



SNIA Cloud Object Storage Test Tools

(Open-Source Industry Interoperability Project)

Live Webinar

July 15, 2025

10:00 am PT / 1:00 pm ET



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Today's Presenters



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SNIA Cloud Object Storage Plugfests sponsored by CST



<https://snia.org/groups/cst>

Committed to the adoption, growth and standardization of **intelligent data storage usage** in cloud infrastructures

- New simplified SNIA Membership Model for FY'25
- Pay one fee for SNIA Membership – Participate in ANY group!
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The SNIA Community



200
industry leading
organizations



2,000
active contributing
members



50,000
IT end users & storage
pros worldwide

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Agenda

- SNIA Cloud Object Storage (COS) Plugfests
- SNIA Cloud Object Storage Test Tools TWG
- Spotlight: Ceph S3-Tests
 - Testing strategy & goals
 - Expanding coverage, 3rd party contributions, future improvements?
- Expanding the open-source S3 tool ecosystem
 - What other open-source tools do you use for S3 testing?
 - Do you have tools within your org that you could open-source?
 - Attend the COS Plugfests! Join the TWG!
- Q & A

SNIA Cloud Object Storage Plugfests

Expert face-to-face events, builds developer network and expedites resolution of interoperability issues – open to both SNIA members and non-members

SDC 2024 - Santa Clara, CA

- Most participants were COS storage providers
- Need for independent, community-driven test tools

Regional SDC Denver 2025 - Westminster, CO

- Expanded participant list
- Structured discussion about COS Test Tools TWG

SDC 2025 - Santa Clara, CA

- Upcoming plugfest September 15-17



SNIA COS Test Tools Technical Work Group

Current Landscape:

- AWS S3 – de facto COS API standard
- Numerous S3 providers, varied deployments (cloud, hybrid, on-prem, multi-cloud)
- Customers expect S3 APIs to function consistently or are unaware of backing storage
- Mass adoption can no longer depend on single-vendor interoperability testing
- Moving beyond independent and inconsistent testing between products

SNIA COS Cross-Vendor Interoperability Benefits:

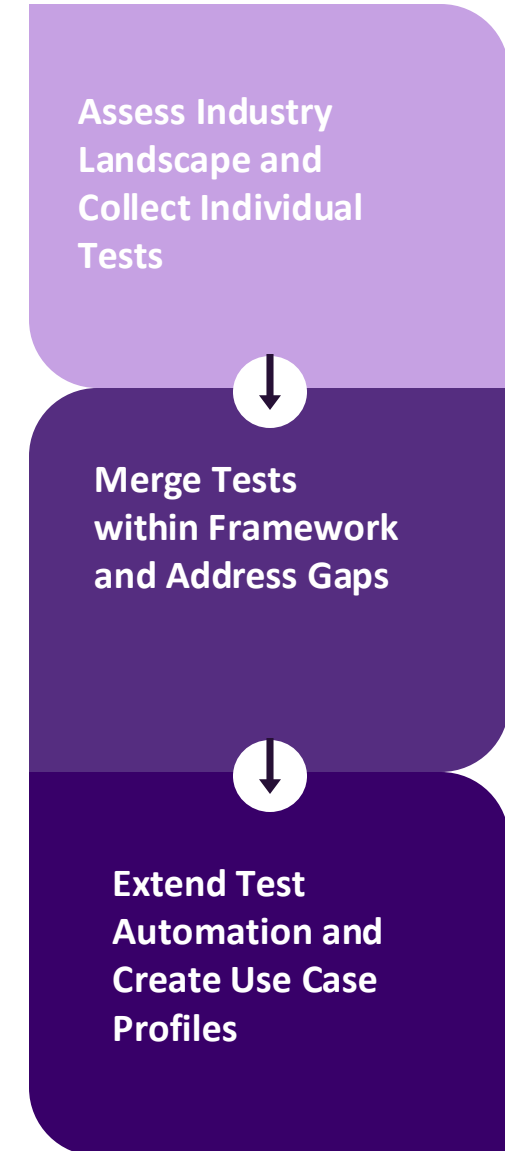
- Makes it easier for cloud storage platforms and ISVs to quickly adapt to diverse end-user requirements
- Lowers support cost, eliminates bugs, and drives industry consistency
- Accelerates cloud storage and ISV reliability, stability, supportability, and interoperability

