DATA TYPES & CONSTRAINTS

What is Data Type ?

In MySQL, as in most relational database management systems (RDBMS), various data types are available to define the type of data that can be stored in a column. Here are some common data types in MySQL:

1. **Numeric Types:**
    - **INT** or **INTEGER**: Integer type (whole numbers).
    - **TINYINT**: Very small integer.
    - **SMALLINT**: Small integer.
    - **MEDIUMINT**: Medium-sized integer.
    - **BIGINT**: Large integer.
    - **FLOAT**: Single-precision floating-point number.
    - **DOUBLE** or **REAL**: Double-precision floating-point number.
    - **DECIMAL** or **NUMERIC**: Fixed-point decimal.

Example:

sqlCopy code

```
CREATE TABLE example_table ( id INT, price DECIMAL(10, 2) );
```

2. **String Types:**
    - **CHAR**: Fixed-length character string.
    - **VARCHAR**: Variable-length character string.
    - **TEXT**: Variable-length text.
    - **BINARY**: Fixed-length binary string.
    - **VARBINARY**: Variable-length binary string.
    - **BLOB**: Variable-length binary large object.

Example:

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CREATE TABLE example_table (name VARCHAR(255), description TEXT);

3. **Date and Time Types:**
    - **DATE**: Date value (YYYY-MM-DD).
    - **TIME**: Time value (HH:MM:SS).
    - **DATETIME**: Combination of date and time.
    - **TIMESTAMP**: Similar to **DATETIME** but automatically converts to the current timestamp.
    - **YEAR**: Year in two-digit or four-digit format.

Example:

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CREATE TABLE example_table (event_date DATE, event_time TIME, created_at TIMESTAMP);

4. **Boolean Type:**
    - **BOOLEAN** or **BOOL**: Boolean value (0 or 1).

Example:

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CREATE TABLE example_table (is_active BOOLEAN);

5. **Enumeration Type:**
    - **ENUM**: A string object with a predefined set of values.

Example:

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CREATE TABLE example_table (status ENUM('Active', 'Inactive', 'Pending'));

6. **Set Type:**
    - **SET**: A string object where each value must be chosen from a predefined set of values.

Example:

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```
CREATE TABLE example_table ( permissions SET('Read', 'Write', 'Execute') );
```

These are just some of the basic data types available in MySQL. Each data type has specific use cases, and it's important to choose the appropriate type based on the nature of the data you are storing. Additionally, MySQL supports various other data types and modifiers that can be explored in the official documentation.

What is contstraints?

In the context of databases, constraints are rules and limitations applied to the data in a table. They ensure that the data adheres to certain conditions, maintaining data integrity and consistency. Constraints help enforce business rules and prevent incorrect or inconsistent data from being stored in the database. Here are some common types of constraints:

1. **Primary Key Constraint:**
    - **Definition:** Ensures that each record in a table can be uniquely identified by a specific column or set of columns. It prevents duplicate and null values in the specified column(s).

Example:

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CREATE TABLE employees (employee_id INT PRIMARY KEY, employee_name VARCHAR(50), department_id INT);

2. **Foreign Key Constraint:**
    - **Definition:** Establishes a link between two tables by enforcing referential integrity. It ensures that values in a column (foreign key) of one table correspond to the values in another table (primary key or unique key).

Example:

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CREATE TABLE departments (department_id INT PRIMARY KEY, department_name VARCHAR(50)); CREATE TABLE employees (employee_id INT PRIMARY KEY, employee_name VARCHAR(50), department_id INT, FOREIGN KEY (department_id) REFERENCES departments(department_id));

3. **Unique Constraint:**
    - **Definition:** Ensures that values in a specified column or a group of columns are unique across the table. Unlike the primary key, a unique constraint allows null values.

Example:

sqlCopy code

```
CREATE TABLE users ( user_id INT PRIMARY KEY, username VARCHAR(50) UNIQUE, email VARCHAR(100) UNIQUE );
```

4. **Check Constraint:**
    - **Definition:** Specifies a condition that must be true for each row in a table. It restricts the range of allowed values for a column.

Example:

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```
CREATE TABLE orders ( order_id INT PRIMARY KEY, order_date DATE, total_amount DECIMAL(10, 2) CHECK (total_amount > 0) );
```

5. **Not Null Constraint:**
    - **Definition:** Ensures that a column does not contain null values.

Example:

sqlCopy code

```
CREATE TABLE customers ( customer_id INT PRIMARY KEY, customer_name VARCHAR(50) NOT NULL, email VARCHAR(100) NOT NULL );
```

6. **Default Constraint:**
    - **Definition:** Provides a default value for a column when no value is specified during an insert operation.

Example:

sqlCopy code

CREATE TABLE products (product_id INT PRIMARY KEY, product_name VARCHAR(50) NOT NULL, price DECIMAL(10, 2) DEFAULT 0.00);

These constraints collectively help ensure data accuracy, consistency, and reliability in a relational database. They are an essential part of database design and contribute to maintaining the quality of the data stored in tables.