MSST
Parallel File Systems
&
Storage Architecture

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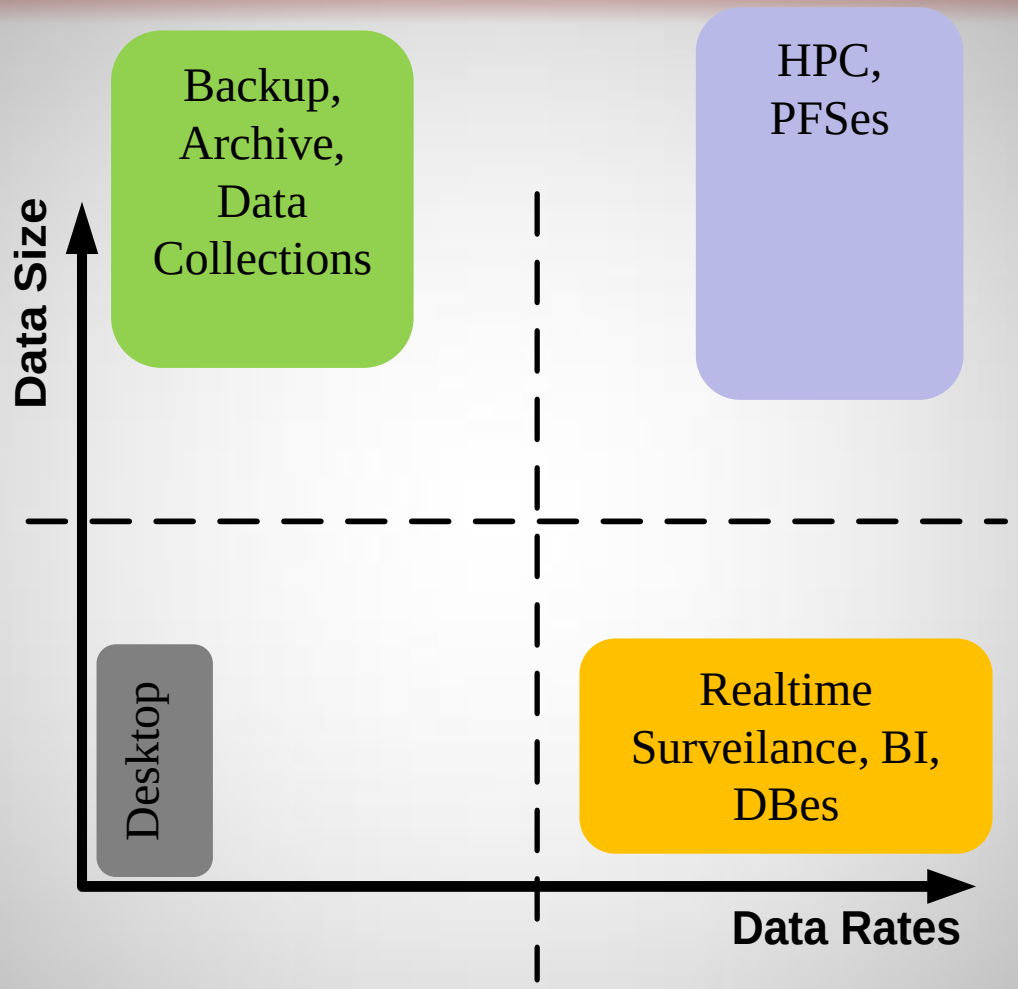
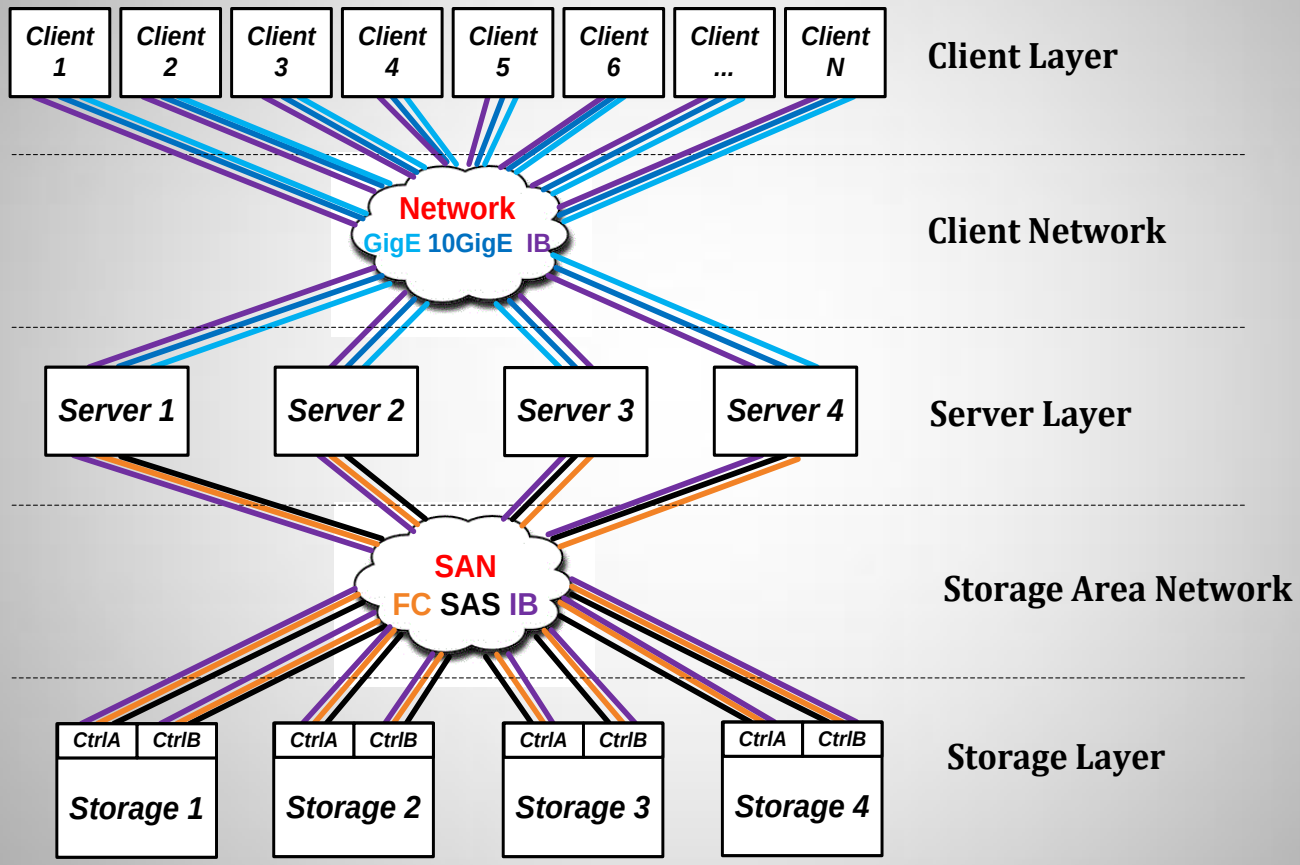
CTO

RAID Inc.

