where key values match”?

A. Database administrator
B. DCL
C. DDL
D. INNER JOIN
E. DROP TABLE

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19. Which term means: “Command that changes values in existing rows”?

A. DBMS
B. UPDATE
C. SELECT
D. DML
E. CREATE TABLE

20. Which term means: “Person who manages security, backup and performance of a database”?

A. INNER JOIN
B. ALTER TABLE
C. SQL
D. DCL
E. Database administrator

Structured Questions

1. Describe the components of a database system. *(5 marks)*

> Hardware; DBMS; data and dictionary; users and DBA; procedures.

2. Write SQL to create database SchoolDB and table Class with a primary key. *(2 marks)*

> CREATE DATABASE SchoolDB; CREATE TABLE Class (ClassID CHAR(4) PRIMARY KEY, ClassName VARCHAR(10) NOT NULL, Teacher VARCHAR(30)).

3. Write SQL to add then remove a foreign key on Student.ClassID. *(2 marks)*

> ALTER TABLE ADD CONSTRAINT fk_class FOREIGN KEY REFERENCES Class; ALTER TABLE DROP FOREIGN KEY fk_class.

4. Write SQL to add 5 marks to ICT marks below 50 and state rows changed. *(2 marks)*

> UPDATE Marks SET Mark = Mark + 5 WHERE SubjectCode = ICT AND Mark < 50; 2 rows.

5. Write an inner join listing each 12B student with the teacher, and give the output. *(4 marks)*

> SELECT Name, Teacher; FROM Student INNER JOIN Class ON ClassID; WHERE ClassName = 12B; Amali Silva, Sunil Silva.

Summary

- A DBMS sits between users and stored data.
- DDL = CREATE, ALTER, DROP.
- DML = INSERT, SELECT, UPDATE, DELETE.

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- WHERE filters rows; ORDER BY sorts; GROUP BY groups.
- INNER JOIN combines tables on matching keys.

MCQ answer key – 8.3

1. **B** – DDL.
2. **C** – DML.
3. **D** – DROP.
4. **B** – S002, S005.
5. **E** – 312 ÷ 5.
6. **E** – Matching ClassID.
7. **A** – ORDER BY DESC.
8. **C** – DBA.
9. **A** – DBMS – Software that creates, manages and controls access to a database.
10. **B** – SQL – Standard language for defining and querying relational databases.
11. **A** – DDL – SQL commands that define database structure.
12. **E** – DML – SQL commands that insert, read, change and delete data.
13. **D** – DCL – SQL commands that grant or revoke access.
14. **D** – CREATE TABLE – Command that makes a new table with columns and types.
15. **C** – ALTER TABLE – Command that changes the structure of an existing table.
16. **A** – DROP TABLE – Command that deletes a whole table and its data.
17. **C** – SELECT – Command that retrieves rows and columns.
18. **D** – INNER JOIN – Combines rows of two tables where key values match.
19. **B** – UPDATE – Command that changes values in existing rows.
20. **E** – Database administrator – Person who manages security, backup and performance of a database.

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