

Lustre Feature Test Plan for Subdirectory Mount

Revision 1.3

September 1, 2016

Revision History

The following is a chronological history of changes made to this document.

Revision	Date	Reason for change	Author
1.0	2016-07-21	Initial Version	Shuichi Ihara - DDN
1.1	2016-08-06	Format and minor clean up. Added Feature setup and User Interface sections. Added manual, interop, and Performance Testing requirements.	James Nunez - Intel
1.2	2016-08-09	Minor edits. Corrected functionality of path2fid. Added metadata testing to the performance section.	James Nunez - Intel
1.3	2016-09-01	Add date and version to first page and revision to revision history. Added What not to test section. Other minor edits.	James Nunez - Intel

Table of Contents

Revision History.....	2
Introduction	4
Feature Installation and Set-up.....	4
Regression Tests.....	4
Manual Testing	6
Interoperability	6
Performance Testing.....	7
User Interface	7
What Not to Test.....	7
Documentation.....	7

Introduction

The ability for Lustre clients to mount subdirectories of a Lustre filesystem is very useful for namespace isolation and other security requirements. The goal of the subdirectory mount feature allows a subdirectory to be export/import as a fileset of namespace in the Lustre filesystem. Note: a fileset is a group of files that are defined through a directory that represents the start point of a file system. Subdirectory mounts allow fine-grained segregation of access to a Lustre file system namespace, restricting what portions of a Lustre file system are made available to clients.

This work will land in the community release of Lustre 2.9.0 and is tracked under JIRA tickets LU-28 and LU-8037 with patches <http://review.whamcloud.com/5007> and <http://review.whamcloud.com/19646>.

Feature Installation and Set-up

The subdirectory mount feature is enabled by default and cannot be turned off. The subdirectory feature is engaged only on the client and nothing has to be done on and Lustre server. Each client has the option to mount a subdirectory with no impact to the file system and no impact the mount point on any other clients.

To mount a subdirectory, 'sdir', on a Lustre client with file system named 'testfs' at mount point /mnt/myfilesystem, use the command on client nodes:

```
mount -t lustre mgs@tcp0:/testfs/sdir /mnt/myfilesystem
```

where 'sdir' is an existing subdirectory in the testfs Lustre file system.

There are no hardware requirements to test this feature.

Regression Tests

The acceptance-small test suite will be run to verify no functional regression. In addition, the 'full' test group will be run with the environment parameter \$FILESET set to enable mounting of a subdirectory.

The Lustre test suite sanity was enhanced with several test cases that test basic functionality like mounting a subdirectory, mounting a subdirectory that does not exist,

test functionality of fid2path inside and outside subdir, and try to mount a directory above the fileset.

test_247a mount subdir as fileset

Lustre clients are able to mount sub directory in Lustre namespace as fileset.

test_247b mount subdir that does not exist

When client mounts sub directory, but if directory does not exist, it returns ENOENT and prints "No such file or directory".

test_247c fid2path outside root

When directory is outside of root in sub directory to "lfs fid2path", it returns ENOENT as expected.

test_247d fid2path inside root

When directory is outside of root in sub directory to "lfs fid2path", it returns FID correctly.

test_247e mount .. as fileset

Verify "/" is invalid and Lustre mount fails to mount it as fileset.

TestSuite	Test Case	Status
test_247a	mount subdir as fileset	PASS
test_247b	mount subdir that does not exist	PASS
test_247c	fid2path outside root	PASS
test_247d	fid2path inside root	PASS
test_247e	mount .. as fileset	PASS

There are known limitations to the subdirectory mount feature in terms of utilities that work in the mounted fileset, but will not work outside that fileset when it is mounted. For example, when mounting a subdirectory, 'path2fid' does not work outside of the mounted fileset, but does work within the fileset. Tests using 'path2fid' outside of the file set are skipped when this feature is used. Similarly, 'fid2path' works as expected inside the mounted fileset, but not outside. The following sanity test suite tests are skipped when a subdirectory is mounted due to use of 'path2fid' or 'fid2path' outside the mounted subdirectory; 27D, 154a, 154b, 154f, 154g, 185, 200, 233a, and 233b.

Manual Testing

Additional testing should be run outside of the tests added to sanity. These tests include

1. Ensure that mounting a file fails with ENOTDIR.
2. Test if you can follow links outside of the fileset, which should fail, and ensure that links in the fileset work as expected.
3. The 'lfs migrate' command must be restricted such that it can only interact with files in the subdirectory.
4. HSM commands must be restricted such that it can only interact with files in the subdirectory.
5. Integration of nodemap support such that client access to a Lustre file system can be restricted based on a nodemap definition. Subdir mounts combined with nodemap functionality will allow an administrator to define policies to restrict the subdirectory that a client NID has permission to access.
6. Ensure that you can mount a striped and a remote subdirectory (Correct behavior under DNE).

The MDS should failover and failback to ensure that the subdirectory is mounted on failback.

A Lustre 2.8.0 file system should be upgraded to a version of Lustre 2.9.0 that contains the subdirectory mount feature to ensure that the subdirectory mount works on an upgraded system.

Interoperability

When an older client, pre-Lustre 2.9.0, tries to mount a subdirectory, an error should be propagated to the user. When an older server, pre-Lustre 2.9.0, with a 2.9.0 or later client tries to mount a subdirectory, an error should be propagated to the user. These two scenarios need to be tested to ensure that a failure is propagated to the user and that the file system continues to operate correctly with no failure that would impact users of the

system.

Performance Testing

There should be no negative performance impacts when writing to and reading from a subdirectory and when writing to the same directory when the file system is mounted at the top level. The same is true for metadata operations.

In order to confirm the performance impacts of running from a subdirectory, we will run `mdtest`, or similar utility that exercises metadata operations, (1) to a subdirectory when the top level file system is mounted and (2) when the same subdirectory is mounted. The results from both tests should not differ. Read and write bandwidth should be tested in a similar manner to make sure there are no differences in performance.

Dynamic Namespace (DNE) will not be used when doing performance testing.

User Interface

There is a new `/proc` parameter, 'subtree', in `mdc.import` to verify Lustre client has the capability of sub directory mount. Thus, a client can check the `mdc.import /proc` entry and know if sub-directory mounts are supported.

There are no new parameters added to 'lfs' nor 'lctl'.

What Not to Test

No claims of security are established for this version of subdirectory mounts and, thus, no aspects of security will be tested in conjunction with the subdirectory mount feature.

Documentation

Additions to the Lustre manual are tracked under LUDOC-319 with patch <http://review.whamcloud.com/#/c/17701/> .