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The Evolution of the NFS Protocol:
NFSv4, NFSv4.1, NFSv4.2, Secure NFS

Steve Dickson
Red Hat, Inc
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NFS Version 4.0

- NFS version 3 most used! Why Change it???
  - Performance!

- Version 4 is now the default protocol version for RHEL6

- Its all Legal!
NFS Version 4.0 – Noteworthy Features

- Version 4 is a Stateful Protocol.
  - Delegations

- Mandated Security

- Referrals

- Firewall Friendly (kinda!)
NFS version 4 – Gotchas!

- “All My files are owned by NOBODY!!!”
  - Idmappings: steved@redhat.com ➞ 3606
  - DNS problem 90% of the time
  - 'Domain=' in /etc/idmapd.conf

- Mounting Legacy servers.
  - Mount negotiation start at v4
  - For Legacy server use /etc/nfsmount.conf mount negotiation
NFS version 4 – More Gotchas!

- Microsoft 2012 Servers
  - No version 4.0 support Only v4.1,v3,v2
  - mount -o minorversion=1
  - RHEL6.4 & RHEL Z-streams
NFS version 4.1

- Sessions
  - Session IDs
- Parallel NFS (pNFS)
  - File Layout (NAS environment) - Netapp
  - Block Layout (SAN environment) - EMC
  - Object Layout (High Perf environment) – Panasas

- IETF: RFC5661
NFS version 4.1 In RHEL

- RHEL6 Client
  - Tech Preview in 6.2
  - pNFS: File layouts only

- RHEL7 Client
  - All layouts supported.
NFS version 4.1 In RHEL

- RHEL7 4.1 Sever
  - No pNFS support
  - Firewall Friendly Callbacks
  - Exactly Once Semantics (sessions)
NFS version 4.1 – Make it work!

- Enabling 4.1/pNFS on the client
  - `mount -o minorversion=1`

- Does the server support pNFS
  - `nfs4filelayout_init: NFSv4 File Layout Driver Registering..`
  - “pnfs=<layout>” in `/proc/self/mountstats`
NFS version 4.2

- Labeled NFS
  - Security contexts
- Server to Server Copy
  - offload to server copy operation
- Sparse Files

- IETF: Internet-Draft
Federated File System (FedFS)

- Constructs File Namespaces Across Servers
  - With V4 Referrals
  - File Set location stored in LDAP
  - Admin interface used RPC
  - Root of global name space found via DNS
Federated File System (FedFS)

- Global Names
  - /Protocol/Fedfs-domain/Directory/file
    - EX: /nfs4/redhat.com/home/steved/.bashrc
  - SMB/CIFS Globally Useful Names support (TBD)
Federated File System (FedFS)

- Manage NFS namespace with Referrals

- Home Page:
  - 0.8.0 is early alpha, just for testers

- Fedfs-utils (in Fedora 17)
Clustered Linux Server

- Clusterizing Delegations
- Cluster Coherent Locking
- Failover
  - Per-export Failover
  - Active/Active NFSv4
- NFS/SAMBA exporting the same data
Secure NFS

- #1 Issue! Kerberos Tickets Expiring
  - Renew renewable tickets
  - Renew an expired tickets

- Kkrenew - Renew a Kerberos v5 ticket

- Identity-Policy-Audit (IPA)
Secure NFS – krennew HOWTO

- `yum install --enablerepo=epel kstart`
  - Extra Packages for Enterprise Linux (EPEL)

- Get a Renewable Kerberos Ticket
  - `kinit -r 10d`
  - Wake up every ten mins and renew the ticket if needed
    - `krennew -K 10 -t`
  - See krennew(1) for more examples.
Secure NFS – IPA Server

- Install package
  - `yum install ipa-server`
- Install server bits
  - `Ipa-server-install`
- All configuration is done with 'admin' ticket
  - `kinit admin`
- Create 'nfs' keytab principles
  - `ipa-getkeytab -k /etc/krb5.keytab -s <ipserver> -p nfs/`hostname`@REDHAT.COM`
Secure NFS – IPA Server

- Start Secure NFS server
  - SECURE_NFS="yes" in /etc/sysconfig/nfs
  - service nfs start
- Add users
  - ipa user-add ksteved
  - ipa passwd ksteved
Secure NFS – IPA client

- Install package
  - `yum install ipa-client`
- Install client bits
  - `Ipaclient-install`
- Start Secure NFS GSS deamon
  - `SECURE_NFS="yes"` in `/etc/sysconfig/nfs`
  - `service rpcgsssd start`
- Secure mount are now possible!!!
Secure NFS – IPA client

- Enable sssd pam & Create Home dirs
  - authconfig --update --enablesssd --enablesssdauth --enablemkhomedir
- service sshd restart
- ssh ksteved@ipa-client.com
Secure NFS – IPA client

• Have SSSD renew the Tickets (see man sssd-krb5)
  • auth_provider = krb5
  • krb5_server = 192.168.1.1
  • krb5_realm = EXAMPLE.COM
  • krb5_renewable_lifetime = 50d
  • krb5_renew_interval = 3600
• service sssd restart
Questions

• Past Summit Talks
  • http://people.redhat.com/steved/Summits/
    Debugging tips/tools/Scenarios, Trace Point examples, Metric Tools, Security and FSCache HOWTO...

• NFSv4.1 new features: Sessions, Parallel NFS (pNFS)
  • http://www.iaps.com/nfsv4.1-new-features.html

• Parallel NFS (pNFS)
  • http://www.pnfs.com/
Resources

• Visit the Red Hat Customer Portal for content
• Visit storage alley and meet the core architects!
• Talks
  • Wed 10:40 - A Deep Dive into Red Hat Storage
  • Wed 2:30 – Distributed File System Choices
  • Wed 4:50 & Thurs 1:20 – GlusterFS Overview
  • Thurs 10:40 – Introduction to Red Hat Storage
  • Thurs 4:30 - The Future of NFS: pNFS (Campground)
  • Thurs 4:50 – Red Hat Storage Roadmap & Futures
  • Fri 9:45 – Red Hat Storage Performance
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