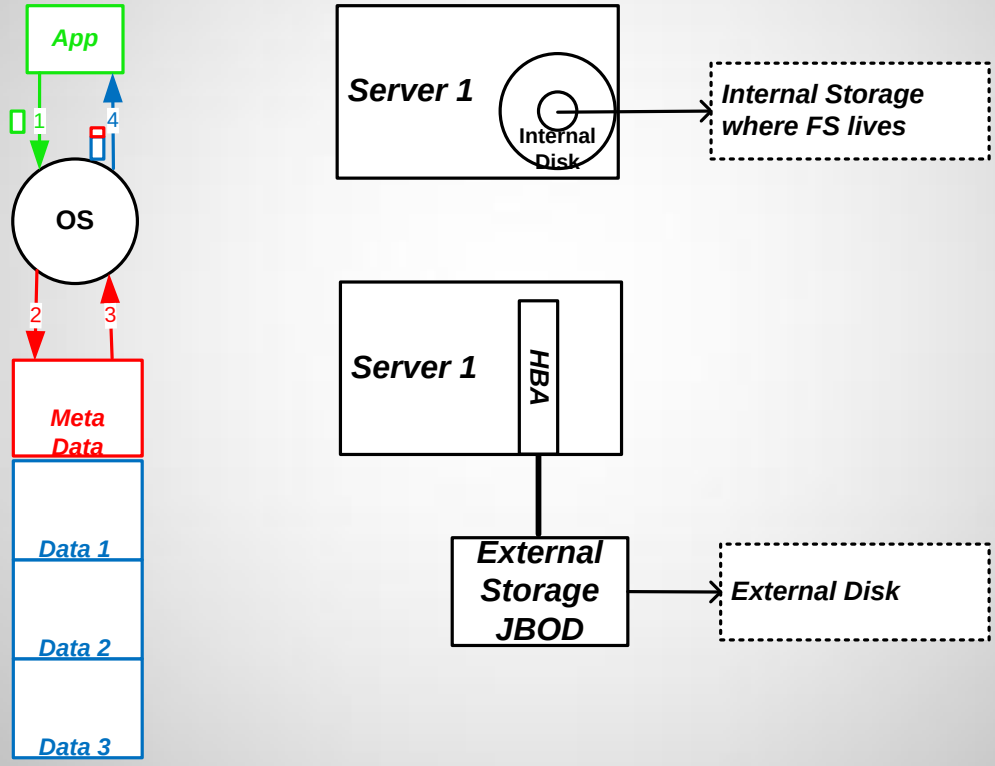
A General View of Big Data



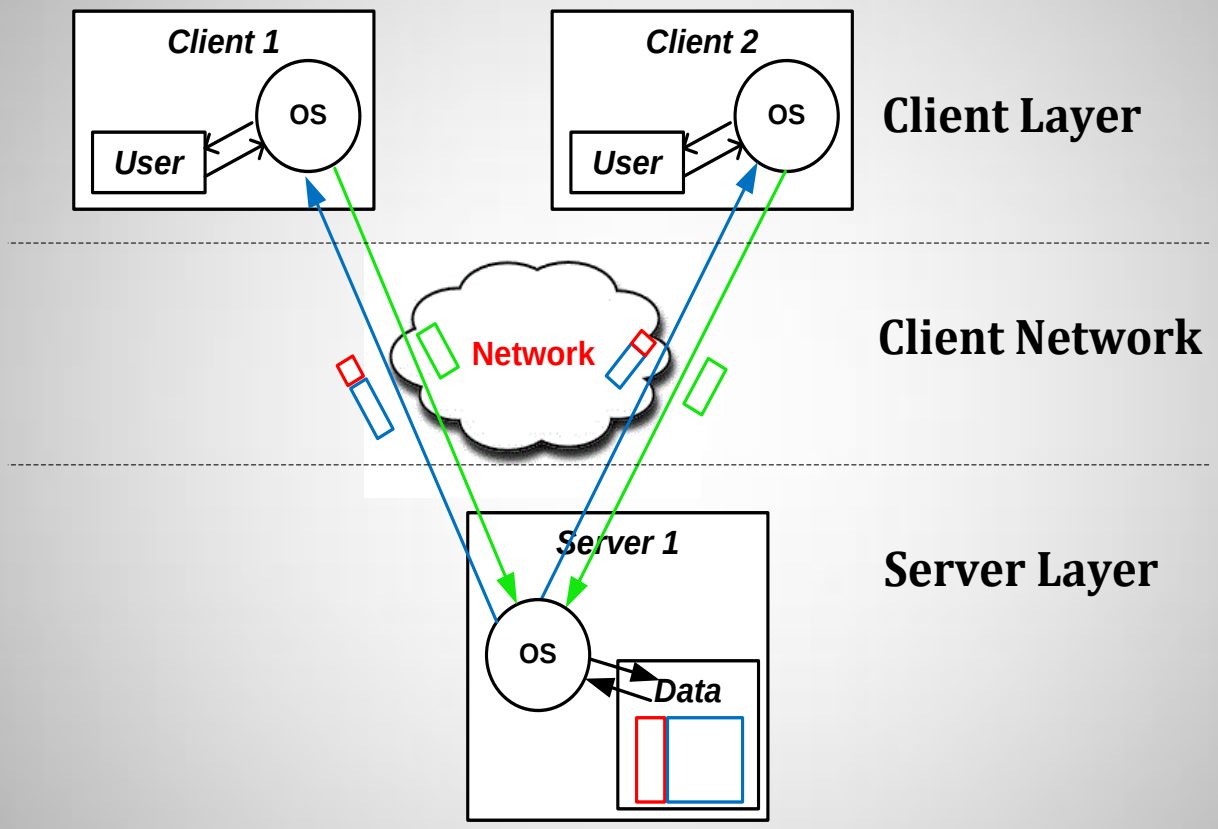
A General View of Cluster File System



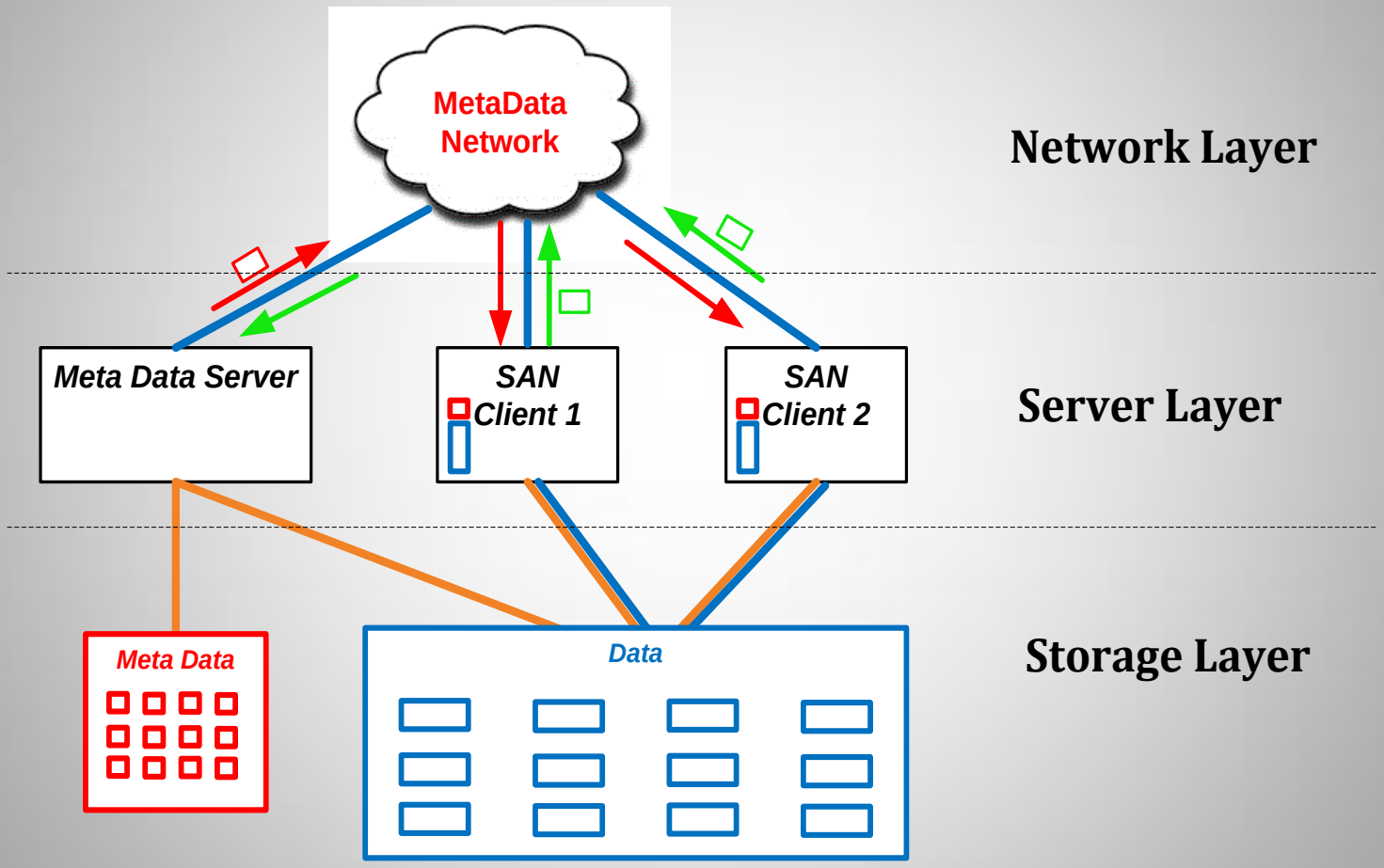
Local File System



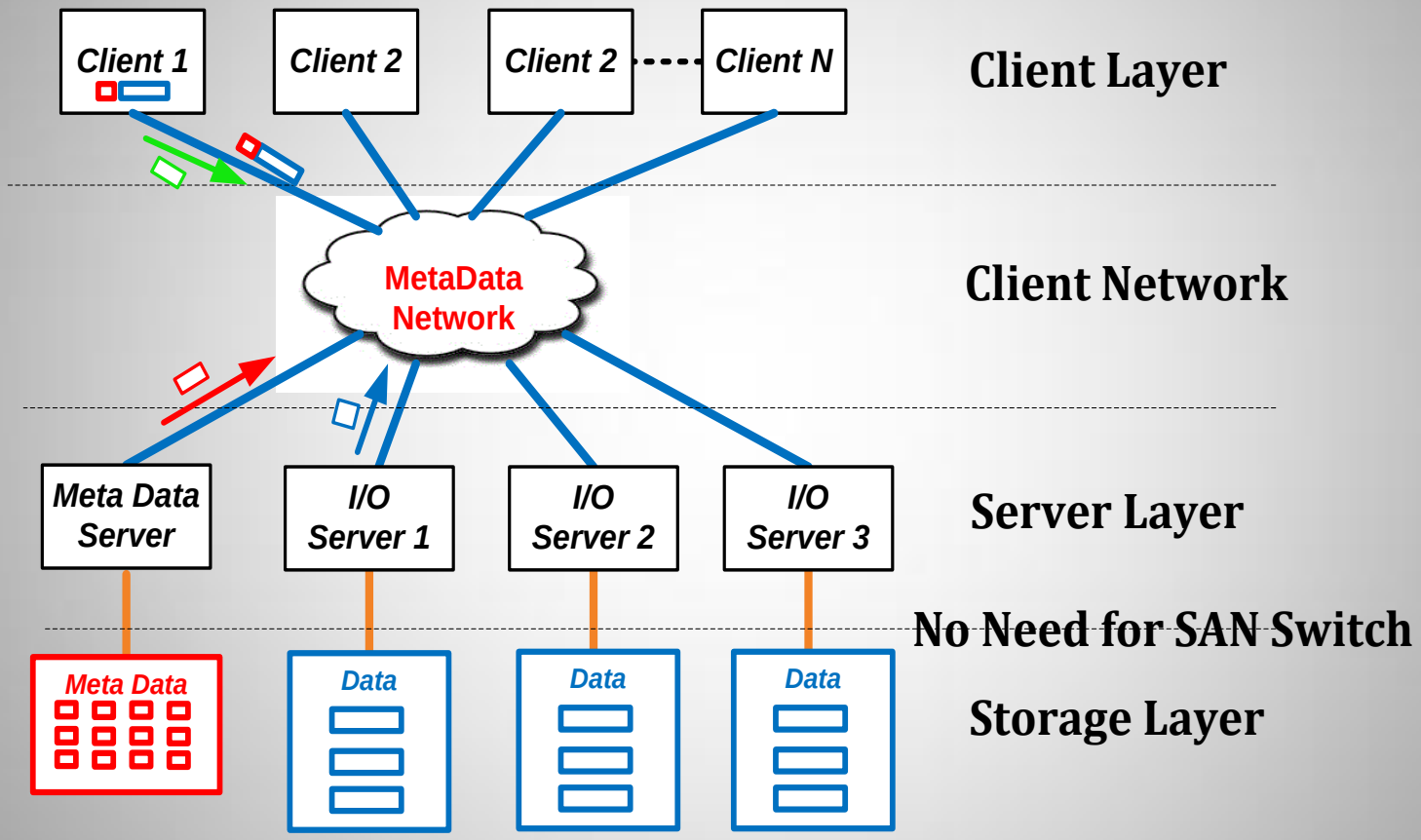
Client-Server and FS : NFS



Shared Disk File System



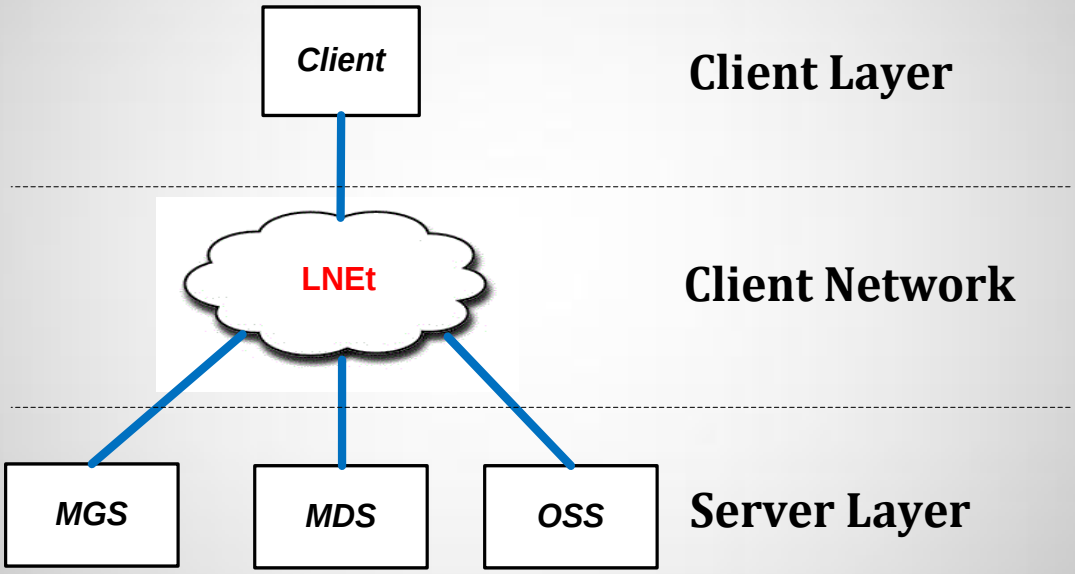
