



# Distributed Name spaceE phase I

## High Performance Data

Di Wang

04/16/2013

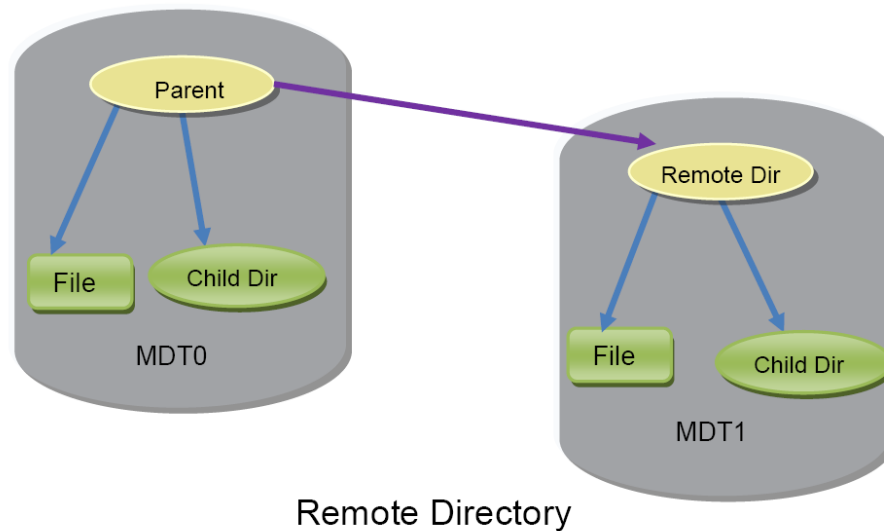
\* Other names and brands may be claimed as the property of others.

# Agenda

- Introduction
- Phase I
  - Remote directory
  - Failover
  - Disk layout
  - Performance
  - Limitation
- Phase II & III

# Introduction

- DNE is sponsored by OpenSFS
- Phase I will be released in Lustre 2.4
- DNE phase I distributes Namespace by remote directory

