Database II Lab/ 3rd Grade

[Second Semester] and [2026]

[Lab 2]

[10/2/2026] [8.30 + 10.30 AM]

Instructor Information

Instructor	Email	Hours
Dr. Rasool Hisham Dr. Zainab Namh Dr. Azhar Flaih Assist. Prof. Zahraa Jaaz	[rasool.hisham@nahrainuniv.edu.iq]	[2 Hrs]

DDL SQL Statements

This lab focuses on reviewing Data Definition Language (DDL) SQL statements.

By the end of the lab, students will be able to:

- Use **DDL commands** to create, modify, and delete database structures.
- Apply and manage **constraints** such as **PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE, and CHECK**.

SQL commands are essential for managing databases effectively. These commands are divided into categories such as Data Definition Language (**DDL**), Data Manipulation Language (**DML**) and Data Control Language (**DCL**).

DDL (Data Definition Language) consists of SQL commands used to define, modify, and manage the structure of database objects (like tables, indexes, and databases).

Syntax of Common DDL Commands

Command	Description	Extended Syntax Example
CREATE	Used to establish a new database or its objects (tables, indexes).	CREATE TABLE table_name (column1 data_type constraints, column2 data_type, ...);
ALTER	Modifies the structure of an existing database object, such as adding or deleting columns.	ALTER TABLE table_name ADD COLUMN column_name data_type;
DROP	Completely removes an object (and all its data) from the database.	DROP TABLE table_name;
TRUNCATE	Removes all records from a table, but keeps the table structure intact for future use.	TRUNCATE TABLE table_name;
RENAME	Used to change the name of an existing database object.	ALTER TABLE old_name RENAME TO new_name;

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DDL - CREATE

1. Create a Database

This command creates a new database.

CREATE DATABASE database_name;

Example:

```
CREATE DATABASE company_db;
```

2. Create a Table with constraints (NOT NULL, UNIQUE, CHECK, PRIMARY KEY, FOREIGN KEY)

Primary Key Constraint:

CREATE TABLE parent_table (
parent_id datatype PRIMARY KEY, column2 datatype);

Foreign Key Constraint:

CREATE TABLE child_table (
child_id datatype PRIMARY KEY,
child_parent_id datatype,
CONSTRAINT fk_constraint_name FOREIGN KEY (child_parent _id) REFERENCES parent_table(parent_id);

Example: Parent Table Department

```
CREATE TABLE department (
  DNo INT AUTO_INCREMENT PRIMARY KEY,
  DName VARCHAR(45) NOT NULL UNIQUE,
  MgrID INT,
  MgrStartDate DATE,
  CONSTRAINT chk_mgr_date CHECK (MgrStartDate > '1990-01-01')   );
```

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Constraints used

PRIMARY KEY → unique department number

NOT NULL → department name is required

UNIQUE → no duplicate department names

CHECK → manager start date must be after 1990-1-1

Child Table – Employee

```
CREATE TABLE employee (
  EmpID INT AUTO_INCREMENT PRIMARY KEY,
  FN VARCHAR(30) NOT NULL,
  LN VARCHAR(30) NOT NULL,
  DoB DATE,
  Address VARCHAR(45),
  Gender VARCHAR(6),
  DNo INT,
  Salary INT,
  CONSTRAINT chk_salary CHECK (Salary >= 0),
  CONSTRAINT fk_emp_dno FOREIGN KEY (DNo) REFERENCES
department(DNo)  );
```

Employee belongs to a department through a Foreign Key.

3. Create an Index

This command creates an index to improve the speed of queries.

```
CREATE INDEX index_name
ON table_name (column_name);
```

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Example:

```
CREATE INDEX idx_dep_dname
ON Department (DName);
```

```
CREATE INDEX idx_emp_empname
ON Employee (LN, FN);
```

DDL - DROP

1. Drop a Table

This command deletes the table and all its data.

```
DROP TABLE table_name;
```

2. Drop a Database

This command removes an entire database and all its tables.

```
DROP DATABASE database_name;
```

3. Drop an Index

This removes an index from a table.

```
DROP INDEX index_name ON table_name;
```

Example:

```
DROP TABLE employee;
DROP DATABASE company_db;
DROP INDEX idx_dep_dname ON Department;
```

DDL - ALTER

1. Add Column

```
ALTER TABLE table_name ADD column_name datatype;
```

Example:

```
ALTER TABLE employee
ADD Email VARCHAR(50) UNIQUE;
```

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2. Modify a Column's Data Type

This command modifies the data type of an existing column.

```
ALTER TABLE table_name
MODIFY column_name new_column_data_type;
```

Example:

```
ALTER TABLE employee
MODIFY Salary DECIMAL(10,2);
```

3. Rename a Column

This command renames an existing column.

MySQL 8.0+

```
ALTER TABLE table_name
RENAME COLUMN old_column_name TO new_column_name;
```

Example:

```
ALTER TABLE employee
RENAME COLUMN FN TO Fname;
```

MySQL 5.7

```
ALTER TABLE table_name
CHANGE COLUMN old_column_name new_column_name new_column_data_type;
```

Example:

```
ALTER TABLE employee
CHANGE COLUMN FN Fname VARCHAR(30);
```

4. Drop a Column from a Table

This command deletes a column from a table.

```
ALTER TABLE table_name DROP COLUMN column_name;
```

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Example:

```
ALTER TABLE employee
DROP COLUMN Address;
```

5. Rename a Table

This command renames an existing table.

ALTER TABLE old_table_name RENAME TO new_table_name;

Example:

```
ALTER TABLE employee
RENAME TO staff;
```

6. Add a Constraint

After a table is already created, you can **add constraints** such as **PRIMARY KEY, FOREIGN KEY, and CHECK** using ALTER TABLE.

- **ADD PRIMARY KEY if Missing**

ALTER TABLE table_name
ADD CONSTRAINT PRIMARY KEY (column_name);

Example:

```
ALTER TABLE employee
ADD CONSTRAINT pk_emp PRIMARY KEY (EmpID);
```

- **Add Foreign Key Constraint**

ALTER TABLE child_table
ADD CONSTRAINT fk_constraint_name FOREIGN KEY (child_column)
REFERENCES parent_table(parent_column);

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Example:

```
ALTER TABLE department
ADD CONSTRAINT fk_mgr
FOREIGN KEY (MgrID) REFERENCES employee(EmpID);
```

- **Add CHECK Constraint**

```
ALTER TABLE table_name
ADD CONSTRAINT constraint_name
CHECK (condition);
```

Example:

```
ALTER TABLE employee
ADD CONSTRAINT chk_gender
CHECK (Gender IN ('Male','Female'));
```

7. Drop a Constraint

```
ALTER TABLE table_name
DROP CONSTRAINT constraint_name;
```

Example:

```
ALTER TABLE employee
DROP CONSTRAINT chk_gender;
```