

BUGS!
Catch Them Before They Catch You
A Survey of Network Storage Test Tools
and Industry Best Practices

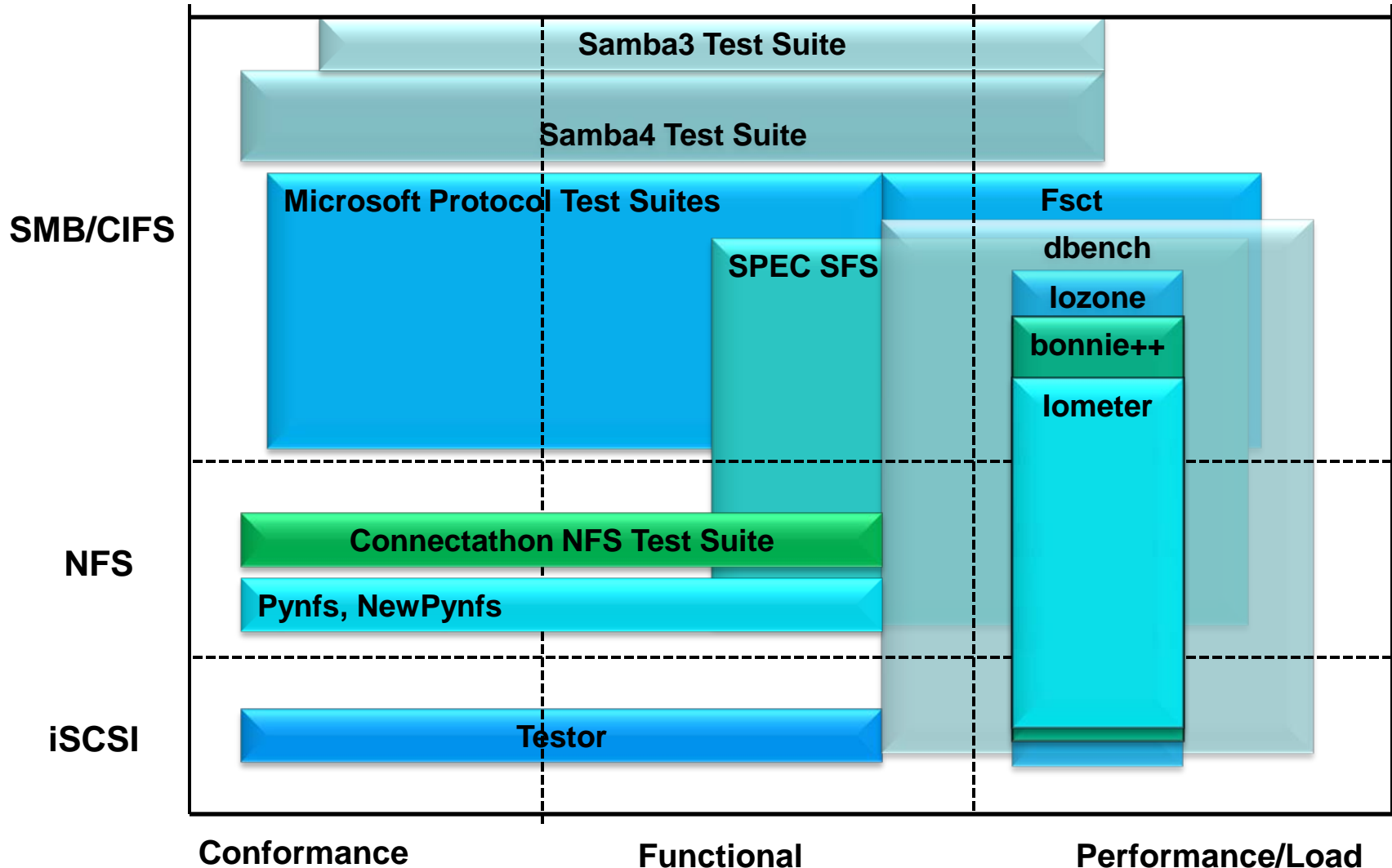
Peter Murray