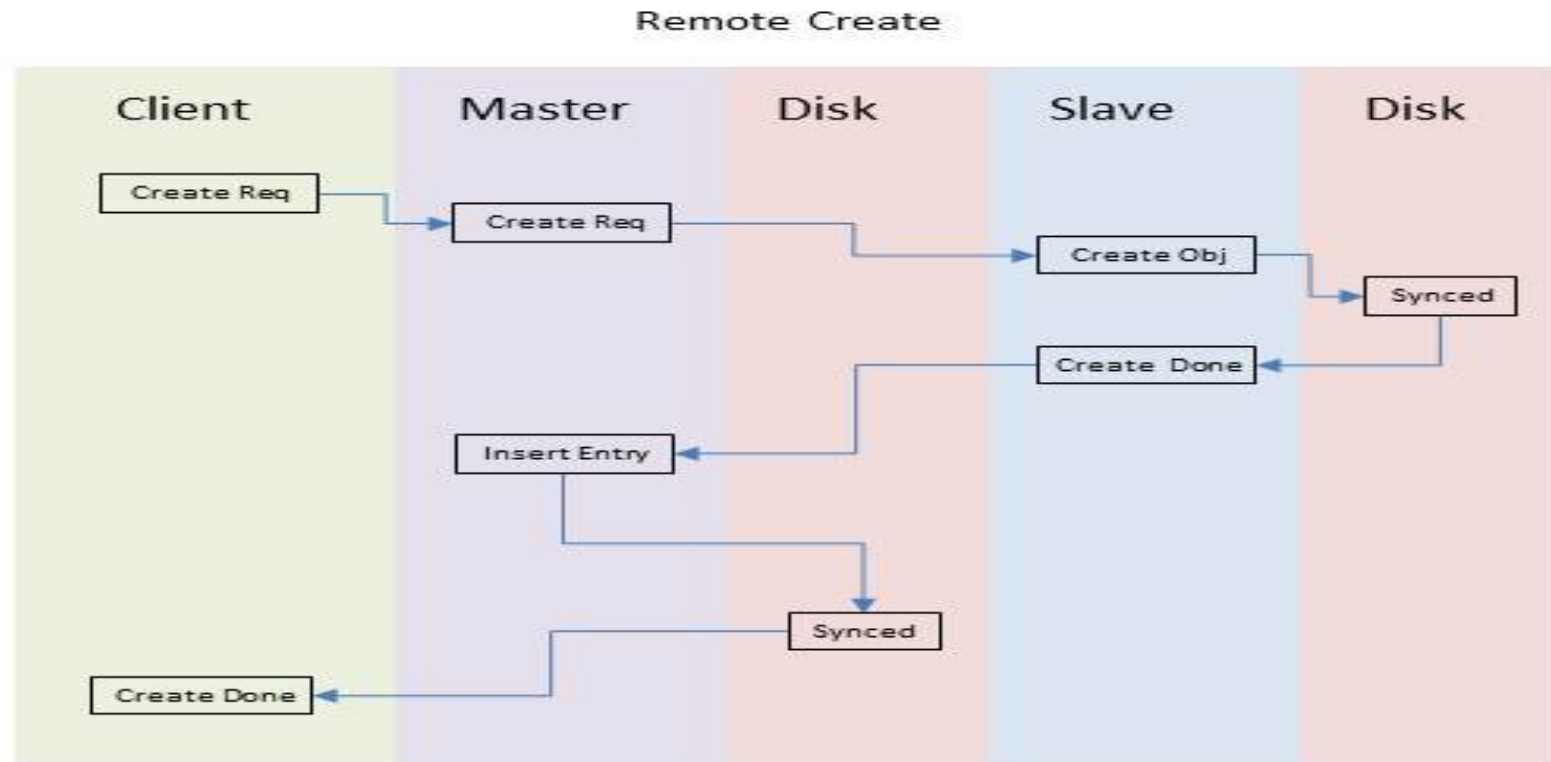


# Remote directory

- Create child on the remote MDT by special lfs command
  - Only the administrator can create the remote directory on MDT0
    - `lfs mkdir -i n remote_dir # create remote directory on MDT n`
    - `rmdir remote_dir # remove remote directory`
    - Parameters to allow normal users to create remote directory on other MDT
      - `Lctl set_param mdt.fsname-MDT0000.enable_remote_dir=1`
      - `Lctl set_param.mdt.fsname-MDT0000.enable_remote_dir_gid=xx`

# Remote directory

- Remote operations are synchronous to avoid recovery problems

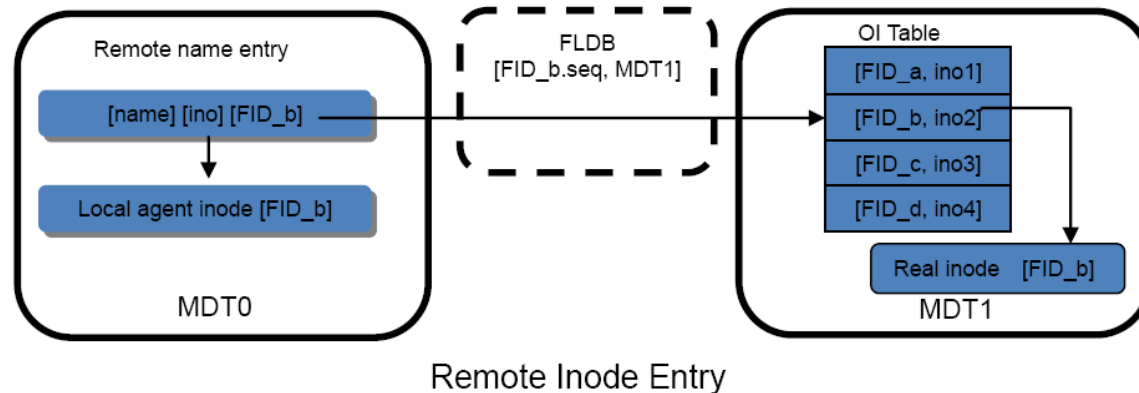


# Failover

- Active-Active failover
  - Allows multiple MDTs to be exported from one MDS
  - Supports active-active failover for metadata as it already does for data
- Permanent MDT failure
  - Failure of MDT0 can make the whole file system inaccessible
  - Failure of other MDTs will isolate any of its subsidiary directory trees

