# Discussion-3 manipulate data

**Discussion Topic:**

One of the most important functions of any relational database management system (RDBMS) is to support your ability to manipulate data.
To this end, you must be able to insert data in a table, modify that data, and then delete whatever data you no longer want to store.

What are some of the MySQL commands that can be used to perform these tasks?
Give an example of each command using an SQL statement and explain how each command works.
What are some of the hazards of using MySQL commands to update and delete data?

**My Post:**

Hello Class,

One of the core functions of a Relational Database Management System (RDBMS) is to allow users to manipulate data, such as inserting data into a table, modifying that data, and then deleting whatever data they no longer want to store. These RDBMS functions are handled by the Data Manipulation Language (DML), a subset of the Structured Query Language (SQL), and implementations of SQL like MySQL (Murach, 2019). Note that the Data Definition Language (DDL) is also a subset of SQL, which handles the definition or modification of the structure of database objects (schemas) like tables and indexes. In other words, DML is used to manipulate the data within schemas, and DDL is used to manipulate the schemas. This article focuses on the DML operations (INSERT, UPDATE, and DELETE) used to manipulate data within MySQL tables, providing examples.

**DML Operations**

The DML operations for modifying data in MySQL tables are handled by the statements (also referred to as commands): `INSERT`, `UPDATE`, and `DELETE`.

- The `INSERT` command adds new rows of data.
- The `UPDATE` command modifies data in existing rows.
- The `DELETE` command removes rows entirely.

Note that these commands manipulate rows, not columns. However, the command `SELECT` is used for querying and retrieving data from a table based on the table column (Watt & Eng, 2014).

These commands (`INSERT`, `UPDATE`, `DELETE`) are often used in combination with the `SELECT` command and the `WHERE` clause to manipulate data by querying the table columns and selecting rows based on a specific condition(s). Note that the `WHERE` clause is responsible for filtering rows, also called records, based on specific conditions (Kathuria, 2021).

**Data Manipulation Examples**

To illustrate the examples on how to use the `INSERT`, `UPDATE`, and `DELETE` commands, the following `products` table is going to be used.

**Figure 1**

*Products Table*

| product_id | category_id | product_code | product_name | description | list_price | discount_percent | date_added |
|---|---|---|---|---|---|---|---|
| 1 | 1 | strat | Fender Stratocaster | The Fender Stratocaster is the electric guitar de... | 699.00 | 30.00 | 2017-10-30 09:32:40 |
| 2 | 1 | les_paul | Gibson Les Paul | This Les Paul guitar offers a carved top and hu... | 1199.00 | 30.00 | 2017-12-05 16:33:13 |
| 3 | 1 | sg | Gibson SG | This Gibson SG electric guitar takes the best of t... | 2517.00 | 52.00 | 2018-02-04 11:04:31 |
| 4 | 1 | fg700s | Yamaha FG700S | The Yamaha FG700S solid top acoustic guitar ha... | 489.99 | 38.00 | 2018-06-01 11:12:59 |
| 5 | 1 | washburn | Washburn D10S | The Washburn D10S acoustic guitar is superbly ... | 299.00 | 0.00 | 2018-07-30 13:58:35 |
| 6 | 1 | rodriguez | Rodriguez Caballero 11 | Featuring a carefully chosen, solid Canadian ce... | 415.00 | 39.00 | 2018-07-30 14:12:41 |
| 7 | 2 | precision | Fender Precision | The Fender Precision bass guitar delivers the so... | 799.99 | 30.00 | 2018-06-01 11:29:35 |
| 8 | 2 | hofner | Hofner Icon | With authentic details inspired by the original, t... | 499.99 | 25.00 | 2018-07-30 14:18:33 |
| 9 | 3 | ludwig | Ludwig 5-piece Drum Set with Cymbals | This product includes a Ludwig 5-piece drum set... | 699.99 | 30.00 | 2018-07-30 12:46:40 |
| 10 | 3 | tama | Tama 5-Piece Drum Set with Cymbals | The Tama 5-piece Drum Set is the most afforda... | 799.99 | 15.00 | 2018-07-30 13:14:15 |

*Note:* The figure table illustrates a product table of various types of guitars.

