15.2.2 DELETE Statement

`DELETE` is a DML statement that removes rows from a table.

A `DELETE` statement can start with a `WITH` clause to define common table expressions accessible within the `DELETE`. See Section 15.2.20, “WITH (Common Table Expressions)”.

Single-Table Syntax

```
DELETE [LOW_PRIORITY] [QUICK] [IGNORE] FROM tbl_name [[AS] tbl_alias]
    [PARTITION (partition_name [, partition_name] ...)]
    [WHERE where_condition]
    [ORDER BY ...]
    [LIMIT row_count]
```

The `DELETE` statement deletes rows from ***`tbl_name`*** and returns the number of deleted rows. To check the number of deleted rows, call the `ROW_COUNT()` function described in Section 14.15, “Information Functions”.

Main Clauses

The conditions in the optional `WHERE` clause identify which rows to delete. With no `WHERE` clause, all rows are deleted.

`where_condition` is an expression that evaluates to true for each row to be deleted. It is specified as described in Section 15.2.13, “SELECT Statement”.

If the `ORDER BY` clause is specified, the rows are deleted in the order that is specified. The `LIMIT` clause places a limit on the number of rows that can be deleted. These clauses apply to single-table deletes, but not multi-table deletes.

Multiple-Table Syntax

```
DELETE [LOW_PRIORITY] [QUICK] [IGNORE]
    tbl_name[.*] [, tbl_name[.*]] ...
    FROM table_references
    [WHERE where_condition]

DELETE [LOW_PRIORITY] [QUICK] [IGNORE]
    FROM tbl_name[.*] [, tbl_name[.*]] ...
```

```
    USING table_references
    [WHERE where_condition]
```

Privileges

You need the DELETE privilege on a table to delete rows from it. You need only the SELECT privilege for any columns that are only read, such as those named in the WHERE clause.

Performance

When you do not need to know the number of deleted rows, the TRUNCATE TABLE statement is a faster way to empty a table than a DELETE statement with no WHERE clause. Unlike DELETE, TRUNCATE TABLE cannot be used within a transaction or if you have a lock on the table. See Section 15.1.37, “TRUNCATE TABLE Statement” and Section 15.3.6, “LOCK TABLES and UNLOCK TABLES Statements”.

The speed of delete operations may also be affected by factors discussed in Section 10.2.5.3, “Optimizing DELETE Statements”.

To ensure that a given DELETE statement does not take too much time, the MySQL-specific LIMIT ***row_count*** clause for DELETE specifies the maximum number of rows to be deleted. If the number of rows to delete is larger than the limit, repeat the DELETE statement until the number of affected rows is less than the LIMIT value.

Subqueries

You cannot delete from a table and select from the same table in a subquery.

Partitioned Table Support

DELETE supports explicit partition selection using the PARTITION clause, which takes a list of the comma-separated names of one or more partitions or subpartitions (or both) from which to select rows to be dropped. Partitions not included in the list are ignored. Given a partitioned table t with a partition named p0, executing the statement DELETE FROM t PARTITION (p0) has the same effect on the table as executing ALTER TABLE t TRUNCATE PARTITION (p0); in both cases, all rows in partition p0 are dropped.

PARTITION can be used along with a WHERE condition, in which case the condition is tested only on rows in the listed partitions. For example, DELETE FROM t PARTITION (p0) WHERE c < 5 deletes rows only from partition p0 for which the condition c < 5 is true; rows in any other partitions are not checked and thus not affected by the DELETE.

The PARTITION clause can also be used in multiple-table DELETE statements. You can use up to one such option per table named in the FROM option.

For more information and examples, see Section 26.5, “Partition Selection”.

Auto-Increment Columns

If you delete the row containing the maximum value for an `AUTO_INCREMENT` column, the value is not reused for a `MyISAM` or `InnoDB` table. If you delete all rows in the table with `DELETE FROM` ***`tbl_name`*** (without a `WHERE` clause) in `autocommit` mode, the sequence starts over for all storage engines except `InnoDB` and `MyISAM`. There are some exceptions to this behavior for `InnoDB` tables, as discussed in Section 17.6.1.6, “AUTO_INCREMENT Handling in InnoDB”.

For `MyISAM` tables, you can specify an `AUTO_INCREMENT` secondary column in a multiple-column key. In this case, reuse of values deleted from the top of the sequence occurs even for `MyISAM` tables. See Section 5.6.9, “Using AUTO_INCREMENT”.

Modifiers

The `DELETE` statement supports the following modifiers:

- If you specify the `LOW_PRIORITY` modifier, the server delays execution of the `DELETE` until no other clients are reading from the table. This affects only storage engines that use only table-level locking (such as `MyISAM`, `MEMORY`, and `MERGE`).
- For `MyISAM` tables, if you use the `QUICK` modifier, the storage engine does not merge index leaves during delete, which may speed up some kinds of delete operations.
- The `IGNORE` modifier causes MySQL to ignore ignorable errors during the process of deleting rows. (Errors encountered during the parsing stage are processed in the usual manner.) Errors that are ignored due to the use of `IGNORE` are returned as warnings. For more information, see The Effect of IGNORE on Statement Execution.

Order of Deletion

If the `DELETE` statement includes an `ORDER BY` clause, rows are deleted in the order specified by the clause. This is useful primarily in conjunction with `LIMIT`. For example, the following statement finds rows matching the `WHERE` clause, sorts them by `timestamp_column`, and deletes the first (oldest) one:

```
DELETE FROM somelog WHERE user = 'jcole'
ORDER BY timestamp_column LIMIT 1;
```

`ORDER BY` also helps to delete rows in an order required to avoid referential integrity violations.