COS Test Tools TWG

COS Plugfests raised the need for the community to create interoperability tooling available to *all developers*

- Expand and improve the interoperability tooling available to everyone in the COS ecosystem
- Researching the landscape of API interoperability testing
- Publishing findings, guidance, or creating novel tools to fill the gaps
- Highlighting existing open-source projects
- Identifying additional open-source tools that should be used in conjunction with COS Plugfests

Open to SNIA members only – non-members may contribute via CLA



Spotlight: Ceph S3-Tests

- <https://github.com/ceph/s3-tests>
- Independent S3 API compatibility test suite
- Python, Boto3
- Primarily focused on S3 API
 - Additional coverage for STS & IAM
- Used in Ceph CI pipeline
 - Oriented towards Ceph's implementation
- Usage by other vendors
 - IBM Cloud Object Storage
 - Versity

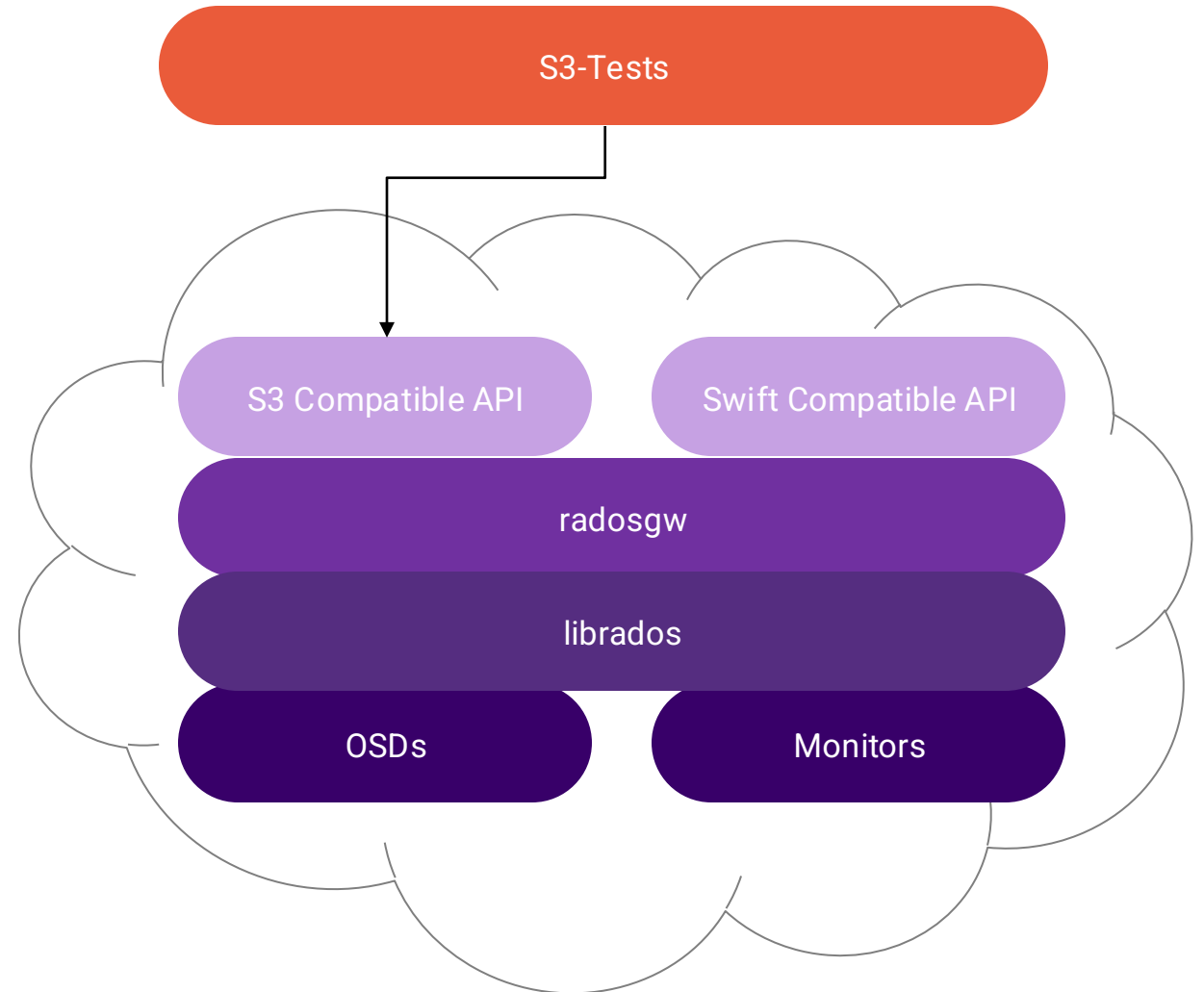
Spotlight: Ceph S3-Tests

What is it?

- Native S3 API test suite for Ceph Object Storage
 - Created with the early project to guide implementation and prevent regression
 - Pytest (Python, earlier Nose) unit test suite Implemented using the Boto3 (originally Boto2) AWS SDK

Test Model

- Black Box
 - Tests have access to S3 results and reply headers only



Spotlight: Ceph S3-Tests

Community

- Many commercial and open source developers/communities have made use of S3-tests at one time or another
 - Many of these are forks
 - Some >4 years old
 - But Ceph upstream has not been very effective at absorbing contributions without a Ceph PR

Some backlog, c.f., <https://github.com/ceph/s3-tests/pulls>

Spotlight: Ceph S3-Tests

Structure and Coverage

- Single suite of (currently) Pytest-based unit tests
 - Modules
 - S3, 714 units
 - SNS, 4 units
 - STS, 34 units
 - S3Select, 38 units
 - IAM, 87 units
 - Body of common functions (utils)
 - Appx. 50 methods, currently

Spotlight: Ceph S3tests

Work In Progress

- IBM Ceph and IBM COS teams have started a project to converge the boto3 “JetEngine” COS tests into S3-Tests

