

# What is Schema and Databases

Definitions, Importance, and Step-by-step MySQL CMD Guide (Up to Creating Tables)

## 1. Introduction

This document explains what a database and a database schema are, why schemas are important, and shows step-by-step commands to create a database and tables in MySQL using the Command Prompt (CMD).

## 2. What is a Database?

A database is a structured collection of data stored electronically. It allows you to store, retrieve, modify, and manage data efficiently. Databases can be relational (RDBMS like MySQL, PostgreSQL) or non-relational (NoSQL like MongoDB).

## 3. What is a Database Schema?

A database schema is the blueprint or structure of a database. It defines how data is organized and how tables relate to each other. Elements of a schema include:

- Tables (e.g., Students, Orders)
- Columns (fields like Name, Age, Price)
- Data types (INT, VARCHAR, DATE, etc.)
- Constraints (PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE)
- Relationships between tables (one-to-one, one-to-many, many-to-many).

Analogy: the schema is like a house plan, while the actual data is the furniture inside the house.

## 4. Why is Schema Important?

- Organizes data: gives a clear structure for storing information.
- Reduces redundancy: normalization avoids duplicating data.
- Enforces rules: constraints prevent incorrect or incomplete data.
- Supports relationships: links data across tables using keys.
- Makes queries easier: predictable shapes simplify SELECT/JOIN operations.
- Improves data integrity, security, and maintainability.
- Helps performance tuning: indexed fields and correct data types speed up queries.

## 5. Step-by-step: Create a Database Schema in MySQL using CMD (Up to Creating Tables)

Follow these steps in the Windows Command Prompt (CMD) to create a database and tables in MySQL.

Step 1: Open MySQL Command Line

1. Open Command Prompt (cmd).
2. Connect to MySQL server using your username (usually 'root'):

## SQL Commands (copy-paste into MySQL CLI)

***Login command***

```
mysql -u root -p
```

### **Create a database**

```
CREATE DATABASE school_db;
```

### **Show databases (verify)**

```
SHOW DATABASES;
```

### **Select (use) the database**

```
USE school_db;
```

### **Create Tables (example: Students and Courses)**

```
CREATE TABLE Students (  
    StudentID INT PRIMARY KEY,  
    Name VARCHAR(50) NOT NULL,  
    Age INT,  
    CourseID INT  
);  
  
CREATE TABLE Courses (  
    CourseID INT PRIMARY KEY,  
    CourseName VARCHAR(100) NOT NULL  
);
```

### **Add foreign key relationship (option 1: ALTER TABLE)**

```
ALTER TABLE Students  
ADD CONSTRAINT fk_course  
FOREIGN KEY (CourseID) REFERENCES Courses(CourseID);
```

### **Verify tables and structure**

```
SHOW TABLES;  
DESCRIBE Students;  
DESCRIBE Courses;
```

### **Basic test query (no data yet)**

```
SELECT * FROM Students;  
SELECT * FROM Courses;
```