**The INSERT Commands**

The `INSERT` command is used to insert rows/records (to store new data) in tables. Different syntax variations of the `INSERT` command exist in MySQL:

Using `VALUES`

```
INSERT INTO table_name
  (column1, column2, ...) -- the columns list
VALUES
  (value1a, value2a, ...), -- Values for the first row
  (value1b, value2b, ...), -- Values for the second row
  (value1c, value2c, ...), -- Values for the third row
  ...
  (value1n, value2n, ...); -- Values for the last row
```

Using `SET`

```
INSERT INTO table_name
SET column1 = value1,
    column2 = value2,
   ... ;
```

With the `SET` command, only one value can be inserted by column.

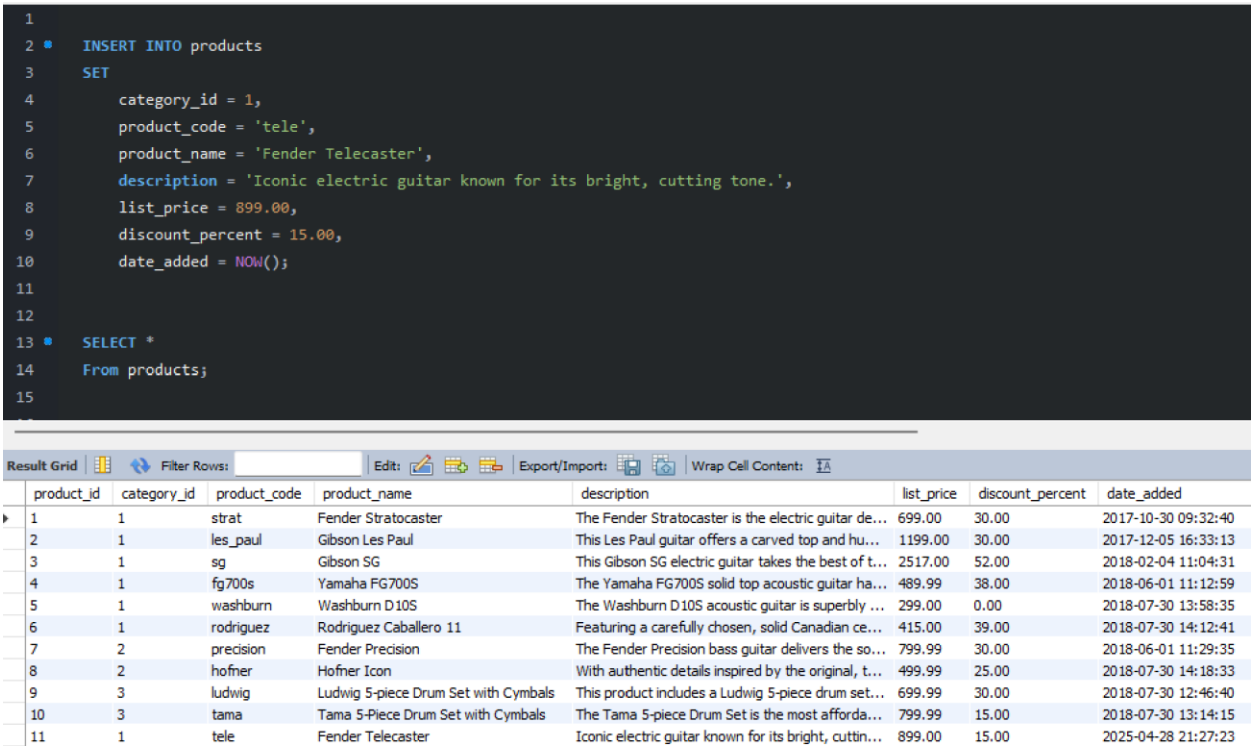
Using `SELECT`

```
INSERT INTO table_name (column1, column2,...)
SELECT source_column1, source_column2,...
FROM source_table
WHERE condition;
```

`Gere, SELECT` is used to insert columns from a source table column where a condition is met.

