



Where is NFS version 4?

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NFSv4 History

- Once there were NFS versions 2 and 3
- Then along came the IETF process
- NFSv4 BOF held in December 1996
- First WG meeting held August 1998
- RFC 2624 "Design Considerations" June 1999
- <lot of work happened here>
- RFC 3010 "NFS version 4" Dec 2000

RFC 3010

- A "wonderfully" written 212 page protocol specification
- IETF Proposed Standard
- Is it big?
- Is it perfect?

What is in NFSv4?

- Improved access and good performance on the Internet
- Strong security with negotiation built into the protocol
- Better cross-platform interoperability
- Designed for protocol extensions

What is really in NFSv4?

- One Protocol
- COMPOUND operations
- Namespace changes
 - No MOUNT protocol
 - Use of "pseudo filesystem"
- File locking
- OPEN/CLOSE
- Lease based state model



What is in NFSv4? (cont)

- Security – Kerberos V5, SPKM-3, LIPKEY, In-band negotiation
- Filehandle types (persistent/volatile)
- Attribute model is expandable
 - Mandatory, recommended, named, ACLs
- Replication and Migration
- Delegation (stronger client caching)
- Minor Versioning

So where is it?

- First NFSv4 "bakeoff" held Oct '99
- 2 Connectathons and 3 more bakeoffs since that time
- Fifth bakeoff currently being held
- 7 operating environments have been represented at the bakeoffs

Updates to RFC 3010

- Implementation work has helped identify mistakes or vague specification
- Current "to do" list is approximately 140 items
- Majority are simple changes
 - error code additions for example
- Some larger changes needed
 - OPEN state model

What went wrong?

- Nothing!
- The IETF process is working as expected
- Our implementation experience is driving towards a stronger protocol and specification
- RFC 3010 will be updated



Interesting Protocol Issues

- OPEN state model's support of Posix process and locking model
- Clarify recovery mechanisms when server and client are out-of-sync
- OPEN_DOWNGRADE
- Other clarifications...



Non-traditional NFSv4 implementations...

- TCL client (nfsv4shell)
- Python client – new work
- Java client and server
- Unknown others possibly exist



nfsv4shell

- TCL based NFSv4 client
- Intent is to provide framework for writing test cases to verify NFSv4 server behavior
- Initial source and ongoing project available at nfsv4shell.sourceforge.net
- Project is open to any contributors

Move to Draft Standard

- Update of RFC3010 early 2002
- Latest proposed updates and working documents are at: www.nfsv4.org
- Earliest move to Draft is Fall 2002
- Based on implementation work to date, this is likely

NFS Vendors Conference

