MySQL NDB Cluster 9.0 Release Notes

Abstract

This document contains release notes for the changes in each release of MySQL NDB Cluster that uses version 9.0 of the `NDB` (`NDBCLUSTER`) storage engine.

Each NDB Cluster 9.0 release is based on a mainline MySQL Server release and a particular version of the `NDB` storage engine, as shown in the version string returned by executing `SELECT VERSION()` in the `mysql` client, or by executing the `ndb_mgm` client `SHOW` or `STATUS` command; for more information, see MySQL NDB Cluster 9.0.

For general information about features added in NDB Cluster 9.0, see What is New in MySQL NDB Cluster 9.0. For a complete list of all bug fixes and feature changes in MySQL NDB Cluster, please refer to the changelog section for each individual NDB Cluster release.

For additional MySQL 9.0 documentation, see the MySQL 9.0 Reference Manual, which includes an overview of features added in MySQL 9.0 that are not specific to NDB Cluster (What Is New in MySQL 9.0), and discussion of upgrade issues that you may encounter for upgrades from MySQL 8.4 to MySQL 9.0 (Changes in MySQL 9.0). For a complete list of all bug fixes and feature changes made in MySQL 9.0 that are not specific to `NDB`, see MySQL 9.0 Release Notes.

Updates to these notes occur as new product features are added, so that everybody can follow the development process. If a recent version is listed here that you cannot find on the download page (https://dev.mysql.com/downloads/), the version has not yet been released.

The documentation included in source and binary distributions may not be fully up to date with respect to release note entries because integration of the documentation occurs at release build time. For the most up-to-date release notes, please refer to the online documentation instead.

For legal information, see the Legal Notices.

For help with using MySQL, please visit the MySQL Forums, where you can discuss your issues with other MySQL users.

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Preface and Legal Notices

This document contains release notes for the changes in each release of MySQL NDB Cluster that uses version 9.0 of the `NDB` storage engine.

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Changes in MySQL NDB Cluster 9.0.1 (2024-07-23, Innovation Release)

MySQL NDB Cluster 9.0.1 is a new Innovation release of NDB Cluster, based on MySQL Server 9.0 and including features in version 9.0 of the `NDB` storage engine, as well as fixing recently discovered bugs in previous NDB Cluster releases.

Obtaining MySQL NDB Cluster 9.0. NDB Cluster 9.0 source code and binaries can be obtained from https://dev.mysql.com/downloads/cluster/.

For an overview of major changes made in NDB Cluster 9.0, see What is New in MySQL NDB Cluster 9.0.

This release also incorporates all bug fixes and changes made in previous NDB Cluster releases, as well as all bug fixes and feature changes which were added in mainline MySQL 9 through MySQL 9.0.1 (see Changes in MySQL 9.0.1 (2024-07-23, Innovation Release)).

This release contains no functional changes specific to MySQL NDB Cluster, and is published to align with and include changes made in MySQL Server 9.0.1.

Changes in MySQL NDB Cluster 9.0.0 (2024-07-02, Innovation Release)

MySQL NDB Cluster 9.0.0 is a new Innovation release of NDB Cluster, based on MySQL Server 9.0 and including features in version 9.0 of the `NDB` storage engine, as well as fixing recently discovered bugs in previous NDB Cluster releases.

Obtaining MySQL NDB Cluster 9.0. NDB Cluster 9.0 source code and binaries can be obtained from https://dev.mysql.com/downloads/cluster/.

For an overview of major changes made in NDB Cluster 9.0, see What is New in MySQL NDB Cluster 9.0.

This release also incorporates all bug fixes and changes made in previous NDB Cluster releases, as well as all bug fixes and feature changes which were added in mainline MySQL 9 through MySQL 9.0.0 (see Changes in MySQL 9.0.0 (2024-07-01, Innovation Release)).

Important

This release is no longer available for download. It was removed due to a critical issue that could stop the server from restarting following the creation of a very large number of tables (8001 or more). Please upgrade to MySQL Cluster 9.0.1 instead.

Deprecation and Removal Notes

- **NDB Cluster APIs:** `Node.js` support in MySQL NDB Cluster is now deprecated, and you should expect its removal in a future release.