Future Work

Major

- Improve formal organization
 - Should be better mapped to recognized functional areas
- Improve coverage model
 - Basically, define/adopt one
- Map and prioritize areas of incomplete coverage
- represent completeness/coverage under the specific areas and overall
 - currently 58 feature labels (pytest.ini)
- e.g., where Ceph Object implementation is incomplete, or simply lacks tests
- Improve interop
 - e.g. support and regularly test with non-Ceph endpoints
 - The Ceph object community aspires to this, but has never had the time or resources to make a serious effort

Minor

- Cleanup and retire a small list of old dependencies on boto2 (oops!)
- S3website

Versity S3 Test Approach

- versitygw tests are all in our upstream repo
 - <https://github.com/versity/versitygw/tree/main/tests>
 - Apache V2.0 license
- Tests fall into three major categories
 - BATS tests - the majority of our test suite - are shell scripts that are used to verify specific S3 API calls by using s3api, s3, s3cmd, mc
 - REST API's tested via openssl/curl commands
 - versitygw SDK tests are coded in golang & are less generic
- Repo contains details on how to set up and run our tests, feedback very welcome

Enabling the Broadest Testing

- Putting together a set of community based tools
 - Every client and server S3 vendor can validate against other vendors tests
 - Companies can use this to ensure their products will be compatible
 - Provides a common foundation for users that want to be able to use multiple vendors for cloud storage
 - Other engineers always think of edge cases to test that you did not anticipate!
 - These community based tools can be used anywhere by any one - great for remote engineers
- Versity uses S3 as a storage target and provides an open source S3 gateway
 - Establishing a broad pool of tests helps increase our product quality
 - Versity has an open source set of tests we plan to contribute

What Comes out of Testing?