`INSERT` Example using the products table:

**Figure 2**
INSERT Example



```sql
INSERT INTO products
SET
    category_id = 1,
    product_code = 'tele',
    product_name = 'Fender Telecaster',
    description = 'Iconic electric guitar known for its bright, cutting tone.',
    list_price = 899.00,
    discount_percent = 15.00,
    date_added = NOW();


SELECT *
From products;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

| product_id | category_id | product_code | product_name | description | list_price | discount_percent | date_added |
|---|---|---|---|---|---|---|---|
| 1 | 1 | strat | Fender Stratocaster | The Fender Stratocaster is the electric guitar de... | 699.00 | 30.00 | 2017-10-30 09:32:40 |
| 2 | 1 | les_paul | Gibson Les Paul | This Les Paul guitar offers a carved top and hu... | 1199.00 | 30.00 | 2017-12-05 16:33:13 |
| 3 | 1 | sg | Gibson SG | This Gibson SG electric guitar takes the best of t... | 2517.00 | 52.00 | 2018-02-04 11:04:31 |
| 4 | 1 | fg700s | Yamaha FG700S | The Yamaha FG700S solid top acoustic guitar ha... | 489.99 | 38.00 | 2018-06-01 11:12:59 |
| 5 | 1 | washburn | Washburn D10S | The Washburn D10S acoustic guitar is superbly ... | 299.00 | 0.00 | 2018-07-30 13:58:35 |
| 6 | 1 | rodriguez | Rodriguez Caballero 11 | Featuring a carefully chosen, solid Canadian ce... | 415.00 | 39.00 | 2018-07-30 14:12:41 |
| 7 | 2 | precision | Fender Precision | The Fender Precision bass guitar delivers the so... | 799.99 | 30.00 | 2018-06-01 11:29:35 |
| 8 | 2 | hofner | Hofner Icon | With authentic details inspired by the original, t... | 499.99 | 25.00 | 2018-07-30 14:18:33 |
| 9 | 3 | ludwig | Ludwig 5-piece Drum Set with Cymbals | This product includes a Ludwig 5-piece drum set... | 699.99 | 30.00 | 2018-07-30 12:46:40 |
| 10 | 3 | tama | Tama 5-Piece Drum Set with Cymbals | The Tama 5-piece Drum Set is the most afforda... | 799.99 | 15.00 | 2018-07-30 13:14:15 |
| 11 | 1 | tele | Fender Telecaster | Iconic electric guitar known for its bright, cuttin... | 899.00 | 15.00 | 2025-04-28 21:27:23 |

*Note:* The figure illustrates the SQL code for inserting a new guitar item in the products table.

**The UPDATE Commands**

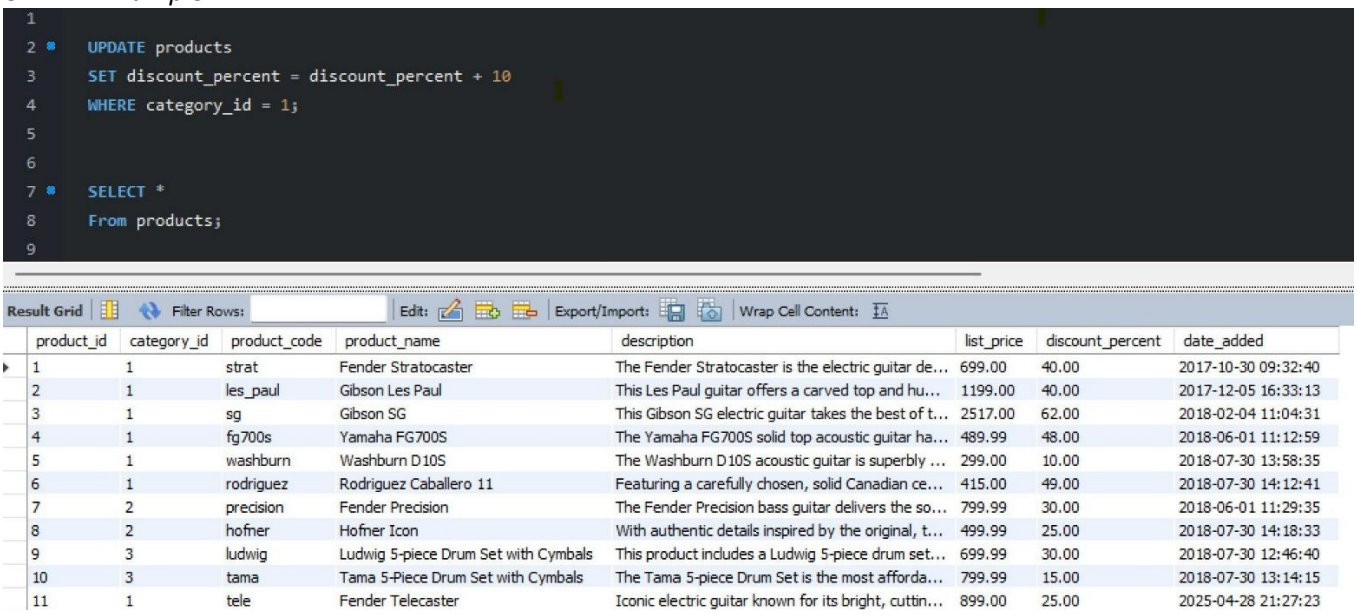
The `UPDATE` command is used to update existing rows/records' values (to modify existing data) in tables.
Syntax:

```sql
UPDATE table_name
SET column1 = new_value1,
    column2 = new_value2
WHERE 'condition';  -- The condition determines which rows are updated
```

The `WHERE` clause is used to update specific records' values based on a specific condition.

`UPDATE` Example using the products table:

**Figure 3**
*UPDATE Example*



```
1
2 •  UPDATE products
3    SET discount_percent = discount_percent + 10
4    WHERE category_id = 1;
5
6
7 •  SELECT *
8    From products;
9
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

| product_id | category_id | product_code | product_name | description | list_price | discount_percent | date_added |
|---|---|---|---|---|---|---|---|
| 1 | 1 | strat | Fender Stratocaster | The Fender Stratocaster is the electric guitar de... | 699.00 | 40.00 | 2017-10-30 09:32:40 |
| 2 | 1 | les_paul | Gibson Les Paul | This Les Paul guitar offers a carved top and hu... | 1199.00 | 40.00 | 2017-12-05 16:33:13 |
| 3 | 1 | sg | Gibson SG | This Gibson SG electric guitar takes the best of t... | 2517.00 | 62.00 | 2018-02-04 11:04:31 |
| 4 | 1 | fg700s | Yamaha FG700S | The Yamaha FG700S solid top acoustic guitar ha... | 489.99 | 48.00 | 2018-06-01 11:12:59 |
| 5 | 1 | washburn | Washburn D10S | The Washburn D10S acoustic guitar is superbly ... | 299.00 | 10.00 | 2018-07-30 13:58:35 |
| 6 | 1 | rodriguez | Rodriguez Caballero 11 | Featuring a carefully chosen, solid Canadian ce... | 415.00 | 49.00 | 2018-07-30 14:12:41 |
| 7 | 2 | precision | Fender Precision | The Fender Precision bass guitar delivers the so... | 799.99 | 30.00 | 2018-06-01 11:29:35 |
| 8 | 2 | hofner | Hofner Icon | With authentic details inspired by the original, t... | 499.99 | 25.00 | 2018-07-30 14:18:33 |
| 9 | 3 | ludwig | Ludwig 5-piece Drum Set with Cymbals | This product includes a Ludwig 5-piece drum set... | 699.99 | 30.00 | 2018-07-30 12:46:40 |
| 10 | 3 | tama | Tama 5-Piece Drum Set with Cymbals | The Tama 5-piece Drum Set is the most afforda... | 799.99 | 15.00 | 2018-07-30 13:14:15 |
| 11 | 1 | tele | Fender Telecaster | Iconic electric guitar known for its bright, cuttin... | 899.00 | 25.00 | 2025-04-28 21:27:23 |

*Note:* The figure illustrates the SQL code for adding +10 to the discount_percent for all items with a category_id = 1

