

taken from a previous release of NDB Cluster to a cluster running NDB 8.0. These tables are handled as described in the preceeding paragraph.

Shared users and grants are stored in the `ndb_sql_metadata` table, which in NDB 8.0.19 and later `ndb_restore` by default does not restore; you can specify the `--include-stored-grants` option to cause it to do so.

- **INFORMATION_SCHEMA changes.** The following changes are made in the display of information regarding Disk Data files in the `INFORMATION_SCHEMA.FILES` table:
 - Tablespace and log file groups are no longer represented in the `FILES` table. (These constructs are not actually files.)
 - Each data file is now represented by a single row in the `FILES` table. Each undo log file is also now represented in this table by one row only. (Previously, a row was displayed for each copy of each of these files on each data node.)

In addition, `INFORMATION_SCHEMA` tables are now populated with tablespace statistics for MySQL Cluster tables. (Bug #27167728)

- **Error information with `ndb_perror`.** The deprecated `--ndb` option for `pererror` has been removed. Instead, use `ndb_perror` to obtain error message information from NDB error codes. (Bug #81704, Bug #81705, Bug #23523926, Bug #23523957)
- **Condition pushdown enhancements.** Previously, condition pushdown was limited to predicate terms referring to column values from the same table to which the condition was being pushed. In NDB 8.0.16, this restriction is removed such that column values from tables earlier in the query plan can also be referred to from pushed conditions. As of NDB 8.0.18, joins comparing column expressions are supported, as are comparisons between columns in the same table. Columns and column expressions to be compared must be of exactly the same type; this means they must also be of the same signedness, length, character set, precision, and scale, whenever these attributes apply.

Pushing down larger parts of a condition allows more rows to be filtered out by the data nodes, thereby reducing the number of rows which `mysqld` must handle during join processing. Another benefit of these enhancements is that filtering can be performed in parallel in the LDM threads, rather than in a single `mysqld` process on an SQL node; this has the potential to improve query performance significantly.

Existing rules for type compatibility between column values being compared continue to apply (see [Section 8.2.1.5, “Engine Condition Pushdown Optimization”](#)).

These additional improvements are made in NDB 8.0.21:

- Antijoins produced by the MySQL Optimizer through the transformation of `NOT EXISTS` and `NOT IN` queries (see [Section 8.2.2.1, “Optimizing IN and EXISTS Subquery Predicates with Semijoin Transformations”](#)) can be pushed down to the data nodes by NDB.

This can be done when there is no unpushed condition on the table, and the query fulfills any other conditions which must be met for an outer join to be pushed down.
- NDB attempts to identify and evaluate a non-dependent scalar subquery before trying to retrieve any rows from the table to which it is attached. When it can do so, the value obtained is used as part of a pushed condition, instead of using the subquery which provided the value.
- **Increase in maximum row size.** NDB 8.0.18 increases the maximum number of bytes that can be stored in an `NDBCLUSTER` table from 14000 to 30000 bytes.

A `BLOB` or `TEXT` column continues to use 264 bytes of this total, as before.