



STORAGE DEVELOPER CONFERENCE

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Open Source SMB Compliance Test Suite

Amit – EMC Isilon Storage Division

Yogesh Kulkarni – Calsoft Inc.



Why an SMB Compliance Test Suite

- ❑ Requirements
 - ❑ Broad Coverage
 - ❑ Easy Extensibility
 - ❑ Portability

Available Option	Limitation
SMB Torture	<ul style="list-style-type: none">• Coverage out of the gate• Extensibility
Microsoft Interop Test Suite	<ul style="list-style-type: none">• Hard to integrate with automation systems• Limited coverage

Conformance Testing Strategy

- The Basics
 - Standard or specification
 - Test Framework
 - Test Cases

Conformance Testing Strategy

- ❑ Possible Test Approaches
 - ❑ Exhaustive testing
 - ❑ Thorough testing
 - ❑ Negative testing
- ❑ We chose Thorough testing including Negative test cases as well

Conformance Testing Strategy

Other Considerations

- State transitions
 - ❑ ***Connection and mount level state transitions***
 - ❑ ***File level state transitions***
 - ❑ ***Value Ranges***
- Multi-dialect support and dialect specific tests

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- Orthogonal Array Testing for scope management
 - “**Orthogonal array testing** is a black box testing technique that is a systematic, statistical way of software testing. It is used when the number of inputs to the system is relatively small, but too large to allow for exhaustive testing of every possible input to the systems.” - Wikipedia
 - We reviewed several Orthogonal Array test software and picked **Hexawise**.

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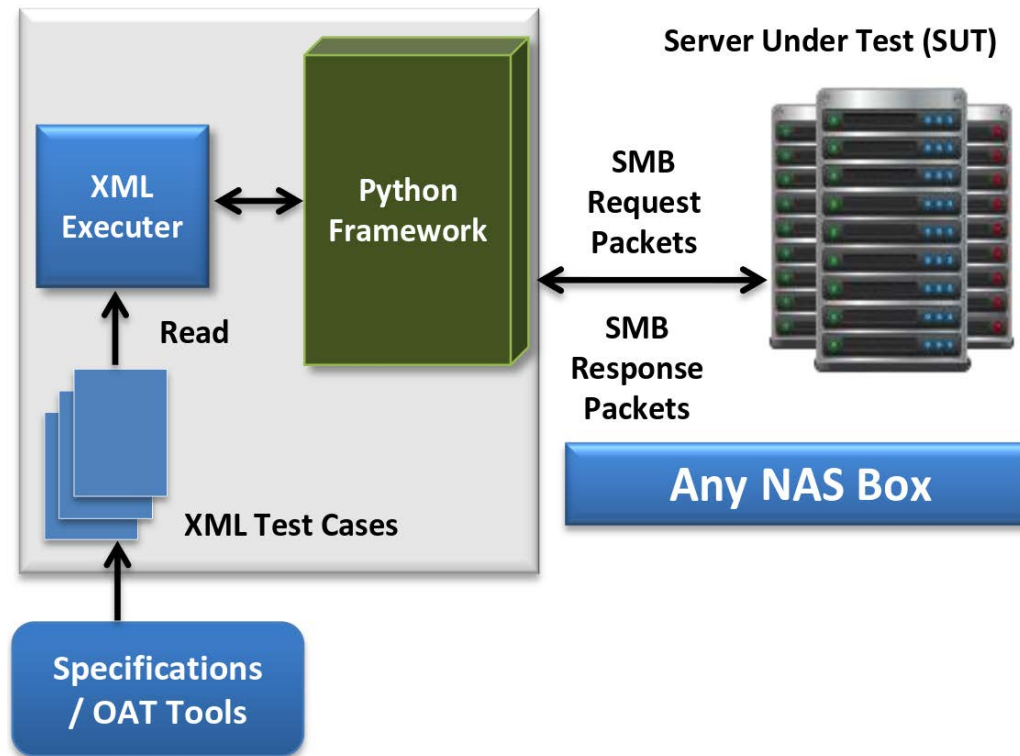
- ❑ Test Cases in XML
 - ❑ XML driven approach for state machine
 - ❑ Client machine states are embedded in an XML file
 - ❑ There is a unique XML tag corresponding to each SMB command request and response
 - ❑ Expected values/errors are put into XML itself
 - ❑ Parameter values can be default or set in the XML
 - ❑ Allows for testing with out-of-range values
 - ❑ Makes addition of test cases easy

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- ❑ The Pike Framework
 - ❑ A Python SMB client
 - ❑ Developed at EMC Isilon
 - ❑ Capable of creating and sending SMB2 packets to a SMB server and parsing the response
- ❑ [Making SMB Testing Less Torturous \(SDC 2013\) - Brian Koropoff - EMC Isilon](#)

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Architecture



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❑ Sample XML request, response pair

```
<SMB2Read>
  <ReadRequest>
    <StructureSize>50</StructureSize>
    <Padding></Padding>
    <Reserved></Reserved>
    <Length>5</Length>
    <Offset>0</Offset>
    <FileId></FileId>
    <MinimumCount>0</MinimumCount>
    <Channel></Channel>
    <RemainingBytes>1</RemainingBytes>
    <ReadChannelInfoOffset></ReadChannelInfoOffset>
    <ReadChannelInfoLength></ReadChannelInfoLength>
    <Buffer></Buffer>
  </ReadRequest>
  <ReadResponse>
    <StructureSize>17</StructureSize>
    <DataOffset> </DataOffset>
    <Reserved> </Reserved>
    <DataLength>1</DataLength>
    <DataRemaining> </DataRemaining>
    <Reserved2> </Reserved2>
    <Buffer>1</Buffer>
  </ReadResponse>
</SMB2Read>

<Result>
  <Cmd>Read</Cmd>
  <ReturnStatus>STATUS_INVALID_PARAMETER</ReturnStatus>
  <ValidationMechanism> </ValidationMechanism>
</Result>
```

Note incorrect read request size, correct size is 49.

Note the expected response from a compliant server. Any other return value will be flagged as an error

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□ Commands covered

Command	Approx. Test Cases
SMB2 Read	50
SMB2 Write	50
SMB2 Create	500*
Locking (op_locks, leases, BRL)	500*
Tree Connect	40
Tree Disconnect	40
Logoff	40

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- ❑ SMB Create
 - ❑ Create is a very large command and has huge number of combinations.
 - ❑ Divided into 4 sub-categories
 - ❑ Create a file
 - ❑ Create a dir
 - ❑ Open a file
 - ❑ Open a dir
 - ❑ Effect of desired access and file share settings
 - ❑ Effect of create options and dispositions

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- ❑ Locking tests
 - ❑ Locking with oplocks, leases and byte range.
 - ❑ Interoperations between oplocks, leases and byte-range locking
 - ❑ Effect of desired access and File share on locking

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□ Links

□ Pike: <https://github.com/emc-isilon/pike>

□ *Pull request for this suite is awaiting approval*

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Questions?