SMB3-NFS Gateway over Lustre

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SMB3-NFS Gateway over Lustre

- Motivation for SMB3-NFS Gateway on Lustre
- Architectural Goals
- SMB3-NFS over Lustre Architecture
- Unified SMB3 & NFSv3/4 stacks (standalone/cluster mode) – Challenges
- Choice of NFS server
- Choice of SMB server
- Unified SMB3 & NFSv3/4 stacks (standalone/cluster mode) – Solutions

Breadth first, not depth approach
Motivation for SMB3-NFS Gateway on Lustre

- Lustre storage available to non-lustre clients
- Data Visualization – clients Windows, Mac, Linux
- Data Acquisition – non-lustre clients
Architectural Goals

- Security
- High Availability
- Reliability
- Manageability
- Performance
SMB3-NFS over Lustre architecture
Unified SMB-NFS Challenges (Standalone Server)

- User Security
  - Authentication
  - Authorization
- File Sharing mode
- File Locking (byte-range)
- Metadata & data cache, if used by any stack must be unified across protocols, or disabled
- Unified Configuration & Management

Advanced Feature
- SMB Leasing (File & Directory) or Delegation in NFS v4
  - Mechanisms to Break lease/delegation
  - SMB/NFS timeouts
Unified SMB-NFS Challenges (Cluster)

- Cluster configuration (AP, AA)
- Unified metadata cache across nodes
- Unified Installation
- Unified Configuration & Management across nodes
Which NFS server to be integrated?

NFS kernel vs NFS Ganesha

Criteria for selection could be the following features
- NFS versions supported
- Easy maintenance of code
- Modularity
- Interoperability with other protocols
- Performance
Which NFS server to be integrated? (contd.)

NFS Ganesha
Pros:
- NFS versions supported v3, v4
- User mode code, Easy maintenance of code
- Modularity
Cons:
- Performance degrades on disabling the inode & data cache

NFS Kernel
Pros:
- NFS versions supported v3, v4
- Performance
Cons:
- Easy maintenance of code
- Modularity
Which SMB server to be integrated?

Any SMB server that supports (samba, MoSMB,…)

- SMB 2.* & 3.* protocols
- Persistent Handles v1 & v2
- Transparent failover of SMB connections
- File locking
- File sharing modes
- Interoperability with other protocols
- Performance
Unified SMB-NFS Gateway (Standalone) – A potential solution

- Authentication
  - SMB supports AD kerberos authentication
  - NFS supports kerberos authentication

- Authorization
  - NFS supports POSIX ACLs
  - SMB must translate NT ACLs<->POSIX ACLs
  - AD users mapped to Linux uid/gid must be supported by SMB server stack. File access checks must be performed accordingly
Unified SMB-NFS Gateway (standalone) – II
a potential solution

- File Sharing & File Locking
  (Advisory lock support across SMB & NFS)
    - NFS must acquire file-system level lock
    - SMB must acquire file-system level lock
- Unified Configuration & Management
  - CLI based
  - UI based
Unified SMB-NFS Gateway (standalone) – III

a potential solution

- Mandatory SMB Locking support
  - SMB & NFS must have common distributed middleware
  - Checks need to be made before each file open
- SMB Directory & File Leases and NFS Delegation
  - SMB & NFS must have unified distributed middleware
  - Checks need to be made before each file open
Unified SMB-NFS Challenges (Cluster)

- Active-Passive
  - Network Load Balancer VIP (virtual IP)
- Active-Active cluster nodes
  - Network Load Balancer VIP (virtual IP) with load-balancer
  - DNS RR
- SMB & NFS must have common distributed middleware across nodes for locks & leases
- Unified Installation
- Unified Configuration & Management
References

- Lustre
  - http://lustre.org/
- NFS
  - https://nfs-ganesha.github.io/
- SMB
  - https://www.samba.org/
  - https://www.mosmb.com

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