Clustered File System : Lustre



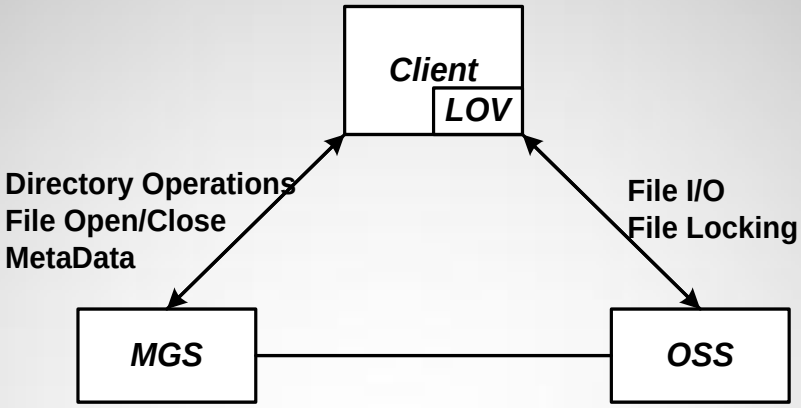
Lustre History

- Designed for HPC Community
- Used by everyone with large-scale needs
  - US National Labs
  - 60 out of Top 100 supercomputers
  - Also seismographic and rendering/animation
- Early use – Beowulf clusters, MPI jobs
- Very large shared file access
  - Processing science data