SwiftTest

pmurray@swifttest.com

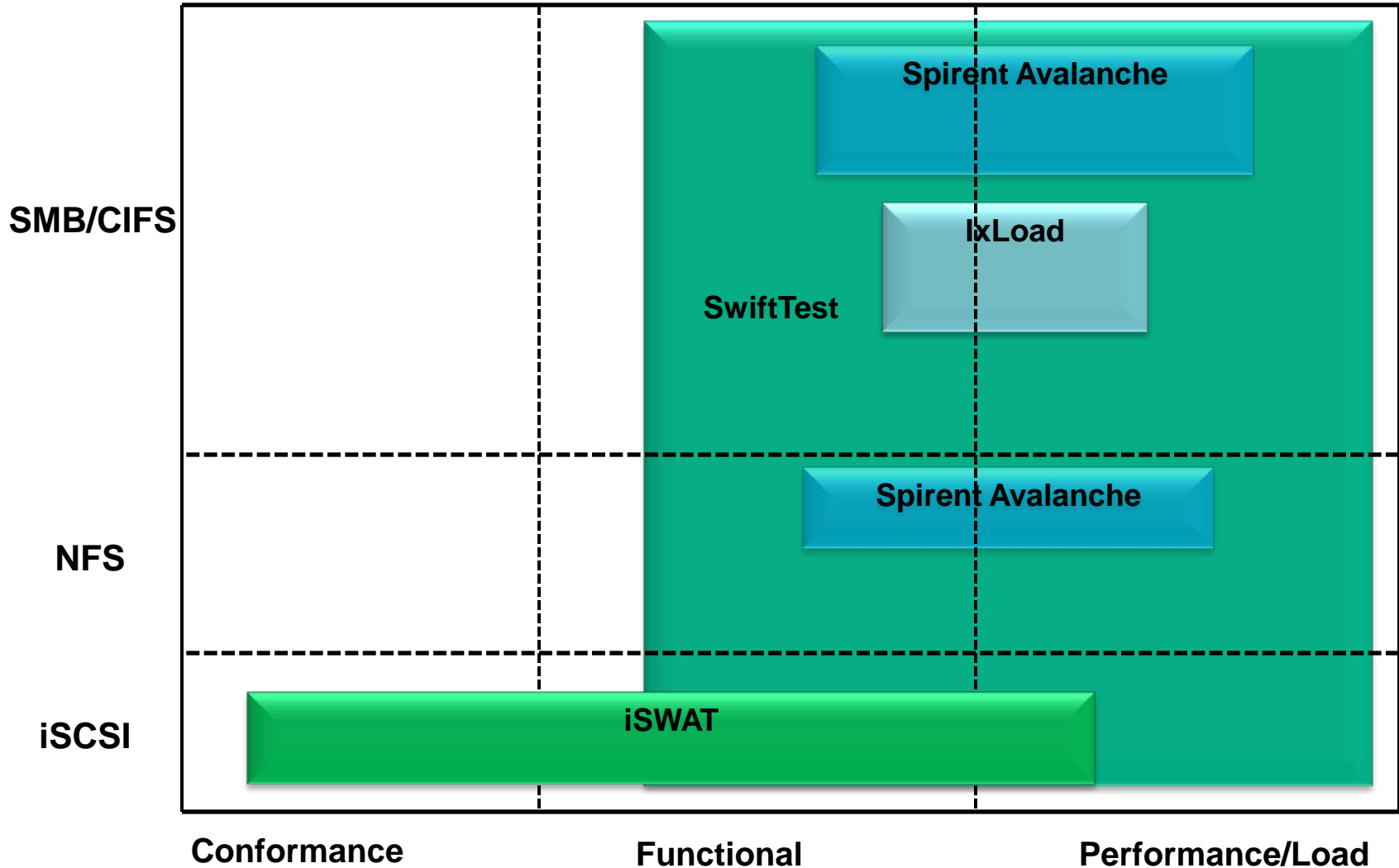
Agenda

- ❑ Today's Testing Landscape
- ❑ Storage Testing Best Practices
- ❑ What's next?

