Castor tape subsystem requirements, design and test plan for release of version 2.1.9-10 (migrated from 2.1.9-9)

Collection of the requirements for the tape subsystem that castor will be tested against before deployment.

Document revisions

Version	Author(s)
V0.01: Partial reverse engineering of the testsuite contents, plus the test description, Based on branch v2_1_7_gateway, revision 21263.	Tape team
V0.02: Next version released to review	Tape team

1 Document production notes:

V0.01
Limited to test/testsuite/castortests/tape.

2 Current tests for tape

2.1 In testsuite

1. Aggregatord/WritetpReadtp: create a random file in disk
2. rtcpd/TpwriteTpread
3. stager/basic
4. stager/cancelledRecall
5. stager/multiFile

2.2 In test/tapegateway_release_tests

1. Migrate 10 files modifying ns checksum whilst TAPECOPY_CREATED.
2. Migrate 10 files nsrm whilst TAPECOPY_WAITINSTREAMS.
3. Migration of 10 files to 1 tape with CNS HOST set to non existing host
4. Migration of 10 files with disk servers rfiod down.
5. Migration of 10 files with VDQM down.
6. Migration of 10 files with VMGR down.
7. Migrate and recall 10 dual tape-copy files
8. Migrate and recall 10 single tape-copy files
9. Migrate and recall stress test.
10. Migrate until end of 2 tapes
11. Recall 2 files from an ARCHIVED tape.
12. Recall 10 files modifying ns checksum whilst TAPECOPY TOBERECALLED

13. Recall 10 files nsrm them whilst TAPECOPY TOBERECALLED.
14. Recall 10 files with CNS HOST set to non existing host.
15. Recall 10 files with disk server rfiod down.
16. Repack 2 tapes.

3 Requirements

[Sources of information : http://castor.web.cern.ch/castor/docs.htm,
https://twiki.cern.ch/twiki/bin/view/FIOgroup/HowtoTestCastorV2#TapeGateway_tests,
https://twiki.cern.ch/twiki/bin/view/FIOgroup/CastorV2Development,
https://twiki.cern.ch/twiki/bin/view/FIOgroup/TapeGateway,
https://twiki.cern.ch/twiki/bin/view/DataManagement/TapeSubsystemTesting,
https://twiki.cern.ch/twiki/bin/view/DataManagement/TapeGatewayTests,
https://twiki.cern.ch/twiki/bin/view/DataManagement/TapeGatewayTestsDraft,
https://twiki.cern.ch/twiki/bin/view/DataManagement/CastorTapeSubsystem,
https://twiki.cern.ch/twiki/bin/view/DataManagement/TapeProjectManagement,
https://twiki.cern.ch/twiki/bin/viewauth/CASTORService,
https://twiki.cern.ch/twiki/bin/view/DSSGroup/,
http://svnweb.cern.ch/world/wsvn/CASTOR/CASTOR2/trunk/test/tapegateway_release_tests/#path_CASTOR2_trunk_test_tapegateway_release_tests_,
http://castor.web.cern.ch/castor/old_castor/DOCUMENTATION/,
http://indico.cern.ch/conferenceDisplay.py?confId=2916]

3.1 Functional requirements

3.1.1 Tape system should migrate single and multiple tape copies to tape

3.1.1.1 When a tape copy is created, the data from one of the disk copies it should be migrated to tape.

3.1.2 Multiple tape copies for the same file should not end up on the same tape

3.1.2.1 In addition to the previous requirement, no 2 tape copies a given file must end up on the same tape.

3.1.3 Tape system must recall tape copies

3.1.3.1 Tape system should either recall tape copies or report a failure to the user in case an unrecoverable problem is encoutered.

3.1.3.2 There must be a recall functionality which recalls all files from a given tape and writes them to another.

3.2 Non-functional: robustness

3.2.1.1 Tape system must handle correctly internal failures (incorrect/modified/missing linked structures inside the DB)

Expected behaviour is to not process the incorrect request (no point in retrying/unrecoverable error), without slowing down/stopping the flow of the non-problematic files. The error should be detected and reported.

3.2.1.1.1 Handle missing castorfile

3.2.1.1.2 Handle missing diskcopy

3.2.1.1.3 Handle missing filesystem

3.2.1.1.4 Handle missing fileserver

3.2.1.1.5 Handle missing fileclass

3.2.1.1.6 Handle missing serviceclass

3.2.1.1.7 Handle missing tapepool

3.2.1.1.8 Handle missing segment

3.2.1.1.9 Handle missing tape

3.2.1.2 Tape system must handle correctly tape system failures

3.2.1.2.1 End of tape

Should re-migrate

3.2.1.2.2 Read error/Tape unavailable/archived

Retry on other copy or fail

3.2.1.2.3 Write error

Should re-migrate to another tape.

3.2.1.2.4 No tape available

Should retry with a delay (no fast spinning)

3.2.1.3 Tape system must handle correctly external services failures

External failures mean unavailability/misconfiguration of external services: Name server, VMGR, VDQM, tape server. The disk server failure is only visible to the tape server, so this is not covered here.