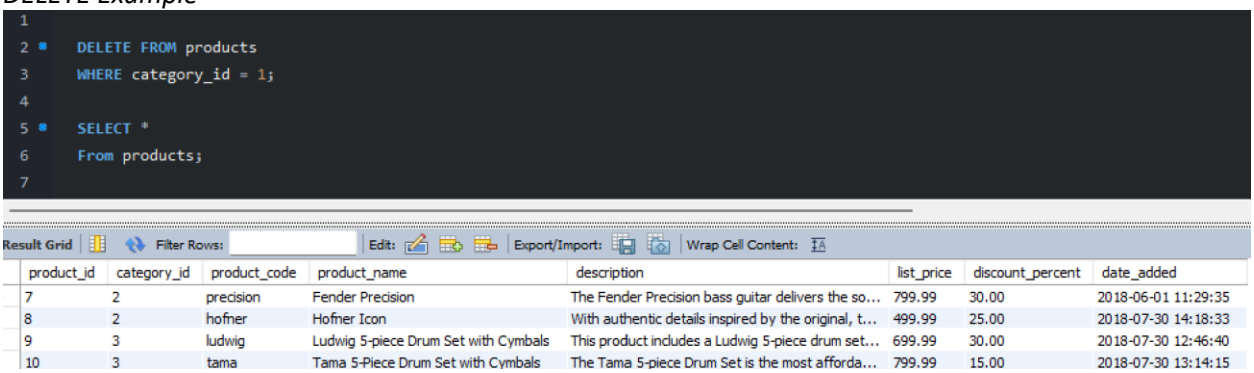
**The DELETE Commands**

The `DELETE` command is used to delete rows/records (to delete existing data) in tables. Syntax:

```
DELETE FROM table_name
WHERE 'condition'; -- Specifies row(s) to delete
```

`DELETE` Example using the products table:

**Figure 3**
*DELETE Example*



```
1
2 •  DELETE FROM products
3    WHERE category_id = 1;
4
5 •  SELECT *
6    From products;
7
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

| product_id | category_id | product_code | product_name | description | list_price | discount_percent | date_added |
|---|---|---|---|---|---|---|---|
| 7 | 2 | precision | Fender Precision | The Fender Precision bass guitar delivers the so... | 799.99 | 30.00 | 2018-06-01 11:29:35 |
| 8 | 2 | hofner | Hofner Icon | With authentic details inspired by the original, t... | 499.99 | 25.00 | 2018-07-30 14:18:33 |
| 9 | 3 | ludwig | Ludwig 5-piece Drum Set with Cymbals | This product includes a Ludwig 5-piece drum set... | 699.99 | 30.00 | 2018-07-30 12:46:40 |
| 10 | 3 | tama | Tama 5-Piece Drum Set with Cymbals | The Tama 5-piece Drum Set is the most afforda... | 799.99 | 15.00 | 2018-07-30 13:14:15 |

*Note:* The figure illustrates the SQL code for deleting all items with a category_id = 1

**Hazards of Using UPDATE and DELETE**

When using the `UPDATE` and `DELETE` commands, users need to be extremely careful, as these commands are very powerful and consequently come with significant risks. Accidentally misusing these commands can result in widespread data corruption or data loss. Some of these hazards include

- Missing or incorrect `WHERE` clause resulting in the `UPDATE` or `DELETE` commands being intentionally applied to all rows.
- Data loss caused by incorrect logic or use of the `WHERE` clause condition and the `UPDATE` command, which may be potentially fixed, and the `DELETE` command, which often results in irreversible loss of data.

To summarize, the INSERT, UPDATE, and DELETE commands are DML operations in MySQL for adding, modifying, and removing data within tables. The INSERT syntax can take various forms. The UPDATE and DELETE commands require particular attention due to their potential to modify or destroy existing data on a large scale.

-Alex

**References:**

Kathuria, H. (2021, November 9). How to write a WHERE clause in SQL. Learn SQL. https://learnsql.com/blog/where-clause-in-sql/

Murach, J. (2019). Chapter 1: An introduction to relational databases. *Murach's MySQL (3rd ed.).* Murach Books. ISBN: 9781943872367

Watt, A., & Eng, N. (2014). Chapter 16 SQL Data Manipulation Language. Database Design – 2nd Edition. Open textbooks, British Columbia University Open Campus. https://opentextbc.ca/dbdesign01/chapter/chapter-sql-dml/