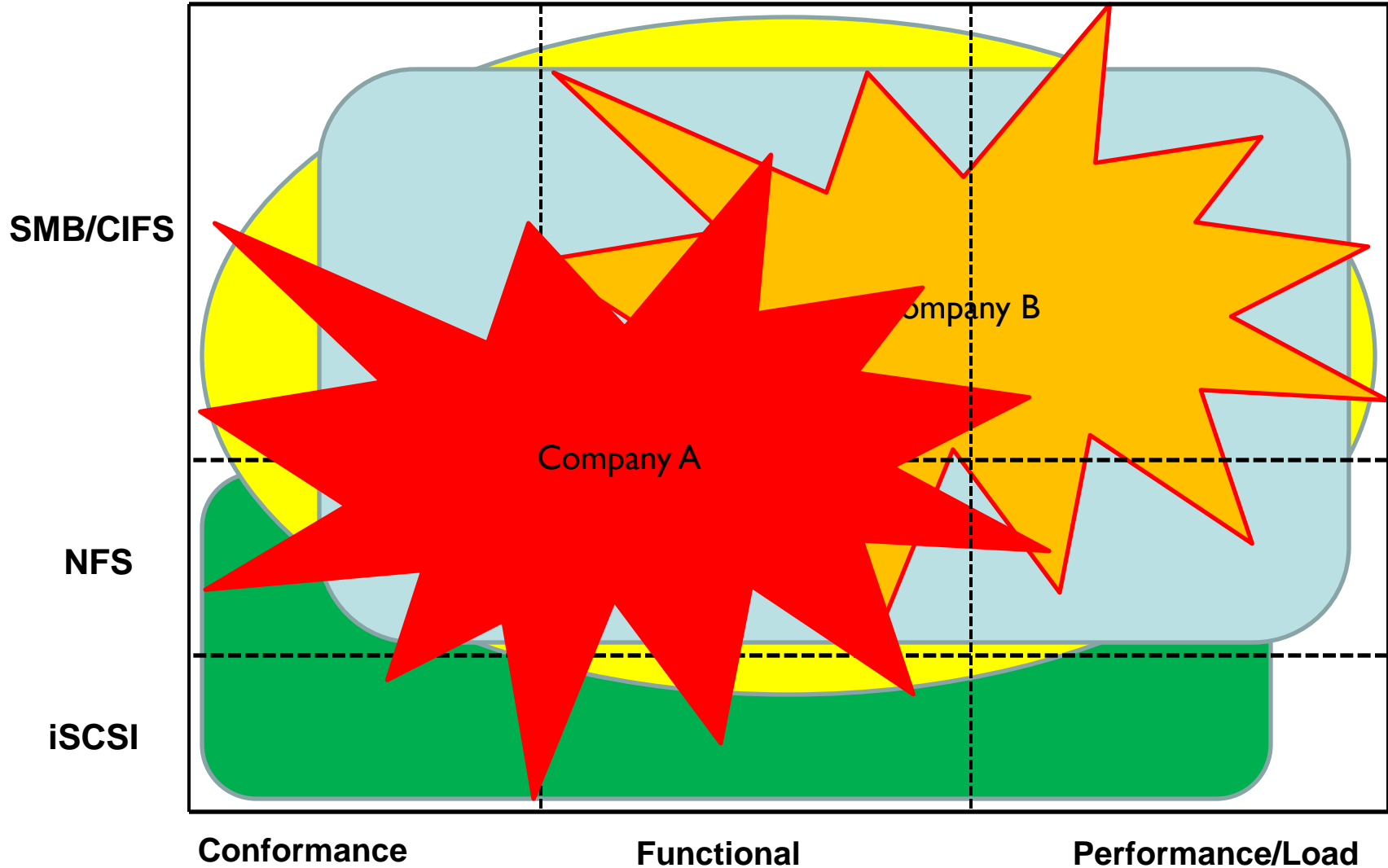
Free / Low Cost Storage Test Tools



Commercial Storage Test Tools



Custom In-House Storage Test Tools



- ❑ Everyone builds them
- ❑ Lets vendors test when other tools aren't enough
 - ❑ Useful for proprietary features
 - ❑ Some create conformance suites
 - ❑ Some run OS instances against products
- ❑ Typically integrated into a test harness
 - ❑ May include Open Source tools
 - ❑ Results correlation can be an issue
- ❑ Typically require many servers for performance
 - ❑ Hundreds/thousands of simulated clients required
 - ❑ Usually run in VMs
- ❑ Require ongoing maintenance

Storage Testing Best Practices

Testing at Layer 2/3

- ❑ Aka “bit blasting”
- ❑ Tests raw capacity of the:
 - ❑ Hardware platform
 - ❑ NIC
 - ❑ Device OS
- ❑ Types of tests:
 - ❑ Max packet rate
 - ❑ Max throughput
 - ❑ Latency
 - ❑ MAC address table size

TCP Connection Processing

- ❑ Basic TCP performance
 - ❑ Shows the TCP stack performance envelope
- ❑ Types of tests:
 - ❑ TCP connection rate
 - ❑ TCP connection table size
 - ❑ TCP connection table scavenging

Single Protocol Functional Testing

- ❑ Shows how well a protocol is implemented
- ❑ Helps determine if all commands work
- ❑ Examples:
 - ❑ Can a client read and write?
 - ❑ Does file locking work?
 - ❑ How do two versions or implementations compare?
 - ❑ What happens when parameters are sent randomly?
 - ❑ How well do single protocol implementations interact?
 - ❑ E.g. Windows SMB client vs. Linux CIFS VFS

Multi-Protocol Functional Testing

- ❑ Involves simultaneous testing of multiple protocols
- ❑ Ensures proper operation among protocols
- ❑ Shows how well protocols interact
 - ❑ Does an SMB Oplock lock an NFS file?
 - ❑ Are attributes mapped correctly across protocols?
 - ❑ Does file sharing across protocols work?
 - ❑ Do NFSv3 and NFSv4 coexist well on a server?

