

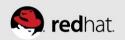
Evolving & Improving Red Hat Enterprise Linux NFS (handout)

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• NFSv2 - RFC 1094, March 1989

- Side car protocols with mounts and file locking.
 - Not firewall friendly
- 32 bit file handles
 - No files > 2GIG
- Slow writes
 - (write, wait, write, wait)
- Each component is an OTW lookup
 - /foo/bar ==> (lookup foo, lookup bar)



- NFSv3 RFC 1813, June 1995 (6 years later)
 - 64 file handle file > 2GB
 - Async writes
 - write, write, commit, wait
 - READDIRPLUS
 - readdirs and lookups all in the same call
 - Post attribute ops
 - Entire path is looked up
 - /voo/bar ==> (lookup foo/bar)



- NFSv4.0 RFC 3010, Dec 2000 (5 years later)
 - Client caching (aka deletions (aka Statefull))
 - Strong security
 - Compound Operations
 - TCP only
- NFSv4.1 RFC 5661 Jan 2010 (10 years later)
 - pNFS
 - _reliable_ only-once semantics
 - callbacks using 2049 port



- NFSv4.2 IETF-Draft ver 19
 - Server-side Copy offload
 - Sparse file support
 - Space Reservations
 - Label NFS (SELinux support)



Parallel NFS (pNFS)

- Architecture
 - Metadata Server (MDS) Handles all non-Data Traffic
 - Data Server (DS) Direct I/O access to clients
 - Shared Storage Between Servers
- Layout Define server Architecture
 - File Layout (NAS Env) Netapp
 - Block Layout (SAN Env) EMC
 - Object Layout (High Perf Env) Pananas & Tonian



Parallel NFS (pNFS) - RHEL 6.4

- First to market with Client support (file layout)
 - Thank you very much Upstream and Partners!!!
- Enabling pNFS:
 - mount -o v4.1 server:/export /mnt/export
- RHEL-Next
 - Block and Object layout support



RHEL7 NFS Server Updates

- Red Hat Enterprise Linux 7.0 completes the server side support for NFS 4.1
 - Support for only-once semantics
 - Callbacks use port 2049
- No server side support for parallel NFS ... yet!



Parallel NFS Updates

- Parallel NFS has three layout types
 - Block layouts allow direct client access to SAN data
 - Object layouts for direct access to the object backend
 - File layout
- RHEL7.0 will add support for block and object layout types
 - Will provide support for all enterprise pNFS servers!



Support for SELinux over NFS

- Labeled NFS enable fine grained SELinux contexts
 - Part of the NFS4.2 specification
- Use cases include
 - Secure virtual machines stored on NFS server
 - Restricted home directory access



NFS V4 Referrals - HOWTO

- On redhat-1 Server:
 - Export file system with: refer=/export@redhat-3
 - Bind mount file system: mount –bind /export /export
 - Start nfs server: service nfs start
- On the Client:
 - Mount file system: mount server:/export /mnt/export
 - Create the referral: cd /mnt/export



FedFS - HOWTO

- Documentation of of this HOWTO is at
 - http://wiki.linux-nfs.org/wiki/index.php/FedFsUtilsDocs
- Install fedfs-utils-0.9 on Fedora 19/RHEL 7
 - On the Client
 - yum install fedfs-utils-client
 - On the Server
 - yum install fedfs-utils-lib fedfs-utils-nsdbparams
 - yum install fedfs-utils-server



FedFS – Setting up client

- yum install autofs
- mkdir /nfs4
- /nfs4 /usr/sbin/fedfs-map-nfs4 ==> /etc/auto.master
- systemctl [re]start autofs



FedFS – Setting up Domain Root Server

- Create Domain Root exports
 - mkdir -p /.domainroot/redhat.com
 - export /.domainroot *(ro,sec=sys,insecure)
- Configure DNS so root server can be found
 - _nfs-domainroot._tcp IN SRV 0 0 2049 server.redhat.com
- Create Junction
 - nfsref add home home.redhat.com /home



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
 - systemctl start nfs-server.service
 - systemctl start nfs-secure-server.service
- Add users
 - ipa user-add ksteved
 - ipa passwd ksteved



Secure NFS – IPA client

- Install package
 - yum install ipa-client
- Install client bits
 - Ipa-client-install
- Start Secure NFS GSS deamon
 - SECURE_NFS="yes" in /etc/sysconfig/nfs
 - service rpcgssd 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



GSS-proxy - HOWTO

- Install IPA
 - yum install ipa-client
 - ipa-client-install
- Install GSS-proxy
 - Yum install gssproxy
- Enable Secure NFS
 - GSS_USE_PROXY="yes" ===> /etc/sysconfig/nfs
 - systemctl restart nfs-secure.service



GSS-proxy - HOWTO

- Creating user keytabs
 - ipa-getkeytab \
 - -s ipa-server.redhat.com \
 - -p steved@redhat.com \
 - -k /var/lib/gssproxy/clients/steved.keytab