  - Rendering animation

Lustre Components

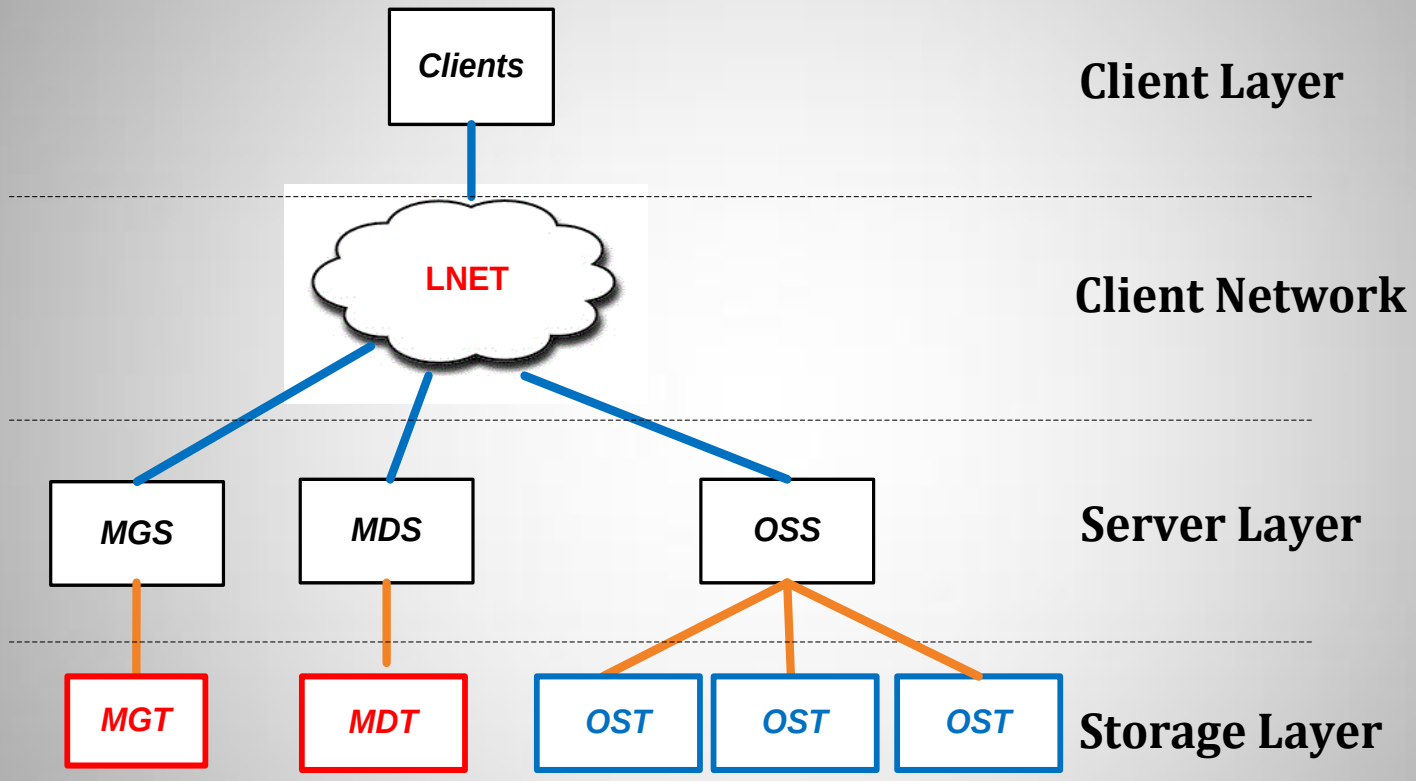


Lustre FS structure



- Client accesses filesystem via Linux VFS, standard IO calls
- VFS talks to Lustre Logical Object Volume (LOV)
- LOV sends request to the proper server
  - Metadata actions to MDS
  - Block IO to OSS
- All transactions handed to LNET for transmission

