Federated file system status
IETF'72 NFSv4 WG meeting

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Acknowledgments

Many people have contributed!

- Craig Everhart: NetApp ATG

- Renu Tewari, Manoj Naik: IBM/Almaden

- Paul Lemahieu, EMC/Rainfinity

- Mario Würzl: EMC

- Rob Thurlow: SUN

Outline

- Overview
- Current status

Goals

- An open, portable protocol that permits the construction of cross-platform, federated file systems accessible to unmodified NFSv4 clients.
  - Open and portable: anyone can use it
  - Cross-platform: cross-vendor, cross-system, cross-version
  - Federated: federation members don't have to give up control of their systems
- Not meant to replace existing cluster protocols!
  - Cluster-of-clusters protocol

Project history

- 2/2007: Public "federated-fs" community formed at FAST'07
  - Mailing list and weekly conference calls
- 6/2007: First draft of requirements doc
  - Includes common terms and definitions
  - Presented at IETF'69
- 12/2007: First draft of protocol specs
  - Presented at IETF'70 and IETF'71
- 6/2008: Proof-of-concept implementation

Terms and definitions

- Fileset: a directory tree (volume)
- Junction: a fileset object that provides a way for one fileset to reference the root of another
- FSL (fileset location): the location of a fileset instance
- FSN (fileset name): an opaque fileset identifier
- NSDB (namespace database): a service that tracks the mapping between FSNs and FSLs
  - Typically one NSDB per administrative domain
- Each FSN contains an FsnUuid (a UUID) and an NSDB location

Protocol overview

- NFSv4 servers know where the junctions are
  - Can detect when a client accesses a junction
  - Can figure out the FSN of the target fileset
  - How both of these are accomplished are implementation details – not part of the protocol
- NSDBs know where each FSN is implemented
- NFSv4 servers contact the NSDBs to find where to redirect clients when the client accesses a junction
- Administrators manage the junctions and the FSN->FSL mappings

Three sub-protocols are being proposed

1. Resolution (server to NSDB): where are the filesets?
2. NSDB administration (admin to NSDB): FSN->FSL map
3. Junction management (admin to server): create, delete, manage junctions

Note: no changes to client protocols

NSDB

Resolution

NSDB administration

Cluster

NFS
Server

Admin

Junction management
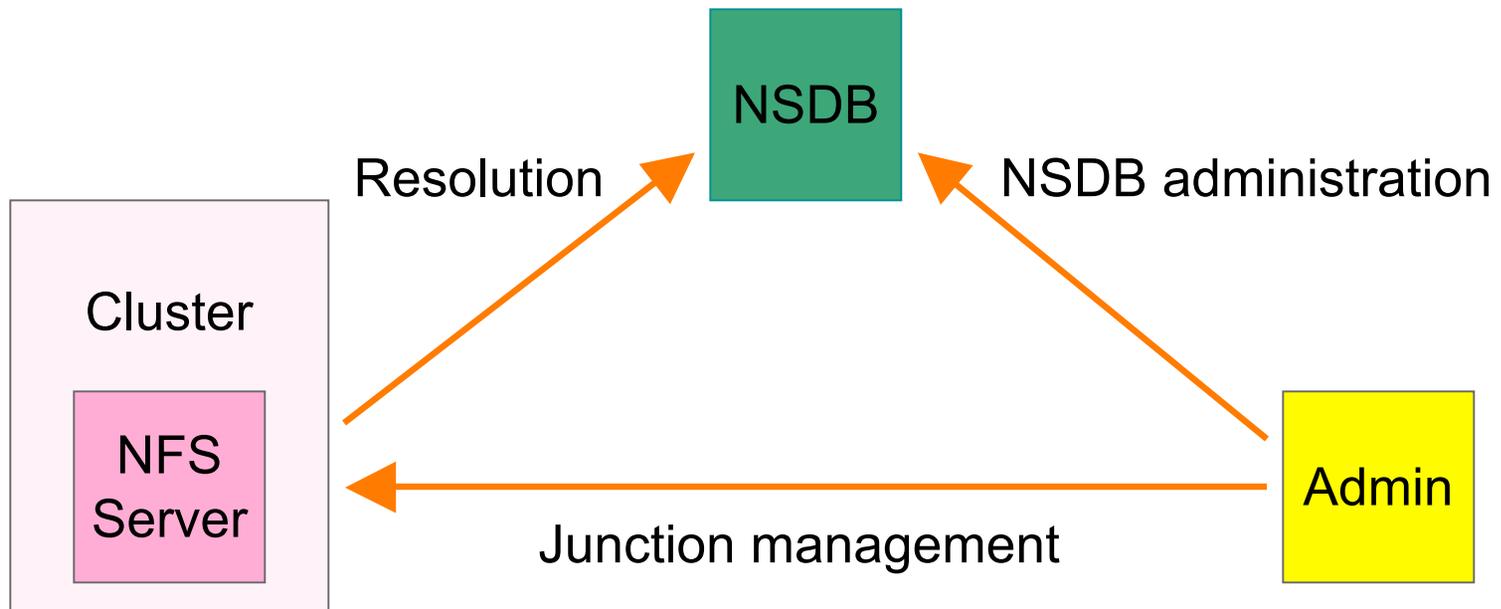
Status

- Requirements draft fairly stable
  - Common terms and definitions agreed upon
- Three sub-protocol drafts in progress
  - Resolution protocol: farthest along
  - NSDB admin protocol: personal draft
  - Server admin protocol: straw man proposal

Open issues

- Much discussion over a possible fourth sub-protocol for root fileset discovery
  - May require changes to the client (bad)
  - May simplify configuration of the client (good)
- Current NSDB based on LDAP
  - LDAP is a convenient platform for a directory
  - LDAP might not be adequately extensible
- Cross-enterprise authentication/identity
  - How effectively can we federate identity without mutual trust?
- We could really use a fileset migration protocol

Conclusions

- We believe that this work is ready to be picked up by the NFSv4 WG and added to charter
  - Proposed on the nfsv4 mailing list
  - All responses were positive
- For more information, join the federated-fs mailing list:

  federated-fs@sdsc.edu