



STORAGE DEVELOPER CONFERENCE

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# Multi-protocol (SMB-NFS) Access Test Suite

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# Why an Multi-protocol Access Test Suite

- ❑ **Data Lake – Data integrity is sacrosanct**
- ❑ While each protocol in itself tries to address this they cannot address this mechanism globally.
- ❑ Same file accessed over SMB1-3, NFSv3,4, pNFS, ftp, http, https.
- ❑ Each protocol has different caching and locking semantics.
- ❑ FS lock manager has to be exercised for all possible scenarios, especially in a multi-node cluster

# Requirements

- ❑ Extensible framework
  - ❑ At least cover SMB2, 2.1, NFSv3 and NFSv4.
  - ❑ Extend to HDFS, NDMP, SFTP, ssh, etc.
- ❑ Needs an implementation of the above protocols

# Test Combinations

- ❑ Obvious combinations:
  - ❑ Oplock break scenarios
  - ❑ Oplock vs Leases and vice versa
  - ❑ Oplock vs NFS4 leases and vice versa
  - ❑ Oplock vs NFS4 delegation and vice versa
  - ❑ SMB Lease vs NFS4 leases and vice versa
  - ❑ SMB Lease vs NFS4 delegation and vice versa

# Test Combinations

- ❑ Less obvious combinations:
  - ❑ Oplock vs NFSv4 Open and vice versa.
  - ❑ SMB Lease vs NFS4 open and vice versa
  - ❑ NFSv3 Read/Write/Access with Oplocks
  - ❑ NFSv3 Read/Write/Access with Leases
  - ❑ V3 Accesses/Read/Write vs V4 open

# Test Combinations

- Additional combinations:
  - SMB3 share access vs NFSv3 read/write
  - SMB3 share access modes vs NFS4 open allow and deny modes and vice versa.

# Notable Observations

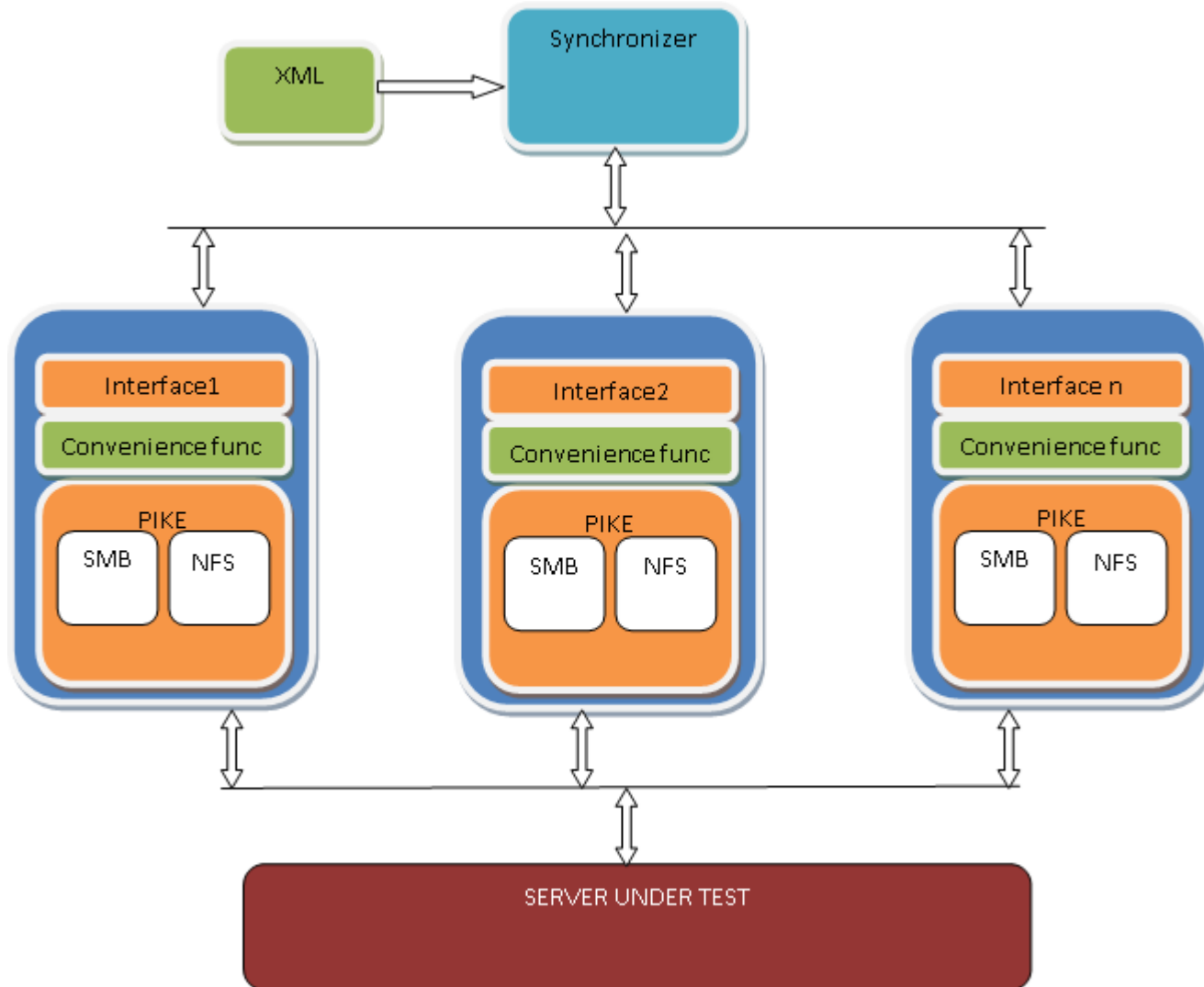
- ❑ Large number of combinations overall
- ❑ More possibilities for extension:
  - ❑ U-g-o vs ACL
  - ❑ File deletion, creation
  - ❑ Directory ops
  - ❑ Attribute updates/changes