- ❑ Functional testing that demonstrates conformance
 - ❑ Typically a test suite from a standards organization
 - ❑ May come from the initial protocol implementer
- ❑ There is no “perfect” conformance tool
 - ❑ Samba Test Suites
 - ❑ Test most of CIFS/SMB
 - ❑ Microsoft Test Suites
 - ❑ Show compliance to MS SMB/SMB2 specification
 - ❑ Connectathon, newpynfs – NFS
 - ❑ iSWAT, Testor - iSCSI

- ❑ Tests the performance envelope
 - ❑ I/O capacity (IOPs)
 - ❑ Meta data command capacity
 - ❑ Session management, navigation and file manipulation capacity
 - ❑ How well I/O and other functions interact
 - ❑ Which commands / combinations tax CPU
- ❑ Helps find:
 - ❑ Sweet spot / effective market position

- ❑ Shows performance envelope with multiple protocols
- ❑ Shows how protocols interact under load
 - ❑ Examples:
 - ❑ Concurrent file access
 - ❑ Inter-protocol file locking
 - ❑ Inter-protocol attribute handling
- ❑ Shows how well I/O works with other operations

Test Tool Considerations

- ❑ Which protocols are supported?
- ❑ How complete are the protocol implementations?
 - ❑ How many commands?
 - ❑ How many parameters are exposed?
- ❑ What is the capacity?
 - ❑ How many IOPs?
 - ❑ How much throughput?
 - ❑ Per 1Gbps link? 10Gbps link? Per chassis?
- ❑ Is scripting and reporting consistent across protocols?

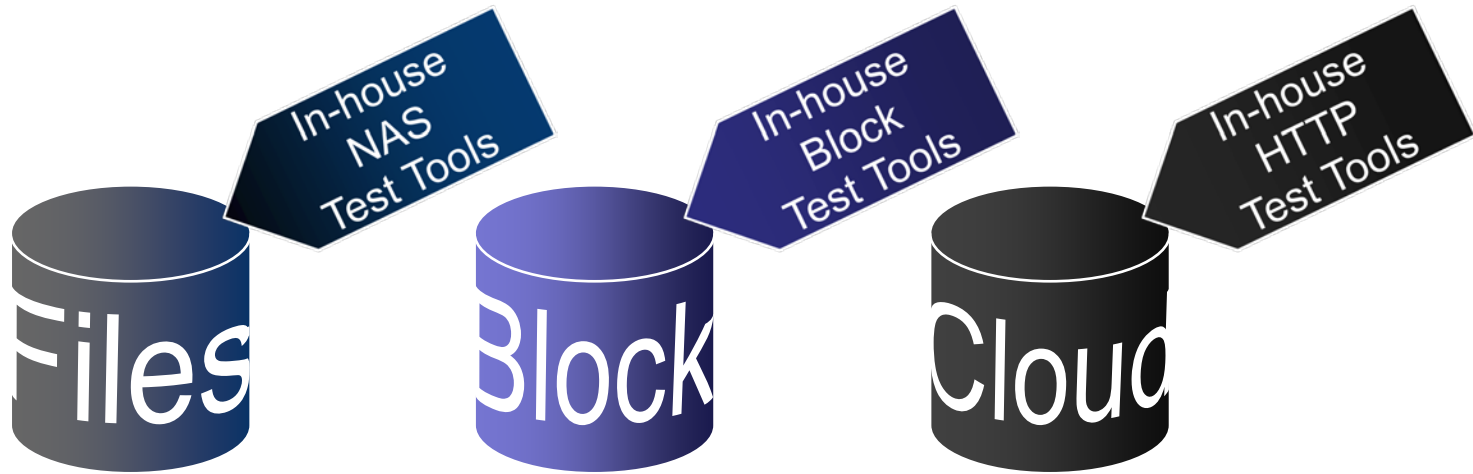
Other Test Tool Considerations

- ❑ How is the tool implemented?
 - ❑ Socket based?
 - ❑ Custom TCP stack?
 - ❑ How well is the stack instrumented?
- ❑ How complete is the configuration tool?
 - ❑ Command-line or GUI?
 - ❑ How detailed is the configuration?
 - ❑ How easy is it to use the UI?
 - ❑ How well is automation implemented?

