NFSv4.2 and beyond

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NFS

Client

NFS

Server
NFS Version 4 Minor Version 2

draft-ietf-nfsv4-minorversion2-26.txt

Abstract

This Internet-Draft describes NFS version 4 minor version two, focusing mainly on the protocol extensions made from NFS version 4 minor version 0 and NFS version 4 minor version 1. Major extensions introduced in NFS version 4 minor version two include: Server Side Copy, Application I/O Advise, Space Reservations, Sparse Files, Application Data Blocks, and Labeled NFS.
Network File System Version 4 (nfsv4)

Charter for Working Group

NFS Version 4 is the IETF standard for file sharing. To maintain NFS Version 4's utility and currency, the working group is chartered to maintain the existing NFSv4, NFSv4.1, Federated Namespace, and related specifications. The working group will also consider a new NFSv4 minor version in the form of NFSv4.2 and supporting protocols. Finally, deployment guidance will be collected for deployments of the NFSv4 FedFS implementations and their interaction with integration with new user authentication models.

Maintenance

The working group has found that as NFSv4 implementations mature and deployments continue, clarifications to existing RFCs are needed. These clarifications assist vendors in delivering quality and interoperable implementations. The working group is chartered with the vetting of the issues and determining correctness of submitted errata. In the case that the needed changes are inappropriate for the errata system, the working group will assist in publication of RFCs that provide either editorial modification to original RFCs or best practices RFCs. The completion of RFC3530bis is the first work item. RFCs expected to generate the most discussion or activity are: RFC 5661, RFC 5662, RFC 5663, and RFC 5664.

RFC5064bis

The NFSv4.1 Objects Layout needs some additional clarification that are to be documented in a bis update. The working group will work final issues and deliver an RFC for the clarifications.

NFSv4.2

For some time, the working group has discussed the requirements for the next NFSv4 minor version. A consensus has formed within...
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- Mar 09 2015
  - Re: [nfsv4] draft-hellwig-nfsv4-scsi-layout-00.txt, Black, David

- Mar 09 2015
  - Re: [nfsv4] Agenda posted for IETF92 - Thursday morning, Tom Haynes
  - Re: [nfsv4] Agenda posted for IETF92 - Thursday morning, David Noveck
  - Re: [nfsv4] Agenda posted for IETF92 - Thursday morning, Andy Adamson
  - Re: [nfsv4] draft-hellwig-nfsv4-scsi-layout-00.txt, Christoph Hellwig
  - [nfsv4] draft-hellwig-nfsv4-scsi-layout-00.txt, Tom Haynes

- Mar 06 2015
  - Re: [nfsv4] client retry and timeouts, Tom Talpey
  - Re: [nfsv4] client retry and timeouts, Frank Filz
  - Re: [nfsv4] client retry and timeouts, Tom Haynes
  - Re: [nfsv4] client retry and timeouts, Malahal Nainen
  - Re: [nfsv4] client retry and timeouts, Tom Talpey
  - Re: [nfsv4] client retry and timeouts, Trond Myklebust
  - [nfsv4] client retry and timeouts, Mkrtchyan, Tigran

- Mar 05 2015
  - Re: [nfsv4] Last call on NFSv4.2 - ends on March 13 ( Re: Draft 33 [was Re: Draft 32 of NFSv4.2]) , Tom Haynes
  - [nfsv4] Last call on NFSv4.2 - ends on March 13 ( Re: Draft 33 [was Re: Draft 32 of NFSv4.2]) , Spencer Shepler
  - [nfsv4] Last call on NFSv4.2 - ends on March 13 ( Re: Draft 33 [was Re: Draft 32 of NFSv4.2]) , Tom Haynes
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  - [nfsv4] Last call on NFSv4.2 - ends on March 13 ( Re: Draft 33 [was Re: Draft 32 of NFSv4.2]) , Spencer Shepler
  - Re: [nfsv4] NFSv4.2 XDR proposed changes for COPY operation, Tom Haynes
  - Re: [nfsv4] NFS4.2 netloc_type4 definition, Olga Korniyevskaia
  - Re: [nfsv4] NFS4.2 netloc_type4 definition, Tom Haynes
  - Re: [nfsv4] Draft 32 of NFSv4.2, Chuck Lever
  - Re: [nfsv4] NFS4.2 other documentation changes, Olga Korniyevskaia
Process

Specify protocol

Implement in Linux

Include in distributions
Process

Specify protocol

Implement in Linux

Include in distributions
NFSv4.0 timeline

- 1998 August: working group created
- **2002 October:** first code merged in 2.5.42
- 2002 December: published RFC 3010 (obsolete)
- 2003 April: published RFC 3530
- **2005 February:** RHEL4 includes NFSv4
- **2010 August:** lost EXPERIMENTAL flag
- **2010 November:** RHEL6 defaults to NFSv4
NFSv4.1 timeline

- 2003 May: draft-talpey-nfsv4-rdma-sess-00
- 2005 October: draft-ietf-nfsv4-minorversion1-00
- 2008 December: draft-ietf-nfsv4-minorversion1-29
- 2009 June: First code merged in 2.6.32
- 2010 January: RFC 5661
- 2010 August: “Developer-only” marking removed
- 2010 November: RHEL6 includes NFSv4.1
- 2013 February: RHEL6.4 includes pNFS
NFSv4.2 timeline

- 2011 April: draft-ietf-nfsv4-minorversion2-00.txt
- 2013 May: labeled NFS merged in 3.11
- 2014 June: RHEL7 includes labeled NFS
- 2015 March: draft-ietf-nfsv4-minorversion2-33.txt
NFSv4.0 - features

- Delegations
- Optional security (RPCSEC_GSS)
- Firewall friendliness
  - (Except, oops: callbacks)
NFSv4.1 - features

- Sessions
  - (Fix the callback problem)
- pNFS
NFS4.1 - pNFS
NFSv4.2

- Security labels
- Sparse file optimizations
- Space reservation
- Server-side copy
- IO hints
- ADB support
NFSv4.2 – Security labels

- New SEC_LABEL attribute
- Allows (partial) SELinux support
- In 3.11 (September 2013)
- In RHEL7 (June 2014)
NFSv4.2 – Sparse files

- SEEK(file, offset, HOLE|DATA) -> offset
  - Used to implement lseek()
  - In 3.18 (October 2014)
  - Not in RHEL yet

- READ_PLUS()
  - Some questions about protocol
  - Patches exist, not upstream
NFSv4.2 – Space reservation

• ALLOCATE(file, offset, length),
  DEALLOCATE(file, offset, length)
  • Used to implement posix_fallocate()
  • In 3.19 (December 2014)
  • Not in RHEL yet
NFSv4.2 – Server-side copy

COPY (from, offset, to, offset, count) -> count
NFSv4.2 – IO hints

• IO_ADVISE(file, offset, length, hints)
  • posix_fadvise()
NFS – other new developments

- NFS/RDMA
- RPCSEC_GSSv3
- FedFS
- Flex-files pNFS layout
Beyond NFSv4.2

- NFS xattrs?
- pNFS for directories (metadata striping)?
- Byte-range delegations?
References

http://linux-nfs.org
http://datatracker.ietf.org/wg/nfsv4