  You can also find the NDB Cluster `jones-ndb` driver for `Node.js` at `https://github.com/mysql/mysql-js`, where it remains available to interested users. (WL #16245)

- **NDB Client Programs:** The `ndb_size.pl` utility is now deprecated and is no longer supported. You can expect it to be removed from a future version of the NDB Cluster distribution; for this reason, you should now modify any applications which depend on it accordingly. (WL #16456)

- Use of an `Ndb.cfg` file for setting the connection string for an NDB process was not well documented or supported. With this release, this file is now formally deprecated, and you should expect support for it to be removed in a future release of MySQL Cluster. (WL #15765)

Performance Schema Notes

- **NDB Replication:** Previously, information about the `NDB` replication applier was available to the user only as a set of server status variables, and only for the default replication channel.

  This release implements a new Performance Schema `ndb_replication_applier_status` table, which can be thought of as an `NDB`-specific extension to the existing `replication_applier_status` table. This enhancement provides per-channel information about an applier's status, including information relating to NDB Cluster conflict detection and resolution, in table form.

  For more information about this table, see The ndb_replication_applier_status Table. For information about replication in NDB Cluster, see NDB Cluster Replication. (WL #16013)

Functionality Added or Changed

- **Important Change:** Now, when the removal of a data node file or directory fails with a file does not exist (**`ENOENT`**) error, this is treated as a successful removal.

- **ndbinfo Information Database:** Added a `type` column to the `transporter_details` table in the `ndbinfo` information database. This column shows the type of connection used by the transporter, which is either of `TCP` or `SHM`.

- **NDB Client Programs:** Added the `--CA-days` option to `ndb_sign_keys` to make it possible to specify a certificate's lifetime. (Bug #36549567)

- **NDB Client Programs:** When started, `ndbd` now produces a warning in the data node log like this one:

```
2024-05-28 13:32:16 [ndbd] WARNING  -- Running ndbd with a single thread of
signal execution.  For multi-threaded signal execution run the ndbmtd binary.
```

(Bug #36326896)

Bugs Fixed

- **NDB Replication:** When subscribing to changes in the `mysql.ndb_apply_status` table, different settings were used depending on whether `ndb_log_apply_status` was `ON` or `OFF`. Since `ndb_log_apply_status` can be changed at runtime and subscriptions are not recreated at that time, changing these settings at runtime did not have the desired effect.

  The difference between enabling `ndb_log_apply_status` dynamically at runtime and doing so from the start of the MySQL proccess was in the format used when writing the ndb_apply_status updates to the binary log. When `ndb_log_apply_status` was enabled at runtime, writes were still done using the `UPDATE` format when `WRITE` was intended.

  To fix this inconsistency and make the behavior more distinct, we now always use `WRITE` format in such cases; using the `WRITE` format also makes the binary log image slightly smaller and is thus preferred. In addition, the cleanup of old events has been improved, which improves the cleanup of failed attempts to create tables and events. (Bug #36453684)

- **NDB Replication:** The binary log index purge callback was skipped for the replica applier, which caused orphan rows to be left behind in the `ndb_binlog_index` table. (Bug #20573020, Bug #35847745, Bug #36378551, Bug #36420628, Bug #36423593, Bug #36485220, Bug #36492736)

- **NDB Cluster APIs:** TLS connection errors were printed even though TLS was not specified for connections.

  To fix this issue, following an ignored TLS error, we explicitly reset the error condition in the management handle to **`NO_ERROR`**. (Bug #36354973)

- **NDB Cluster APIs:** It was possible to employ the following NDB API methods without them being used as `const`, although this alternative usage had long been deprecated (and was not actually documented):

  - `Dictionary::listEvents()`
  - `Dictionary::listIndexes()`
  - `Dictionary::listObjects()`
  - `NdbOperation::getNdbErrorLine()`

  Now, each of these methods must always be invoked as `const`. (Bug #36165876)

- **NDB Client Programs:** In some cases, it was not possible to load cerificates generated using `ndb_sign_keys`. (Bug #36430004)

- **NDB Client Programs:** `ndb_redo_log_reader` could not read data from encrypted files. (Bug #36313482)

- **NDB Client Programs:** The following command-line options did not function correctly for the `ndb_redo_log_reader` utility program:

  - `--mbyte`
  - `--page`
  - `--pageindex`

  (Bug #36313427)

- **NDB Client Programs:** `ndb_redo_log_reader` exited with `Record type = 0 not implemented` when reaching an unused page, all zero bytes, or a page which was only partially used (typically a page consisting of the page header only). (Bug #36313259)
- **NDB Client Programs:** `ndb_restore` did not restore a foreign key whose columns differed in order from those of the parent key.

  Our thanks to Axel Svensson for the contribution. (Bug #114147, Bug #36345882)
- The destructor for `NDB_SCHEMA_OBJECT` makes several assertions about the state of the schema object, but the state was protected by a mutex, and the destructor did not acquire this mutex before testing the state.