Storage Testing Trends

Today's Storage Systems

□ Protocol silos



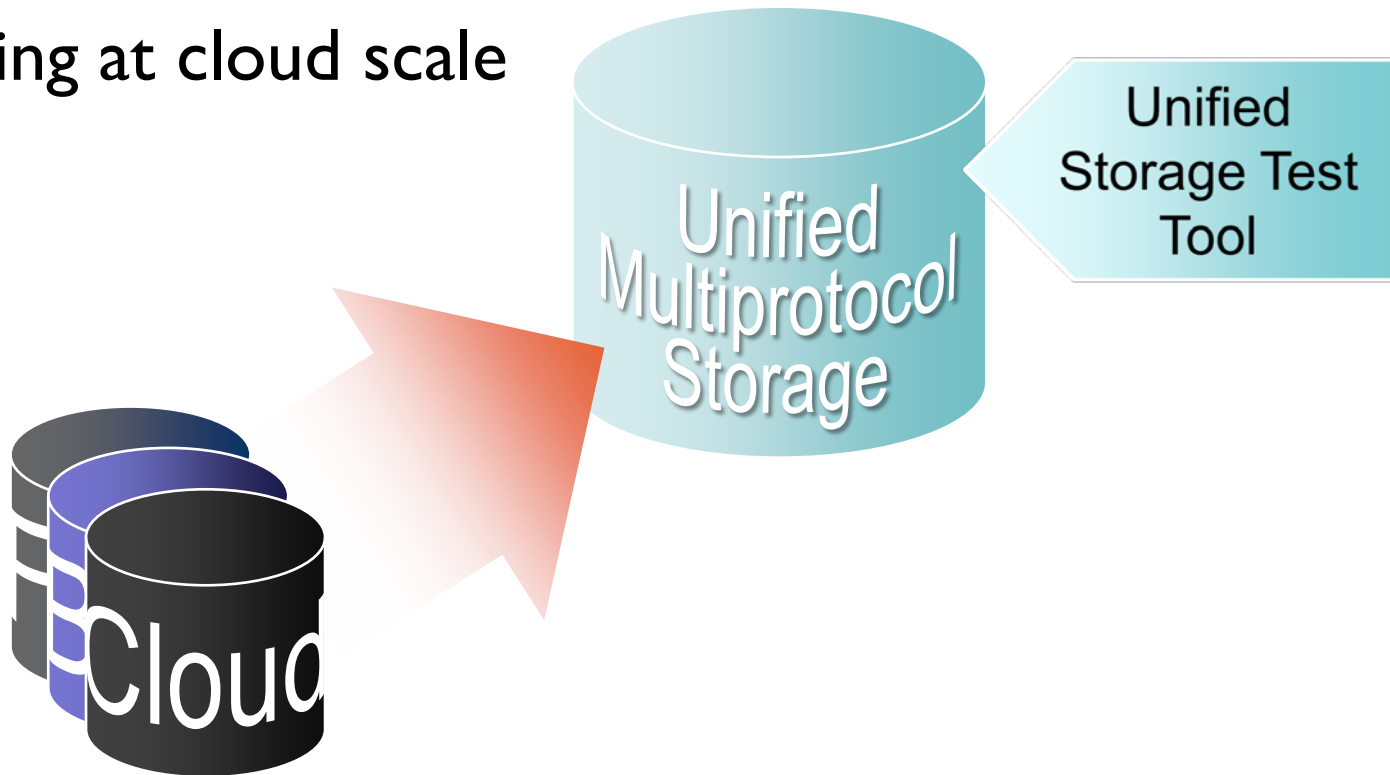
The Changing Storage Landscape

- ❑ NetApp Customers Mark Historical Milestone of 150,000 Unified Storage Systems Deployed
- ❑ New EMC Unified Storage Delivers Unmatched Simplicity and Efficiency in Virtual Environments
- ❑ IBM announces new offering to access billions of files in a cloud
- ❑ VMworld 2010: Isilon ships clustered NAS with iSCSI

- ❑ **And more...**

Tomorrow's Unified Systems

- ❑ Unified multiprotocol test tools
- ❑ Testing at cloud scale



Test Tool References

- ❑ [Microsoft Protocol Test Suites](#)
- ❑ [Samba Test Suites](#)
 - ❑ [Dbench](#)
- ❑ [Pynfs, NewPynfs](#)
- ❑ [Connectathon NFS test suite](#)
- ❑ [SPEC SFS](#)
- ❑ [lozone](#)
- ❑ [bonnie++](#)
- ❑ [lometer](#)
- ❑ [Testor](#)
- ❑ [iSWAT](#)
- ❑ [SwiftTest](#)
- ❑ [Spirent Avalanche](#)
- ❑ [Ixia IxLoad](#)

Thank You

Questions?