Agenda

• State of Object Testing
• Things to consider when testing Object storage
• What is Load DynamiX doing today for Object storage
  ▪ Easy to use Object Storage Validation
  ▪ Comprehensive Unified Storage Validation
  ▪ Granular control at the client & protocol level
• Conclusion
State of the Nation for Object Storage

Customers are actively evaluating Object storage

In the last 12 months we have seen a significant increase in customers doing Object Storage performance validation
The need for Object Storage Validation

The disconnect we see...

- Customers are looking to reduce storage costs
- Open source solutions are being evaluated by every customer
- Different levels of maturity across the common platforms:
  - S3 well defined and strong adherence to documented API behavior.
  - Swift evolving fast; often gaps in documentation
  - Commercial implementations differ in supported operations & integrations
- There is often a disconnect between vendors offerings & customers use cases
Top use cases we are seeing...
Performance & Stability are inherent challenges

1. Archive / Backup
   - Stability
   - Data integrity

2. Cloud
   - Latency
   - Throughput
   - Bandwidth
   - Scalability
   - Stability

3. Content Delivery
   - Bandwidth
   - Throughput
   - Latency
   - Scalability
   - Compute sizing

Survey results showed the top priorities for customers in 2015 are:

- Implementing a new backup/DR solution (58%)
- Improving availability (51%)
- Evaluating new storage technologies (49%) (Object, cloud, SDS, virtualization).
Object Performance Validation
Things to consider when testing performance

- **Overall Performance**
  - Validate latency for different object sizes. Vendors tend to optimize for large objects. Customers workloads are mixed.
  - Need to be able to validate per service, per cluster and per for read/write throughput and aggregate across. Line rate is rarely achieved by clusters.
  - Unified storage models need to validate file, object and block interfaces concurrently under load.

- **Meta-Data Performance**
  - Meta data operations performance can vary significantly under load. Different protocols handle meta-data differently. Swift places it in the http header, S3 in the http body.
  - Eventual consistency in Amazon S3. There can be considerable latency when making changes to buckets that affects meta data performance.
Object Performance Validation
Things to consider when testing availability

- **Authentication**
  - Multiple authentication protocols and versions need to be validated (ie S3 v2/4 or Keystone 2/3)
  - Time skew will cause authentication failures in S3 & Swift
  - Token expiration in Swift can be problematic

- **Availability/Reliability**
  - Stability of distributed nodes, and the overall cluster under load is often a challenge.
  - Complex service availability. We often see proxy architectures respond even though core services are down. Creates weird errors
  - Multi-tenancy adds another layer that needs to be validated across tenants running different load patterns
Object Performance Validation
Things to consider when testing capacity

- **Capacity**
  - Ability to scale in a linear fashion as you increase nodes
  - Actual capacity that can be achieved. Are there any limitations imposed by flat object/container structures?
  - Max object size that can be supported

- **Efficiency**
  - Ability to validate tiering particularly in archiving or backup solutions
  - Ability to test storage compression and deduplication. Is there data loss?
The Load DynamiX Solution
Industry Leading Object Storage Performance Validation

Load DynamiX Enterprise software

Workload I/O Profiles

Load DynamiX Performance Validation Appliance

Performance Analytics

Switch

File, Block, or Object storage

Product or Configuration A

Product or Configuration B

IOPS, Throughput, Latency
Easy to use, Enterprise Ready
Unified Object Workloads out of the box for Swift & S3

Load DynamiX Enterprise provides an enterprise platform for modeling, validating and managing your file, object & block storage validation.

Setting data and metadata ratios & commands are easy
Out of the box Object Workload Models
For Swift & S3

- Provides intuitive configurations to model object workloads for S3 & Swift
- Analytics provide the data to optimize object storage infrastructure
Web scale Performance Validation
Mixed Workloads modeling made Easy

What does a Composite Workload simulate?

- Applications with multiple access patterns
- Across multiple tenants or Virtualized environments
- Multiprotocol / unified storage deployments

Customer Benefits

- Easy modeling of complex workloads
- The most realistic workload models available today
Load DynamiX provides scalable unified performance validation for Object, File and Block
Object Storage Client Modeling
Granular control over client behavior

- Key Configurable Parameters:
  - Credentials, URI/URLs, HTTP Header/Body Content, HTTPS/Certificates, Load Profiles...
- Key Performance Indicators
  - Concurrent Applications/Connections, Scenarios/Users/Connections Per Second, Throughput, Time to First Byte, Min/Max/Avg Response Times...
Precise control when needed
Hyper scale performance validation for Swift, S3 & CDMI

Deep definition of request headers for all operations and authentication

Precise control over Swift, S3 & CDMI operations

Rich statistics for in-depth analysis
Object Storage Performance Validation
Scalable Workload Generation from Load DynamiX

User/Client Emulation
- Session Persistence
- Parallel Scenarios
- Object & Meta-data operations (and APIs)
- Authentication (S3 – v2/4, Keystone 2/3)
- Bucket/Container and Object ACL validation

Content Generation
- Compressible & dedupeable content
- HTTP/S Parsing: Content Insert/Extraction
- Dynamic HTTP Body Templates

Object Storage Web Services
- OpenStack Swift, Amazon S3, SNIA CDMI, other...
- Authentication (S3 v2/4, Keystone 2/3)
- RESTful Interfaces
- Form Submissions
- Multi-part Uploads
- AJAX emulation
- Page Load Times
- Large File Transfers
- Load Balancing

Scalability
- 19Gbps HTTP per port (stateful)
- 1M+ Open Connections
- 200K+ Connections/Sec
- High throughput 1/10GE
- Appliance Stacking

Insight/Debug
- REST Method Metrics
- L4-7: TCP/Protocol
- L2-3: Network Statistics
- Inline Tracing, Logging
- Data Verification/Integrity
Conclusion

- Customers are looking for better ways to meet storage and cost needs
- Object, open source and unified storage is seen as key to meeting those objects
- Vendor and customer use cases do not always align
- Performance validation requires testing across multiple dimensions
- Load DynamiX is the leader in Object and Unified storage validation for your customers workloads
Thank you!