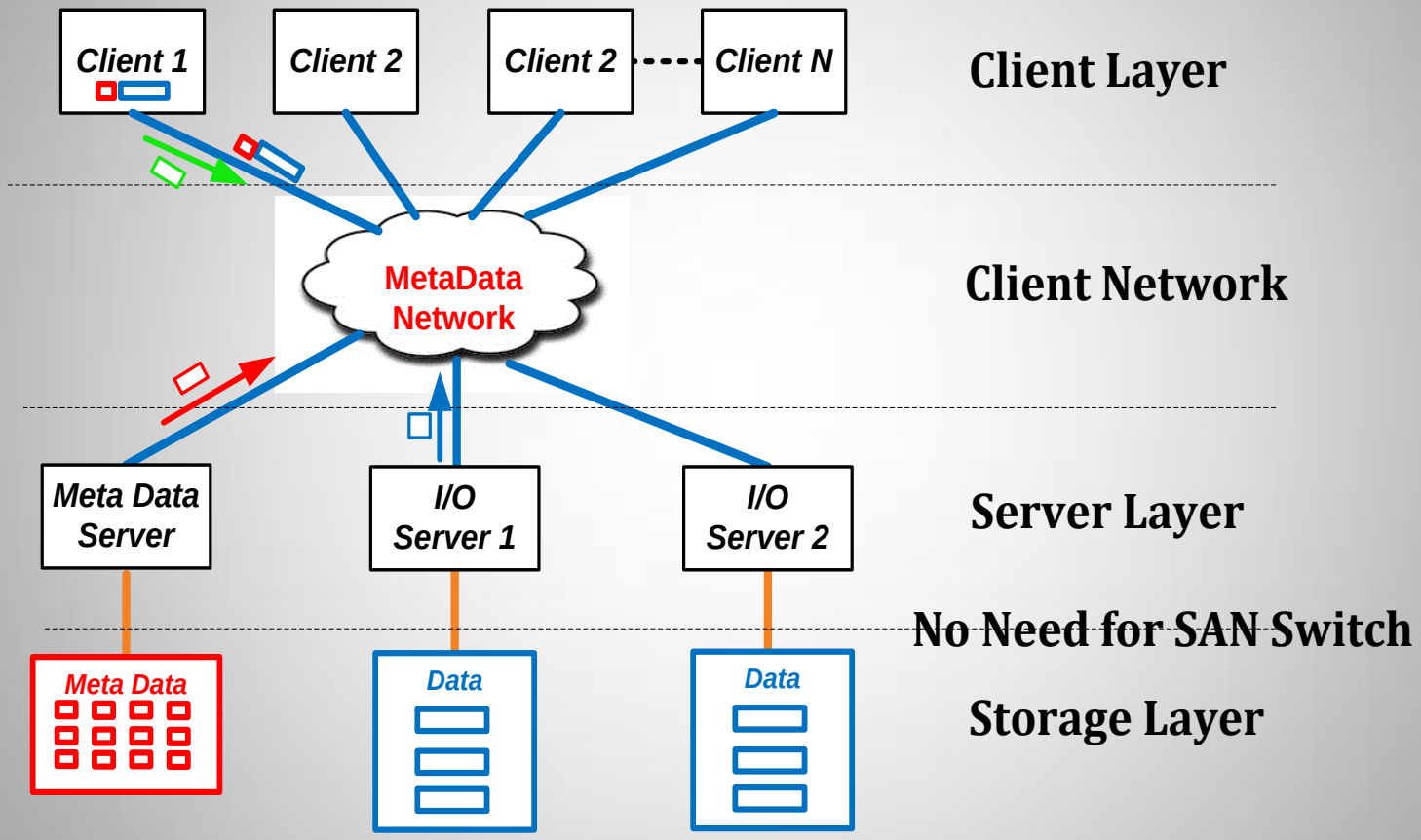
Lustre Storage Components



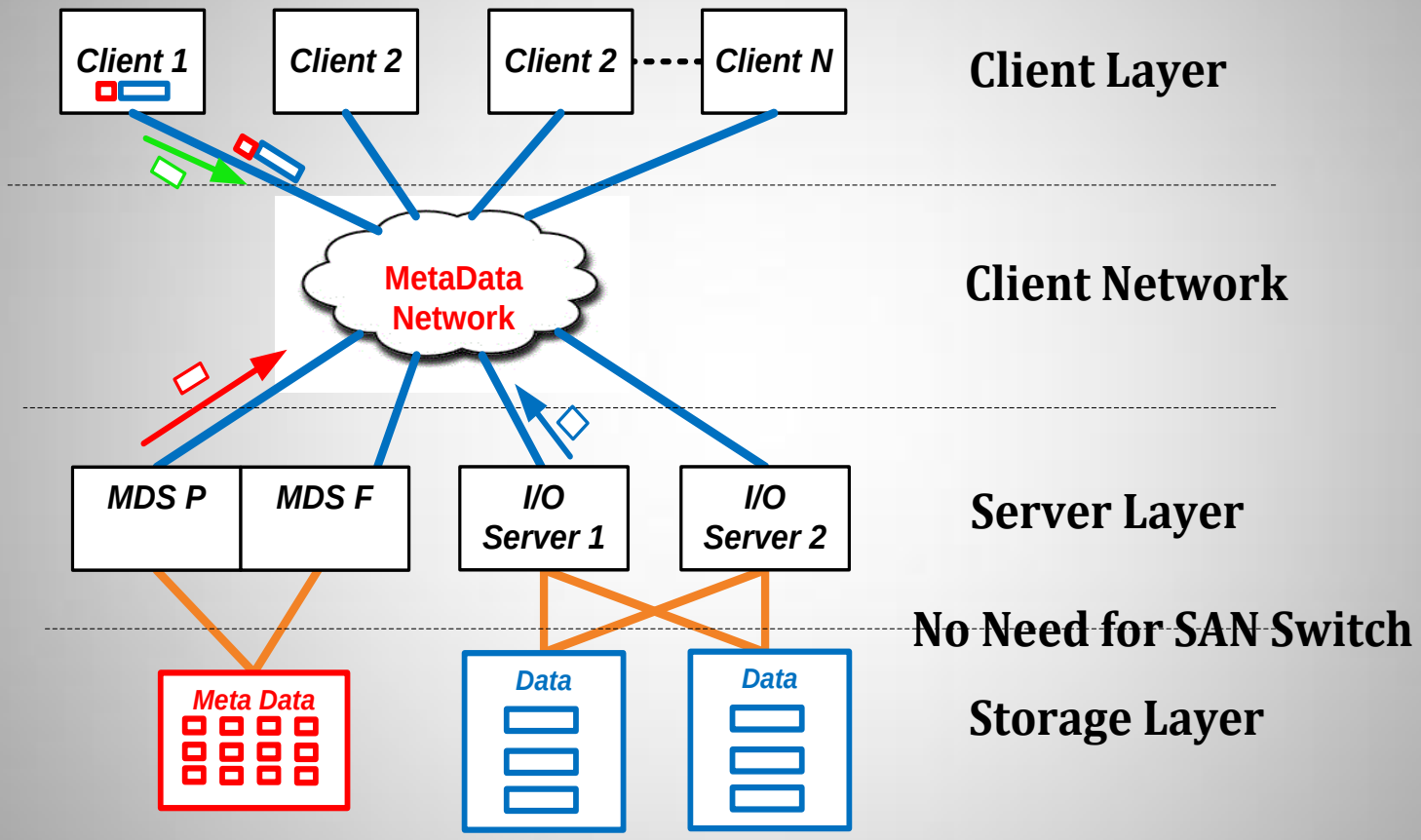
Lustre Storage Considerations

- No data Protection
- No replication
- Can protect nodes with shared storage
- Consider LVM for additional backup of critical data
- Storage health is entirely on storage unit