InnoDB Tables

If you are deleting many rows from a large table, you may exceed the lock table size for an `InnoDB` table. To avoid this problem, or simply to minimize the time that the table remains locked, the following strategy (which does not use `DELETE` at all) might be helpful:

1. Select the rows *not* to be deleted into an empty table that has the same structure as the original table:

   ```
   INSERT INTO t_copy SELECT * FROM t WHERE ... ;
   ```

2. Use `RENAME TABLE` to atomically move the original table out of the way and rename the copy to the original name:

   ```
   RENAME TABLE t TO t_old, t_copy TO t;
   ```

3. Drop the original table:

   ```
   DROP TABLE t_old;
   ```

No other sessions can access the tables involved while `RENAME TABLE` executes, so the rename operation is not subject to concurrency problems. See Section 15.1.36, “RENAME TABLE Statement”.

MyISAM Tables

In `MyISAM` tables, deleted rows are maintained in a linked list and subsequent `INSERT` operations reuse old row positions. To reclaim unused space and reduce file sizes, use the `OPTIMIZE TABLE` statement or the **myisamchk** utility to reorganize tables. `OPTIMIZE TABLE` is easier to use, but **myisamchk** is faster. See Section 15.7.3.4, “OPTIMIZE TABLE Statement”, and Section 6.6.4, “myisamchk — MyISAM Table-Maintenance Utility”.

The `QUICK` modifier affects whether index leaves are merged for delete operations. `DELETE QUICK` is most useful for applications where index values for deleted rows are replaced by similar index values from rows inserted later. In this case, the holes left by deleted values are reused.

`DELETE QUICK` is not useful when deleted values lead to underfilled index blocks spanning a range of index values for which new inserts occur again. In this case, use of `QUICK` can lead to wasted space in the index that remains unreclaimed. Here is an example of such a scenario:

1. Create a table that contains an indexed `AUTO_INCREMENT` column.

2. Insert many rows into the table. Each insert results in an index value that is added to the high end of the index.

3. Delete a block of rows at the low end of the column range using `DELETE QUICK`.

In this scenario, the index blocks associated with the deleted index values become underfilled but are not merged with other index blocks due to the use of `QUICK`. They remain underfilled when new inserts occur, because new rows do not have index values in the deleted range. Furthermore, they remain underfilled even if you later use `DELETE` without `QUICK`, unless some of the deleted index values happen to lie in index blocks within or adjacent to the underfilled blocks. To reclaim unused index space under these circumstances, use `OPTIMIZE TABLE`.

If you are going to delete many rows from a table, it might be faster to use `DELETE QUICK` followed by `OPTIMIZE TABLE`. This rebuilds the index rather than performing many index block merge operations.

Multi-Table Deletes

You can specify multiple tables in a `DELETE` statement to delete rows from one or more tables depending on the condition in the `WHERE` clause. You cannot use `ORDER BY` or `LIMIT` in a multiple-table `DELETE`. The ***`table_references`*** clause lists the tables involved in the join, as described in Section 15.2.13.2, “JOIN Clause”.

For the first multiple-table syntax, only matching rows from the tables listed before the `FROM` clause are deleted. For the second multiple-table syntax, only matching rows from the tables listed in the `FROM` clause (before the `USING` clause) are deleted. The effect is that you can delete rows from many tables at the same time and have additional tables that are used only for searching:

```
DELETE t1, t2 FROM t1 INNER JOIN t2 INNER JOIN t3
WHERE t1.id=t2.id AND t2.id=t3.id;
```

Or:

```
DELETE FROM t1, t2 USING t1 INNER JOIN t2 INNER JOIN t3
WHERE t1.id=t2.id AND t2.id=t3.id;
```

These statements use all three tables when searching for rows to delete, but delete matching rows only from tables `t1` and `t2`.

The preceding examples use `INNER JOIN`, but multiple-table `DELETE` statements can use other types of join permitted in `SELECT` statements, such as `LEFT JOIN`. For example, to delete rows that exist in `t1` that have no match in `t2`, use a `LEFT JOIN`:

```
DELETE t1 FROM t1 LEFT JOIN t2 ON t1.id=t2.id WHERE t2.id IS NULL;
```

The syntax permits `.*` after each ***tbl_name*** for compatibility with **Access**.

If you use a multiple-table `DELETE` statement involving `InnoDB` tables for which there are foreign key constraints, the MySQL optimizer might process tables in an order that differs from that of their parent/child relationship. In this case, the statement fails and rolls back. Instead, you should delete from a single table and rely on the `ON DELETE` capabilities that `InnoDB` provides to cause the other tables to be modified accordingly.

> **Note**
>
> If you declare an alias for a table, you must use the alias when referring to the table:
>
> ```
> DELETE t1 FROM test AS t1, test2 WHERE ...
> ```

Table aliases in a multiple-table `DELETE` should be declared only in the ***table_references*** part of the statement. Elsewhere, alias references are permitted but not alias declarations.

Correct:

```
DELETE a1, a2 FROM t1 AS a1 INNER JOIN t2 AS a2
WHERE a1.id=a2.id;

DELETE FROM a1, a2 USING t1 AS a1 INNER JOIN t2 AS a2
WHERE a1.id=a2.id;
```

Incorrect:

```
DELETE t1 AS a1, t2 AS a2 FROM t1 INNER JOIN t2
WHERE a1.id=a2.id;

DELETE FROM t1 AS a1, t2 AS a2 USING t1 INNER JOIN t2
WHERE a1.id=a2.id;
```

Table aliases are also supported for single-table `DELETE` statements beginning with MySQL 8.0.16. (Bug #89410,Bug #27455809)