3.2.1.3.1 Name server unavailable

3.2.1.3.2 VMGR unavailable

3.2.1.3.3 VDQM unavailable

3.2.1.3.4 Tape server unreacheable

3.2.1.3.5 Disk server unreacheable

3.2.1.4 Tape system must handle properly the incoherences in information.

The tape system should reject and report as failed any request encountering a mismatch: wrong checksums inside the stager, wrong checksum inside the name server, wrong size

3.2.1.4.1 Checksum mismatches

3.2.1.4.2 Size mismatches

3.2.1.4.3 Wrong segment information

3.2.1.4.4 Missing nameserver entry

3.3 Functional: performance control (policies)

3.3.1.1 Tape drives scheduling.

We should be able to schedule migrations, recalls and tape mounts by policy.

Each file migration is attached to a service class which has an nbDrive property, representing the maximum number of drives this service class can use concurrently. The drives should be distributed evenly over the tape pools associated with the service class. If a tape pool is shared between several service classes, the behaviour is ***undetermined***. If the service class changes before migration, the behaviour is ***undetermined***.

3.3.1.2 Performance expectations under high load

3.3.2 Non-Functional: installable/maintainable

3.3.2.1 The systems should cover all of its functional and non-functional requirements using both rtcpclientd (regression test) and the tape gateway.

3.3.2.2 The new version must be upgradable from the previous one (rtcpclientd-to-rtcpclientd) with all types of files in-system. None should be lost. Manual procedure OK is some get stuck. New version will be 2.1.9-10, old version is 2.1.9-9.

The system should not loose data of block migrations recalls when upgrading from 2.1.9-9 to 2.1.9-10. Tape space contingency is an acceptable trade-off (re-migration of a tape copy that get set back in its state in the process). Switch-over unavailability should be below [TBD].

3.3.2.3 In the new version, it must possible to switch from rtcpclientd to the tapegateway with all types of files in-system. None should be lost. Manual procedure OK if some get stuck.

3.3.2.4 In the new version, it must possible to switch back from the tape gateway to the rtcpclientd with all types of files in-system. None should be lost. Manual procedure OK if some get stuck.

4 Design specifications

5 Test plan

5.1 Module testing

Based on design specifications... / Modules APIs.

5.2 Integration testing

Based on design specifications

5.3 System testing

In the development stagers, functionanlity/performance test.

Requirements covered	Test case title and description
3.2.1.4.1	Migrate 10 files modifying ns checksum whilst TAPECOPY_CREATED.
3.2.1.4.4	Migrate 10 files nsrm whilst TAPECOPY_WAITINSTREAMS.
3.2.1.3.1	Migration of 10 files to 1 tape with CNS HOST set to non existing host
3.2.1.3.5	Migration of 10 files with disk servers rfiod down.
3.2.1.3.3	Migration of 10 files with VDQM down.
3.2.1.3.2	Migration of 10 files with VMGR down.
3.1.1.1, 3.1.2.1, 3.1.3.1	Migrate and recall 10 dual tape-copy files
3.1.1.1, 3.1.3.1	Migrate and recall 10 single tape-copy files
3.3.1.2	Migrate and recall stress test.
3.2.1.2.1	Migrate until end of 2 tapes
3.2.1.2.2	Recall 2 files from an ARCHIVED tape.
3.2.1.4.1	Recall 10 files modifying ns checksum whilst TAPECOPY TOBERECALLED
3.2.1.4.4	Recall 10 files nsrm them whilst TAPECOPY TOBERECALLED.
3.2.1.3.1	Recall 10 files with CNS HOST set to non existing host.
3.2.1.3.5	Recall 10 files with disk server rfiod down.
3.1.3.2	Repack 2 tapes.
3.3.2.2	Install and poputate stager in production version 2.1.9-9 with files in all

Requirements covered	Test case title and description
	possible state then migrate to 2.1.9-10 and validate that the files follow their lifecycle propoerly.
3.3.2.2	Base for tests: have a procedure to install from scratch a stager in 2.1.9-9 and then migrate (for the moment 2.1.9-8 => 2.1.9-8 + tapegateway)
3.3.2.3, 3.3.2.4	Base for test: have a procedure to switch back and forth between tape gateway and rtcpclientd.
3.3.2.1	Reproduce all non-installation tests in both rtcpclientd and tape gateway.

The non-covered requirements are:

3.1.3.2, 3.2.1.1.1, 3.2.1.1.2, 3.2.1.1.3, 3.2.1.1.4, 3.2.1.1.5, 3.2.1.1.6, 3.2.1.1.7, 3.2.1.1.8, 3.2.1.1.9, 3.2.1.2.3, 3.2.1.2.4, 3.2.1.3.2, 3.2.1.3.3, 3.2.1.3.4, 3.2.1.3.5, 3.2.1.4.2, 3.2.1.4.3, 3.3.1.1, 3.3.2.1, 3.3.2.2, 3.3.2.3, 3.3.2.4

5.4 Acceptance test

In the preprod environment.

6 Test environments

6.1 The development stagers

6.2 The preproduction environment