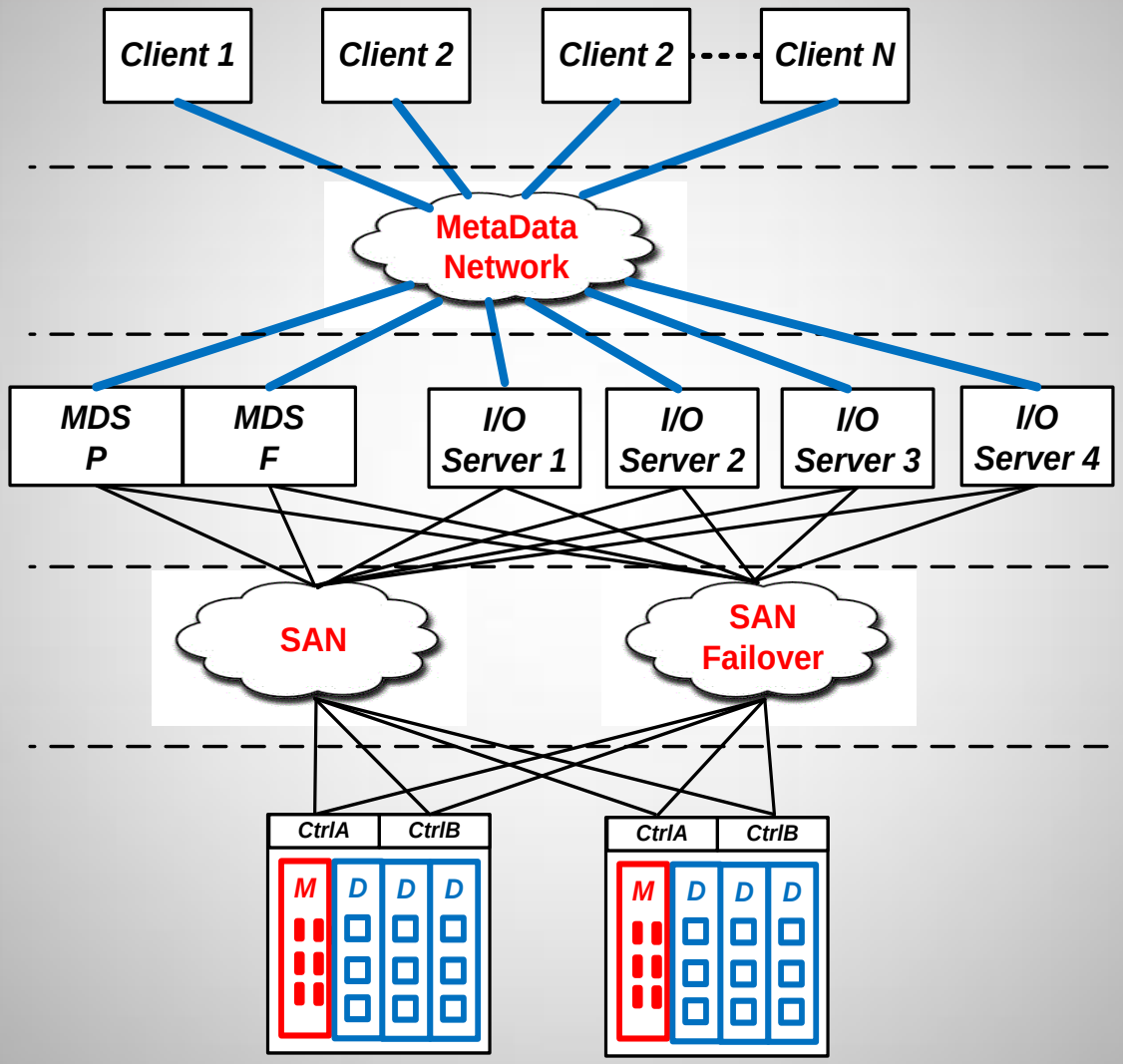
CFS: Simple Lustre



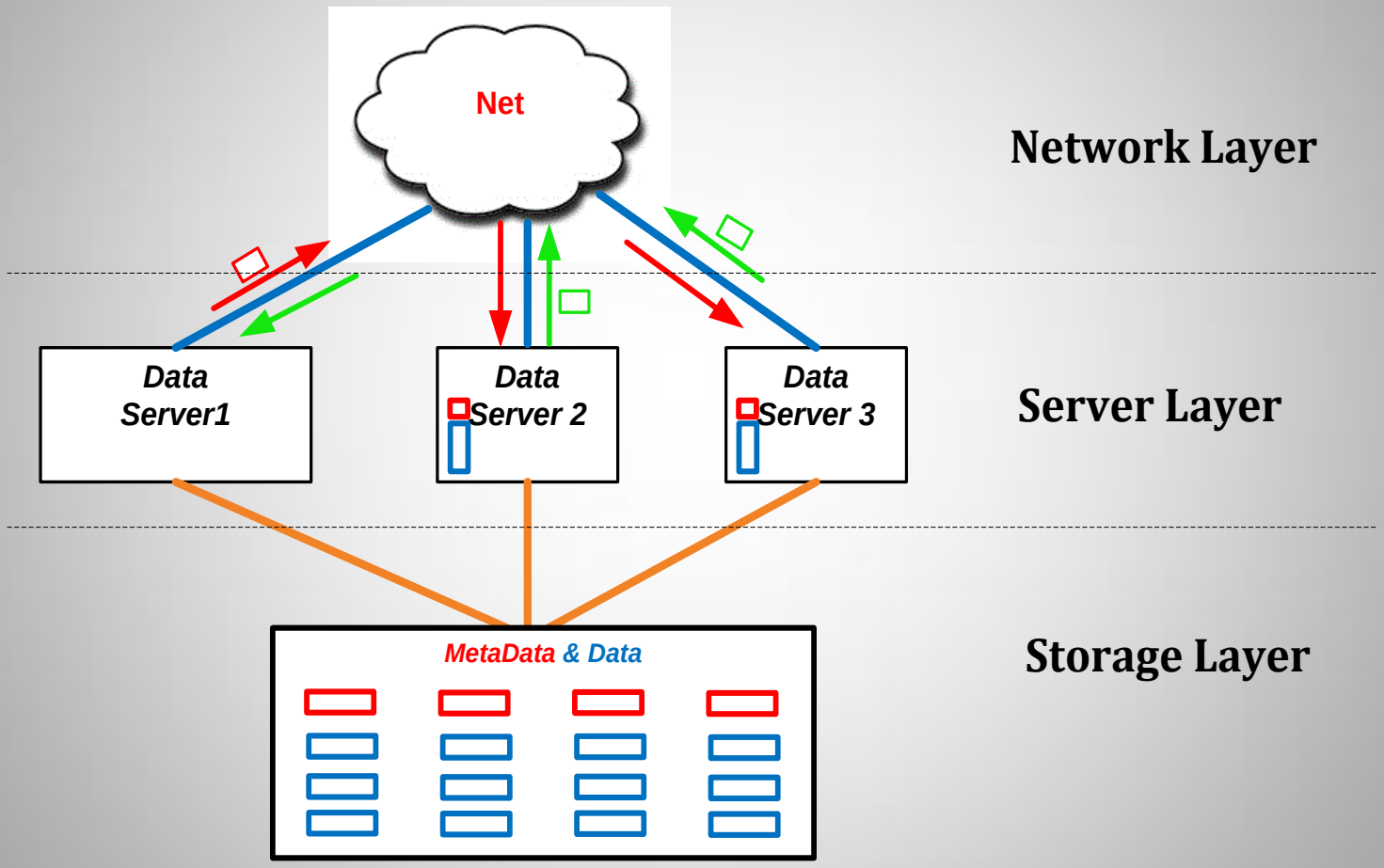
CFS: Simple HA Lustre



Clustered File System : More HA Lustre



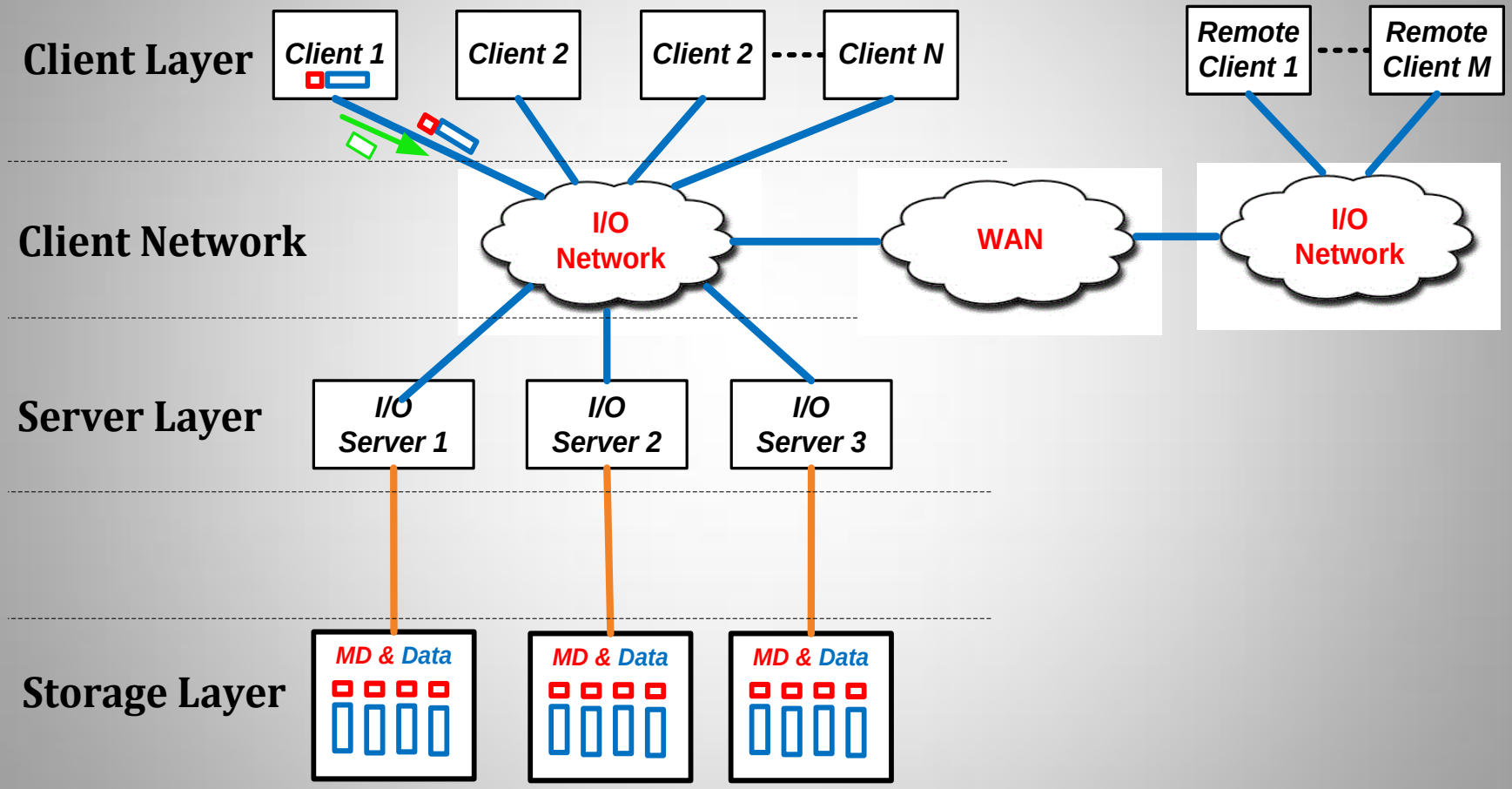
Shared Disk File System: Where GPFS is born