# Design Considerations

- ❑ The framework contains protocol knowledge
- ❑ Assumes resource availability
- ❑ Distributed execution



# Multi-Protocol Test Suite Architecture



# Synchronizer

- ❑ Controls the flow between the protocol framework and test xml
- ❑ Basic operations:
  - ❑ Receive XML input
  - ❑ Extract the client information from XML
  - ❑ Extract commands from XML
  - ❑ Call appropriate interface located at different locations on the network
  - ❑ Pass the corresponding XML to the Interface depending upon the Test Case
  - ❑ Log the result of each test case
- ❑ Calls from Synchronizer to Interface are made through socket communication

# XML Parser

- ❑ XML input contains the actual SMB/NFS commands that are executed by the client
- ❑ Commands are grouped in sets
- ❑ Can be extended to contain other protocol commands
- ❑ The XML tags have the instructions about which command is to be passed to which client

# Interface

- ❑ Responsible for:
  - ❑ Wrapping protocol client implementation
  - ❑ Fetching the result and sending back response to the Synchronizer
  - ❑ Sending asynchronous notifications to the synchronizer (required for validation in lock/lease breaking cases)

# MP test suite sample case

```
1 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2 - <TCS>
3 -   <TC>
4     <Desc></Desc>
5 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
6 +     <SMB2Negotiate>
35    </CLIENT>
36 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
37 +     <SMB2SessionSetup>
59    </CLIENT>
60 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
61 +     <SMB2TreeConnect>
78    </CLIENT>
79 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
80 +     <SMB2Create>
141    </CLIENT>
142 -   <CLIENT ip="192.168.205.55" port="5010" protocol="NFS3" server_ip="172.17.54.28" id="2">
143 +     <NFS3Mount>
157    </CLIENT>
158 -   <CLIENT ip="192.168.205.55" port="5010" protocol="NFS3" server_ip="172.17.54.28" id="2">
159 +     <NFS3Access>
187    </CLIENT>
188 -   <CLIENT ip="192.168.205.55" port="5010" protocol="NFS3" server_ip="172.17.54.28" id="2">
189 +     <NFS3UnMount>
192    </CLIENT>
193 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
194 +     <SMB2Close>
214    </CLIENT>
215 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
216 +     <SMB2TreeDisconnect>
226    </CLIENT>
227 -   <CLIENT ip="192.168.205.55" port="5010" protocol="SMB" server_ip="172.17.54.28" id="1">
228 +     <SMB2LOGOFF>
238    </CLIENT>
239   </TC>
240 + </TCS>
```

# Multi-protocol Test Suite

# Questions?