# Disk Layout

- Remote directory



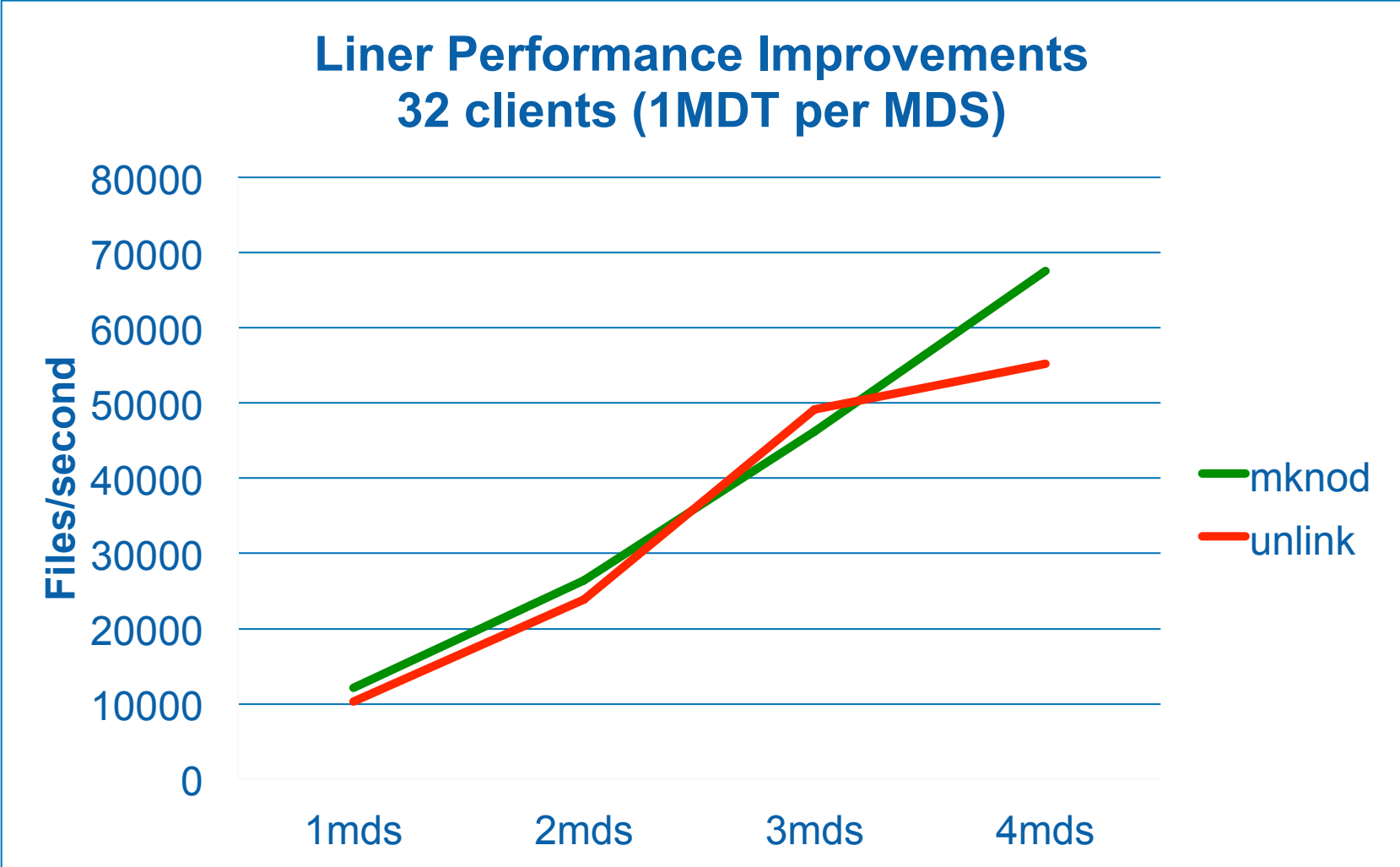
- FID will be stored both in directory entry and EA(LMA) of the directory
- LFSCK phase III will check and fix remote directories online
  - Off-line check is not supported for DNE