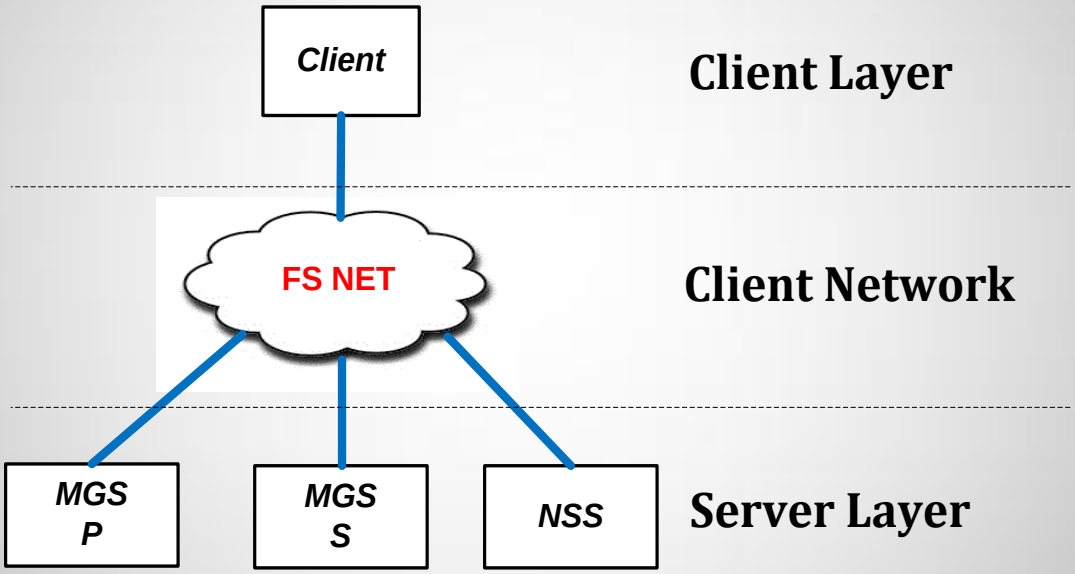
GPFS History

- Video Streaming
- Tiger Shark -Real Time -Streaming -Read Perf -Wide Stripe
- GPFS 2.3
- HPC
- Large Scale Clusters 1000's of nodes
- GPFS 3.1
- ILM - Storage Pools - Filesets - Policy Engine
- Ease of Administration
- Multiple- networks
- Distributed Token Management
- GPFS 3.2
- Faster Failover
- Multiple NSD servers
- GPFS General File Serving

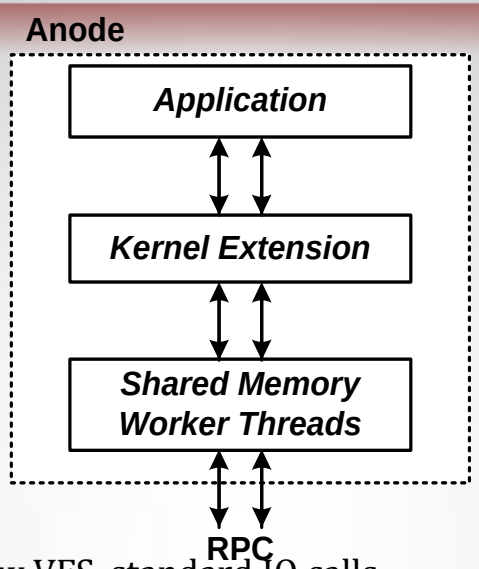
CFS: Where GPFS is now.