- We are validating the server complies with the API
 - Not validation of a vendor specific architecture
 - Each test can pass, fail or be marked as “not implemented”
- Look at key work flows and use cases
 - Some implementations might pass successfully all of their implemented test cases but fail to support important use cases
 - Looking to add key combinations and work flows for the test suite to catch these
- Power of having other teams run their tests against your implementation
 - The other team builds and writes code without your assumptions
 - More likely to think differently and test new edges of code that you never thought of!

Expanding the Ecosystem

- Role of test tools in the S3 ecosystem
 - Interoperability
 - S3 to S3
 - Cross-API (S3 to other COS APIs)
 - Cross-technology (Object to File / Block / Database)
- Integration of open-source tools in enterprise testing
- Open-sourcing S3 tools
- Cloud Object Storage Test Tools TWG role in developing novel tools

SNIA DEVELOPER CONFERENCE



SDC 25

SANTA CLARA, CA
SEPTEMBER 15-17

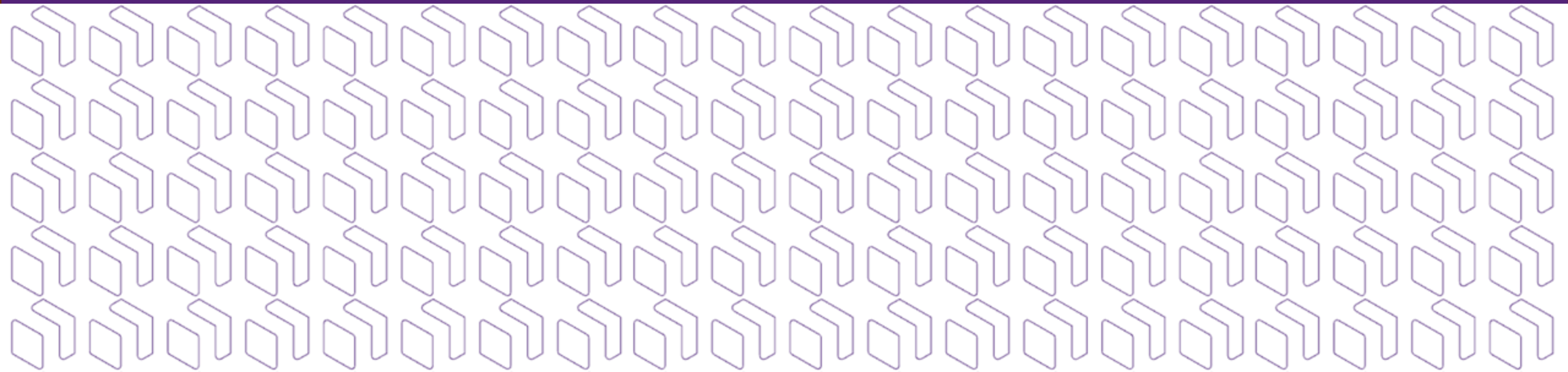
BY Developers FOR Developers

[View Agenda](#)

View Preliminary Agenda

<https://www.snia.org/sniadeveloper/sessions-2025>

Q&A



For More Information

- Join the SNIA Cloud Object Storage Test Tools TWG - Email: costttwg-chair@snia.org
- Join us: [Register for the SNIA Cloud Object Storage Plugfest @SDC'25, September 15-17](#)
- Learn More about the [SNIA Cloud Storage Technologies \(CST\) Community](#)
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**SNIA COS Plugfest
Registration**



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