Beyond NFSv4.1
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Purpose of this Presentation

- Make the case for post NFSv4.1 standards work
- Start green lighting on work items
Case for post-NFSv4.1

- Meta-data intensive workloads
- Federations
- Virtualization
Is this all NFSv4.2?

- Ideally we should look to avoid adding more operations
- NFSv4 and NFSv4.1 have a lot of infrastructure to add new features:
  - attributes
  - layout types
  - unused flag fields
Meta-data intensive workloads

- E.g. workloads with intense LOOKUPs, READDIRs
- Delegations alone may not suffice
  - E.g. NFSv3 GETATTRs can over whelm a single server
    - NFSv4.1 Delegation could also overwhelm a single device

Proposal: extend pNFS to support parallel MDS
Federations

- namespace
- Best practices and standards needed for
  - ID mapping
  - location of root of namespace
- Running code needed from clients to support migration
  - not just referrals
Virtualization

- NFS and Hypervisors make a great team today:
  - NFS is (practically) the most secure storage access protocol
  - files have more flexibility for provisioning than LUNs

- Hypervisors could use
  - hole punching
    - When a virtual machine (VM) de-allocates data indicate this to the NFS server
  - de-dupe awareness in the clients
    - Many VM images cloned from a master
    - Clones diverge but share a high %-age of content
    - Indicating which blocks are common will reduce overhead on hypervisors
Other Items that have been mentioned in the past …

- End to End Data Integrity
- MAC Label and Enforcement
- Request Priority
- …
Greenlighting on more things …