GPFS Components

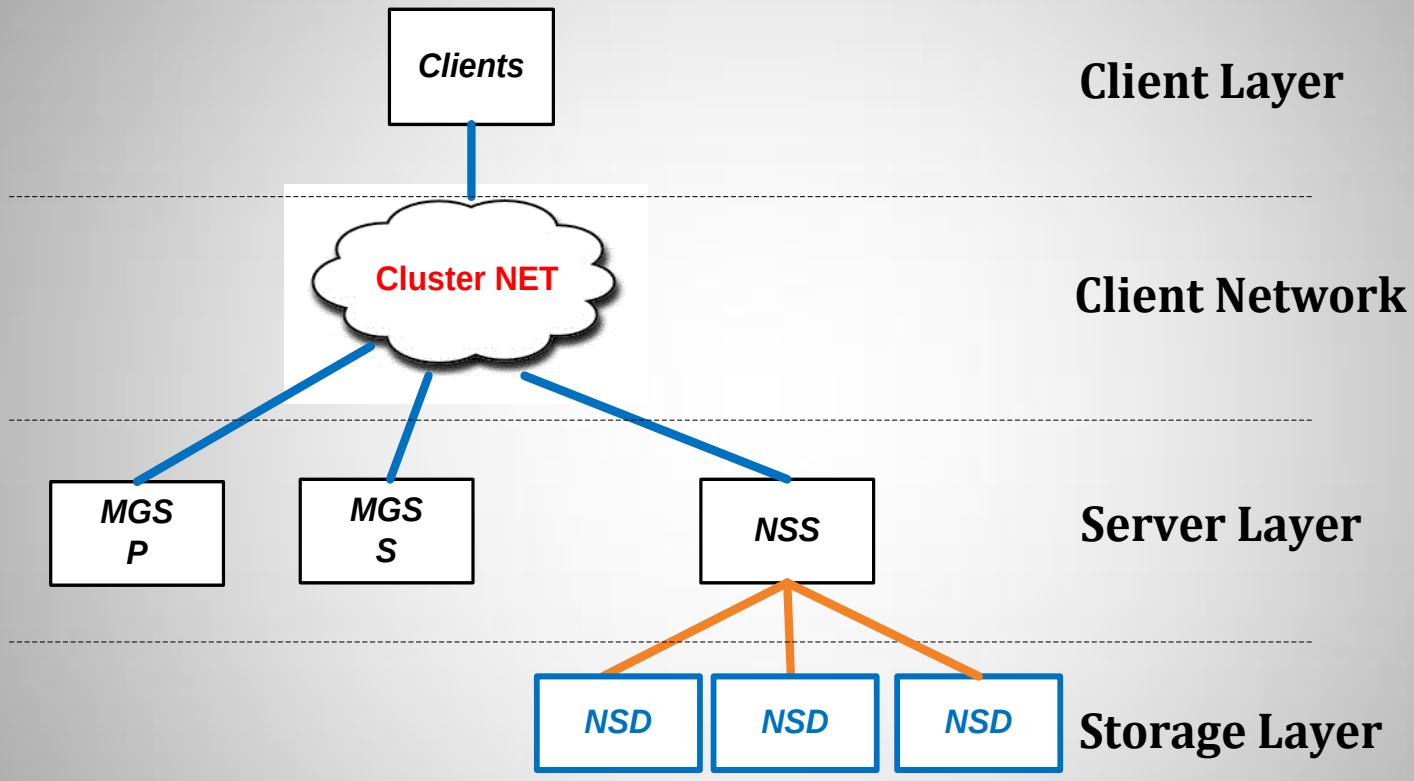


GPFS FS structure



- Client accesses filesystem via Linux VFS, standard IO calls
- VFS talks to Kernel Extension Layer
- Kernel Extension Layer sends request to the proper server
  - Block IO to NSS
- All transactions handed by RPCs.

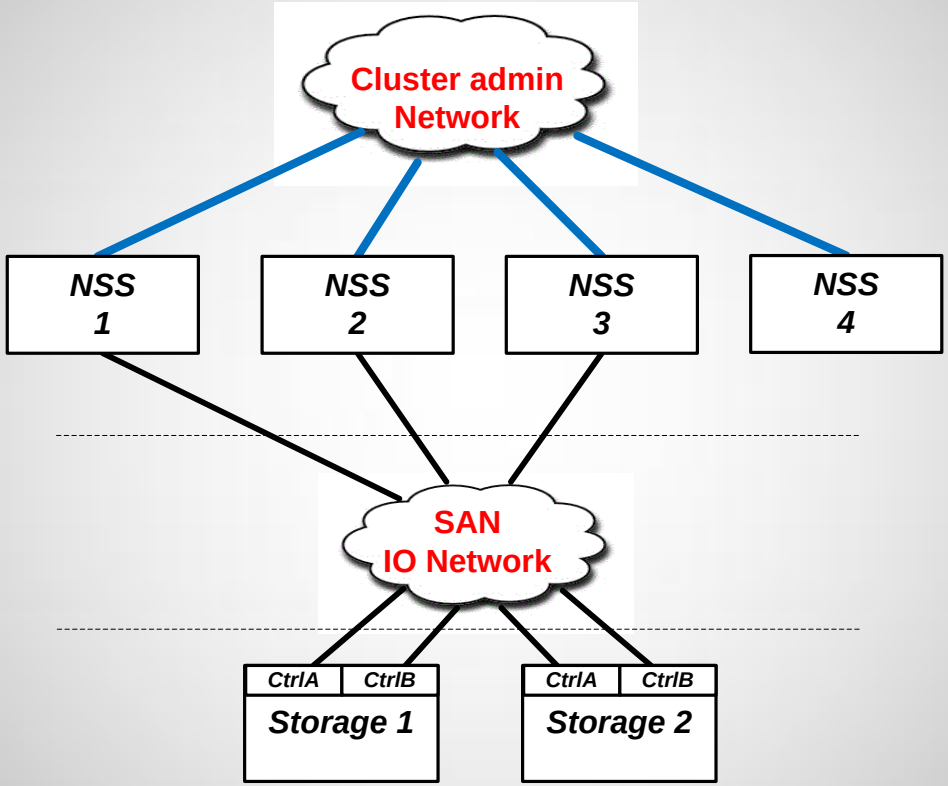
GPFS Storage Components



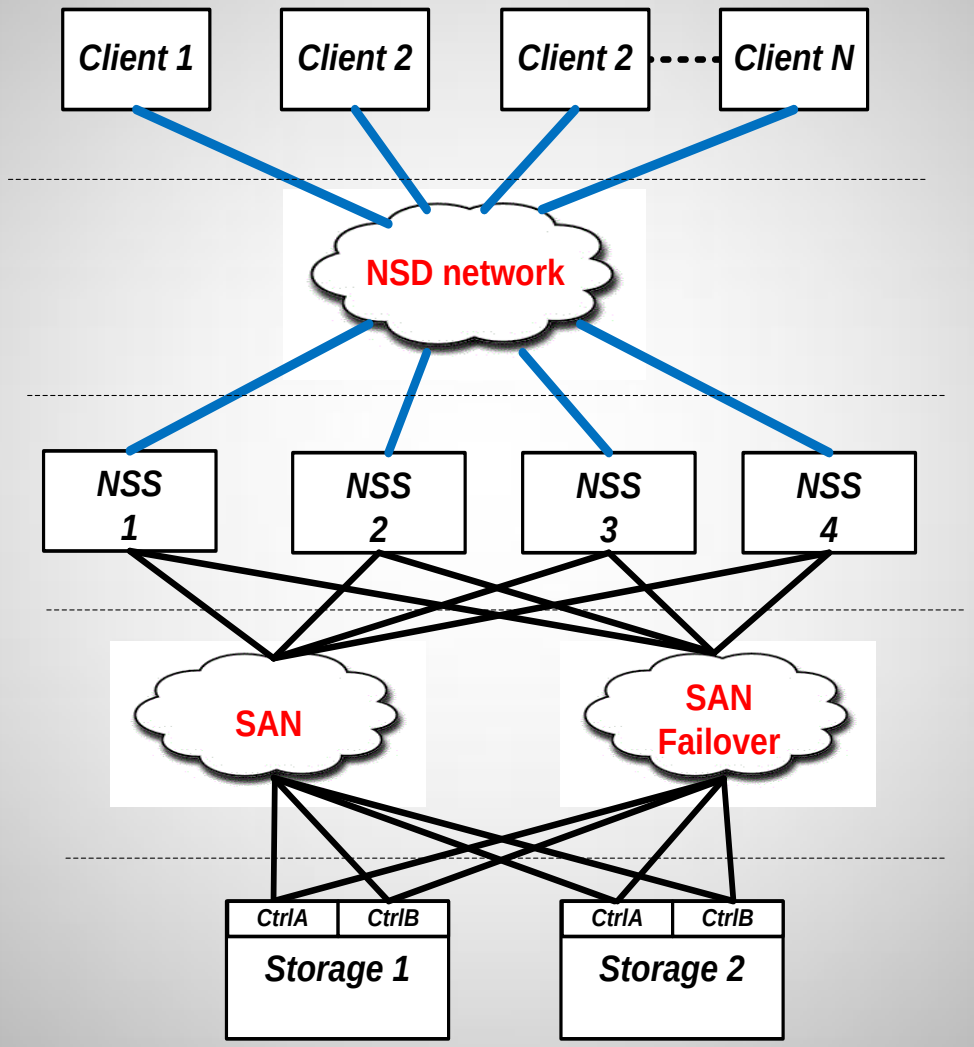
GPFS Storage Considerations

- Replication, yes.
- No protection other than replication
- Can use block devices as well as dm-0 etc.
- Storage health is entirely on storage unit
- Can integrate with HSM especially Tivoli.

CFS: GPFS as Shared Disk



CFS: GPFS as Clustered FS and HA



CFS: GPFS more HA