  We fix this by acquiring the mutex within the destructor. (Bug #36568964)
- `NDB` now writes a message to the MySQL server log before and after logging an incident in the binary log. (Bug #36548269)
- Removed a memory leak in `/util/NodeCertificate.cpp`. (Bug #36537931)
- Removed a memory leak from `src/ndbapi/NdbDictionaryImpl.cpp`. (Bug #36532102)
- The internal method `CertLifetime::set_set_cert_lifetime(X509 *cert)` should set the not-before and not-after times in the certificate to the same as those stored in the `CertLifetime` object, but instead it set the not-before time to the current time, and the not-after time to be of the same duration as the object. (Bug #36514834)
- Removed a possible use-after-free warning in `ConfigObject::copy_current()`. (Bug #36497108)
- When a thread acquires and releases the global schema lock required for schema changes and reads, the associated log message did not identify who performed the operation.

  To fix this issue, we now do the following:

  - Prepend the message in the log with the identification of the NDB Cluster component or user session responsible.
  - Provide information about the related Performance Schema thread so that it can be traced.

  (Bug #36446730)

  References: See also: Bug #36446604.
- Metadata changes were not logged with their associated thread IDs. (Bug #36446604)

  References: See also: Bug #36446730.
- When building `NDB` using `lld`, the build terminated prematurely with the error message `ld.lld: error: version script assignment of 'local' to symbol 'my_init' failed: symbol not defined` while attempting to link `libndbclient.so`. (Bug #36431274)
- TLS did not fail cleanly on systems which used OpenSSL 1.0, which is unsupported. Now in such cases, users get a clear error message advising that an upgrade to OpenSSL 1.1 or later is required to use TLS with NDB Cluster. (Bug #36426461)
- The included `libxml2` library was updated to version 2.9.13. (Bug #36417013)
- NDB Cluster's pushdown join functionality expects pushed conditions to filter exactly, so that no rows that do not match the condition must be returned, and all rows that do match the condition must returned. When the condition contained a BINARY value compared to a `BINARY` column this was not always true; if the value was shorter than the column size, it could compare as equal to a column value despite having different lengths, if the condition was pushed down to `NDB`.

Now, when deciding whether a condition is pushable, we also make sure that the `BINARY` value length exactly matches the `BINARY` column's size. In addition, when binary string values were used in conditions with `BINARY` or `VARBINARY` columns, the actual length of a given string value was not used but rather an overestimate of its length. This is now changed; this should allow more conditions comparing short string values with `VARBINARY` columns to be pushed down than before this fix was made. (Bug #36390313, Bug #36513270)

References: See also: Bug #36399759, Bug #36400256. This issue is a regression of: Bug #36364619.

- Setting `AutomaticThreadConfig` and `NumCPUs` when running single-threaded data nodes (`ndbd`) sometimes led to unrecoverable errors. Now `ndbd` ignores settings for these parameters, which are intended to apply only to multi-threaded data nodes (`ndbmtd`). (Bug #36388981)

- Improved the error message returned when trying to add a primary key to an `NDBCLUSTER` table using `ALGORITHM=INPLACE`. (Bug #36382071)

  References: See also: Bug #30766579.

- The handling of the `LQH` operation pool which occurs as part of TC takeover skipped the last element in either of the underlying physical pools (static or dynamic). If this element was in use, holding an operation record for a transaction belonging to a transaction coordinator on the failed node, it was not returned, resulting in an incomplete takeover which sometimes left operations behind. Such operations interfered with subsequent transactions and the copying process (`CopyFrag`) used by the failed node to recover.

  To fix this problem, we avoid skipping the final record while iterating through the `LQH` operation records during TC takeover. (Bug #36363119)

- The `libssh` library was updated to version 0.10.4. (Bug #36135621)

- When distribution awareness was not in use, the cluster tended to choose the same data node as the transaction coordinator repeatedly. (Bug #35840020, Bug #36554026)

- In certain cases, management nodes were unable to allocate node IDs to restarted data and SQL nodes. (Bug #35658072)

- Setting `ODirect` in the cluster's configuration caused excess logging when verifying that `ODirect` was actually settable for all paths. (Bug #34754817)

- In some cases, when trying to perform an online add index operation on an `NDB` table with no explicit primary key (see Limitations of NDB online operations), the resulting error message did not make the nature of the problem clear. (Bug #30766579)

  References: See also: Bug #36382071.

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