LHCb Databases Upgrade/Migration Incident report, 7 January 2018

Description

Five of the databases hosting services for the computing infrastructure of the LHCb experiment were scheduled for interventions including host migrations and database system upgrades (**lbacc, lbwms, lbboinc, lbprod** and **dfc**) on an a pre-allocated window of five hours.

lbacc, **lbboinc** and **lbmws** were intervined on without further issues.

The **lbprod** upgrade took much longer than expected originally due to the database datafiles requiring a full defragmentation, which, given the total data size, lasted for serveral hours.

After restart of operations, **lbprod** triggered a Kernel/NFS bug which caused intermittent NFS access interruptions, bringing the database to a halt for the duration of the episodes.

After upgrading **dfc** a certain query was detected to take several minutes to complete (for a normal execution time of milliseconds) which rendered the system unusable. First, the database was moved to a new server. A first attemp to recreate the database from a logical export to remove all data fragmentation was tried without success. Then the database was exported and downgraded to the previous version.

Impact

The **dfc** performance issue rendered the whole infrastructure unusable. After this issue was solved the Kernel/NFS bug affecting **lbprod** generated random episodes during which the whole system freezed.

Timeline

Event	Date
Planned migration/upgrade	Wed 7 9:00AM-12:00AM
lbprod upgrade/defragmentation conclusion	Wed 7 21:00PM
dfc recreation	Thu 8, Completed at 12:05AM
dfc downgrade	Thu 8, Completed at 14:15PM
TransformationDB separation from lbprod	Fri 9 - 8:00-19:00
lbprod server restart to fix Kernel/NFS Issue	Mon 12 9:00AM

Followup Actions

In the following weeks after the incident the source of the DFC issue was identified as coming from an difference in the optimization of SQL queries between the two database versions. A workaround for the original problematic query was proposed to the LHCb team.

After the Kernel/NFS bug was identified a campaign to upgrade all affected servers to a non-buggy version was started by the databases team.

Summary

The Upgrade and migration of the databases hosting the diverse LHCb computing services was affected by two different problems:

- A Kernel/NFS bug which was triggered by the particular load and data access patterns of the **lbprod** database
- A SQL triggered issue in the dfc databse which was undetected in the test and integration databases due to a correlation between the severity of the impact and the total data size of the relevant tables.

Workarounds have been found for both issues.