

# MySQL Data Types and Constraints

## ☒ 1. Numeric Data Types

Data Type	Description	Example
INT	Integer number	empno INT
DECIMAL(p,s)	Fixed-point number (p=precision, s=scale)	sal DECIMAL(10,2)
FLOAT / DOUBLE	Floating-point number	marks FLOAT
TINYINT	Small integers (-128 to 127)	status TINYINT

## ☒ 2. String (Character) Data Types

Data Type	Description	Example
CHAR(n)	Fixed-length string	gender CHAR(1)
VARCHAR(n)	Variable-length string	ename VARCHAR(50)
TEXT	Large text	description TEXT

## ☒ 3. Date & Time Data Types

Data Type	Description	Example
DATE	'YYYY-MM-DD'	hire_date DATE
DATETIME	'YYYY-MM-DD HH:MM:SS'	created_at DATETIME
TIMESTAMP	Similar to DATETIME with auto-updates	last_updated TIMESTAMP

# MySQL Constraints with Examples

Constraints help control the type of data allowed in the table.

Constraint	Description	Example
PRIMARY KEY	Uniquely identifies each row	empno INT PRIMARY KEY
NOT NULL	Ensures the column cannot be NULL	ename VARCHAR(50) NOT NULL
UNIQUE	Ensures unique values in a column	email VARCHAR(100) UNIQUE

Constraint	Description	Example
<b>CHECK</b>	Restricts values based on a condition	<code>CHECK (sal &gt; 0)</code>
<b>DEFAULT</b>	Sets a default value if none is provided	<code>status TINYINT DEFAULT 1</code>
<b>AUTO_INCREMENT</b>	Auto-increments integer values (Primary Keys)	<code>empno INT AUTO_INCREMENT PRIMARY KEY</code>
<b>FOREIGN KEY</b>	Creates a relationship between tables	<code>deptno INT, FOREIGN KEY (deptno) REFERENCES department(deptno)</code>

## ☒ Example: Employee Table with Data Types & Constraints

```
CREATE TABLE employee (  
  empno INT PRIMARY KEY AUTO_INCREMENT,  
  ename VARCHAR(50) NOT NULL,  
  job VARCHAR(50),  
  sal DECIMAL(10,2) CHECK (sal > 0),  
  deptno INT,  
  status TINYINT DEFAULT 1,  
  hire_date DATE,  
  FOREIGN KEY (deptno) REFERENCES department(deptno)  
);
```



## Quick Notes:

- ☒ Use `AUTO_INCREMENT` for unique IDs.
- ☒ `CHECK` is supported in MySQL 8.0+, earlier versions ignore it.
- ☒ Use `FOREIGN KEY` to maintain relationships (e.g., Employee belongs to Department).
- ☒ `DEFAULT` is useful for status flags or created timestamps.



## \*Working with `ALTER` in MySQL

- ☒ `ALTER TABLE` is used to:
  - Add a new column
  - Modify an existing column
  - Rename a column or table
  - Delete (drop) a column
  - Add or drop constraints

## ☒ 1. Add a Column

```
ALTER TABLE employee  
ADD COLUMN age INT;
```

🔗 Adds a new column `age` of type `INT` to the `employee` table.

---

## ✓ 2. Modify/Change a Column (Data Type or Size)

```
ALTER TABLE employee  
MODIFY COLUMN ename VARCHAR(100);
```

🔗 Changes the `ename` column's data type to `VARCHAR(100)`.

### Change Column Name and Type (Using `CHANGE`)

```
ALTER TABLE employee  
CHANGE COLUMN job job_title VARCHAR(50);
```

🔗 Renames `job` to `job_title` and changes its data type.

---

## ✓ 3. Drop (Delete) a Column

```
ALTER TABLE employee  
DROP COLUMN age;
```

🔗 Removes the `age` column from the `employee` table.

---

## ✓ 4. Rename the Table

```
ALTER TABLE employee  
RENAME TO emp_master;
```

🔗 Changes the table name from `employee` to `emp_master`.

---

## ✓ 5. Add a Constraint (Example: UNIQUE)

```
ALTER TABLE employee  
ADD CONSTRAINT unique_empno UNIQUE (empno);
```

🔗 Adds a unique constraint on the **empno** column.

---

## ✓ 6. Drop a Constraint

(For MySQL 8.0+, you need the constraint name)

```
ALTER TABLE employee
DROP INDEX unique_empno;
```

🔗 Drops the **UNIQUE** constraint.

---

## ✓ 7. Add Foreign Key

```
ALTER TABLE employee
ADD CONSTRAINT fk_dept
FOREIGN KEY (deptno) REFERENCES department(deptno);
```

---

## 📄 Quick Reference - Common ALTER Commands

Task	Command Example
Add Column	<code>ADD COLUMN col_name datatype;</code>
Modify Column	<code>MODIFY COLUMN col_name datatype;</code>
Change Column Name/Type	<code>CHANGE COLUMN old_name new_name datatype;</code>
Drop Column	<code>DROP COLUMN col_name;</code>
Rename Table	<code>RENAME TO new_table_name;</code>
Add Constraint	<code>ADD CONSTRAINT constraint_name ...;</code>
Drop Constraint	<code>DROP INDEX constraint_name;</code>

---