# Upgrade to DNE

- All Lustre servers and clients are either 1.8/2.x.
- Shutdown MDT and all OSTs, then upgrade MDT and all OSTs to Lustre 2.4. Remount MDT and OSTs
  - Erase the config log with `tunefs.lustre`, if upgrading from 1.8 to DNE
- Adding new MDT by
  - `mkfs.lustre --reformat -mgsnode=xxx -mdt --index=1 /dev/{mdtn_devn}`  
`mount -t lustre -o xxxxx /dev/{mdtn_devn} /mnt/mdtn`
- Upgrade clients to Lustre version with DNE
  - Non-DNE clients can still access the DNE servers, but only files on MDT0



# DNE performance

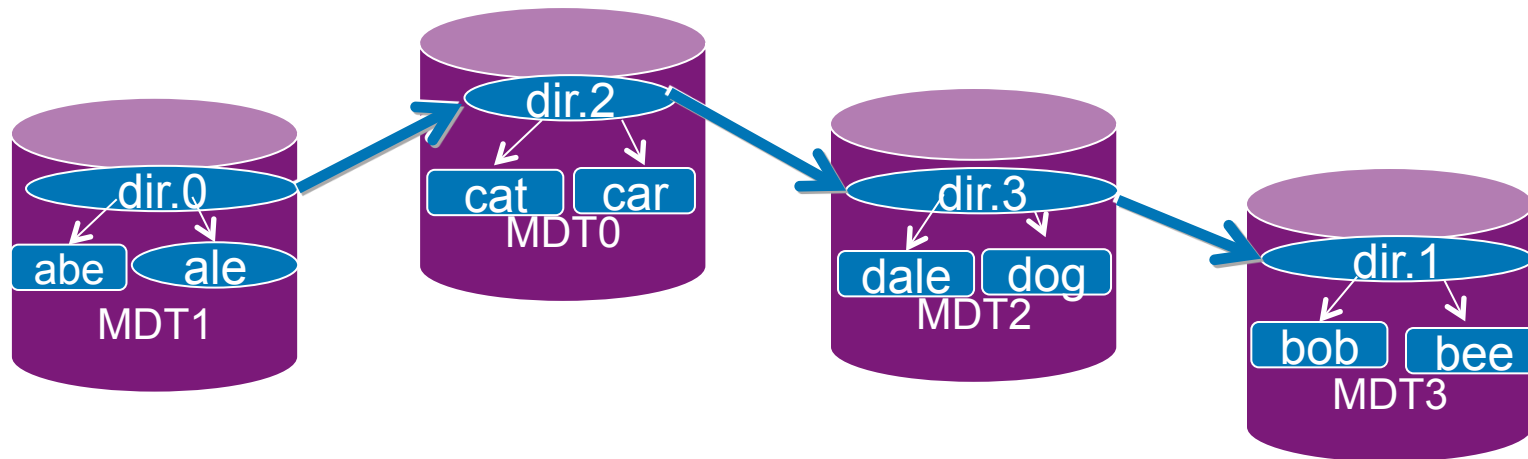


# Limitation

- Only remote directory creation/unlink are allowed, and other remote operations will return –EXDEV
- Cross MDT operations are synchronous
- No FS checking tool for remote directory consistency
- Only using copy/remove to migrate directories/files to the new MDTs

# DNE phase II

- Fully functional DNE
  - Migration tool
  - Any metadata operations can be cross-MDT
  - Normal users can do remote operation
  - No synchronization for cross-MDT operation
  - Shard directory



# DNE phase III

- MDT pools
- Space balancing between MDT and QOS

