

A.10.39 How do I continue to send queries in the event that one of the SQL nodes fails?

MySQL NDB Cluster does not provide any sort of automatic failover between SQL nodes. Your application must be prepared to handle the loss of SQL nodes and to fail over between them.

A.10.40 How do I back up and restore an NDB Cluster?

You can use the NDB Cluster native backup and restore functionality in the NDB management client and the `ndb_restore` program. See [Section 23.5.8, “Online Backup of NDB Cluster”](#), and [Section 23.4.23, “ndb_restore — Restore an NDB Cluster Backup”](#).

You can also use the traditional functionality provided for this purpose in `mysqldump` and the MySQL server. See [Section 4.5.4, “mysqldump — A Database Backup Program”](#), for more information.

A.10.41 What is an “angel process”?

This process monitors and, if necessary, attempts to restart the data node process. If you check the list of active processes on your system after starting `ndbd`, you can see that there are actually 2 processes running by that name, as shown here (we omit the output from `ndb_mgmd` and `ndbd` for brevity):

```
shell> ./ndb_mgmd

shell> ps aux | grep ndb
me      23002  0.0  0.0 122948  3104 ?        Ssl  14:14   0:00 ./ndb_mgmd
me      23025  0.0  0.0   5284   820 pts/2    S+   14:14   0:00 grep ndb

shell> ./ndbd -c 127.0.0.1 --initial

shell> ps aux | grep ndb
me      23002  0.0  0.0 123080  3356 ?        Ssl  14:14   0:00 ./ndb_mgmd
me      23096  0.0  0.0   35876   2036 ?        Ss   14:14   0:00 ./ndbmtdd -c 127.0.0.1 --initial
me      23097  1.0  2.4 524116 91096 ?        Sl   14:14   0:00 ./ndbmtdd -c 127.0.0.1 --initial
me      23168  0.0  0.0   5284   812 pts/2    R+   14:15   0:00 grep ndb
```

The `ndbd` process showing 0.0 for both memory and CPU usage is the angel process (although it actually does use a very small amount of each). This process merely checks to see if the main `ndbd` or `ndbmtdd` process (the primary data node process which actually handles the data) is running. If permitted to do so (for example, if the `StopOnError` configuration parameter is set to `false`), the angel process tries to restart the primary data node process.

A.11 MySQL 8.0 FAQ: MySQL Chinese, Japanese, and Korean Character Sets

This set of Frequently Asked Questions derives from the experience of MySQL's Support and Development groups in handling many inquiries about CJK (Chinese-Japanese-Korean) issues.

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