ADVANCED TECHNOLOGY GROUP (ATG)

Accelerate with ATG Webinar

IBM Storage Ceph Update for Version 7.1

John Shubeck – ATG Storage Technical Specialist

Date: August 27, 2024

Accelerate with ATG Technical Webinar Series

Advanced Technology Group experts cover a variety of technical topics.

Audience: Clients who have or are considering acquiring IBM Storage solutions. Business Partners and IBMers are also welcome.

To automatically receive announcements of upcoming Accelerate with IBM Storage webinars, Clients, Business Partners and IBMers are welcome to send an email request to accelerate-join@hursley.ibm.com.

2024 Upcoming Webinars – Register Here!

Ongoing Innovation – IBM Storage Virtualize 8.7.1 Technical Update – October 10th, 2024

Important Links to bookmark:

ATG Accelerate Site: https://ibm.biz/BdSUFN

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Offerings

Client Technical Workshops

- **IBM FlashSystem Deep Dive & Advanced Functions: September 18th – 19th in Paramus, NJ**
- IBM DS8900F Advanced Functions
- IBM Fusion & Ceph: A Deep Dive into Next Gen Storage
- IBM Cyber Resiliency with IBM Storage Defender
- IBM Storage Scale System & Storage Scale Workshop

TechZone Test Drive / Demo's

- IBM Storage Scale and Storage Scale System GUI
- IBM Storage Virtualize Test Drive
- IBM DS8900F Storage Management Test Drive
- Managing Copy Services on the DS8000 Using IBM Copy Services Manager Test Drive
- IBM DS8900F Safeguarded Copy (SGC) Test Drive
- IBM Cloud Object Storage Test Drive - (Appliance based)
- IBM Cloud Object Storage Test Drive - (VMware based)
- IBM Storage Protect Live Test Drive
- IBM Storage Ceph Test Drive - (VMware based)

Please reach out to your IBM Representative or Business Partner for more information.

***IMPORTANT* The ATG team serves clients and Business Partners in the Americas, concentrating on North America.**

Registration Open!

Storage @ IBM TechXchange Conference 2024

October 21-24, 2024
Mandalay Bay | Las Vegas
#IBMTechXchange

Key Learnings

- Practical how-to advice
- Patterns and best practices
- Success stories, IBM PoV, proven techniques

Featured Products

IBM Storage Defender
IBM Storage Fusion
IBM Storage Scale + IBM Storage Ceph
IBM Tape + IBM SAN
IBM Storage FlashSystem + IBM Storage DS8000

Collaborate. Learn. Play.

Community

IBM Champions
User Groups
Tech Peers
Business Partners

Sandbox

Network
Learn
Collaborate
Play

Roadmaps

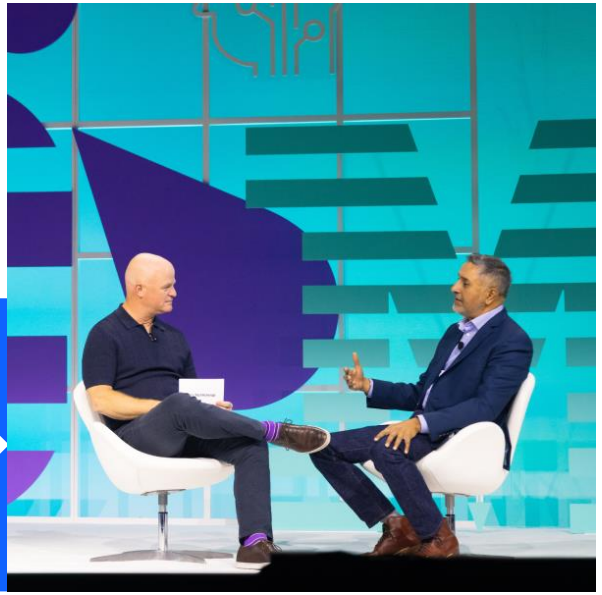
Go deep with people in the know and set the stage for where IBM is going in the future

Breakout Sessions

Trends and Directions
User Groups
Product Deep Dives
Meet the Expert
Professional Development
Show the Code
Birds of a Feather
Academic/Research

Accelerate your Career

Labs (Instructor-Led, Self-paced)
IBM Certification Testing
Earn up to 25 hours in CPE credits



https://www.ibm.com/community/ibm-techxchange-conference/

Game On! →

Accelerate with ATG Survey

Please take a moment to share your feedback with our team!

You can access this 6-question survey via Menti.com with code 1708 6924 or

Direct link https://www.menti.com/alwhyze7z1gz

Or

QR Code

ADVANCED TECHNOLOGY GROUP (ATG)

Accelerate with ATG Webinar

IBM Storage Ceph
Updates for Version 7.1

John Shubeck – ATG Storage Technical Specialist

Date: August 27, 2024

About the Presenter

John Shubeck is an information technology professional with over 42 years of industry experience spanning both the customer and technology provider experience. John is currently serving as a Senior Storage Technical Specialist on IBM Object Storage platforms across all market segments in the Americas.

Introducing our panelists

Shu Mookerjee is a Level 2 Certified Technical Specialist with over twenty years at IBM, working in a variety of roles including sales, management and technology. For the last decade, he has focused exclusively on storage and has been the co-author of four (4) Redbooks. Currently, Shu is part of the Advanced Technology Group where he provides education, technical guidance, Proofs of Concept and Proofs of Technology to IBMers, business partners and clients.

Introducing our panelists

Jerrod Carr is an IBM Principal Storage Technical Specialist in IBM Storage Solutions. Jerrod Carr has been in the Storage industry for over 21 years selling hardware and software for various large technology companies. With beginnings in the Cleversafe IBM team for 8 years providing expertise in Cloud Object Storage, the last 3 years working on the Americas SWAT team as a Senior Storage Specialist providing unstructured data experience to the various markets.

Todd Johnston is a proven applied technologist bringing decades in customer advocacy, technology implementations, service provider enablement, sales engineering, and solution architecture. Todd is especially focused on Ceph innovation and early adoption, technical agility, and disruptive technologies. Todd's expertise in lies storage software, virtualization, and container and hybrid cloud infrastructures. Todd joins us from the IBM SWAT practice in our cross functional team.

IBM Storage Ceph Review

IBM Storage Ceph offering

IBM Storage Ceph and Red Hat Ceph packaging

IBM Storage Ceph
On-prem S3 storage at scale and performance

- Object storage
- Block storage
- File storage
- Presence at the on-prem object market at 10-Petabyte+ scale
- S3 compatibility with AWS

Red Hat OpenStack Platform

Red Hat Ceph Storage

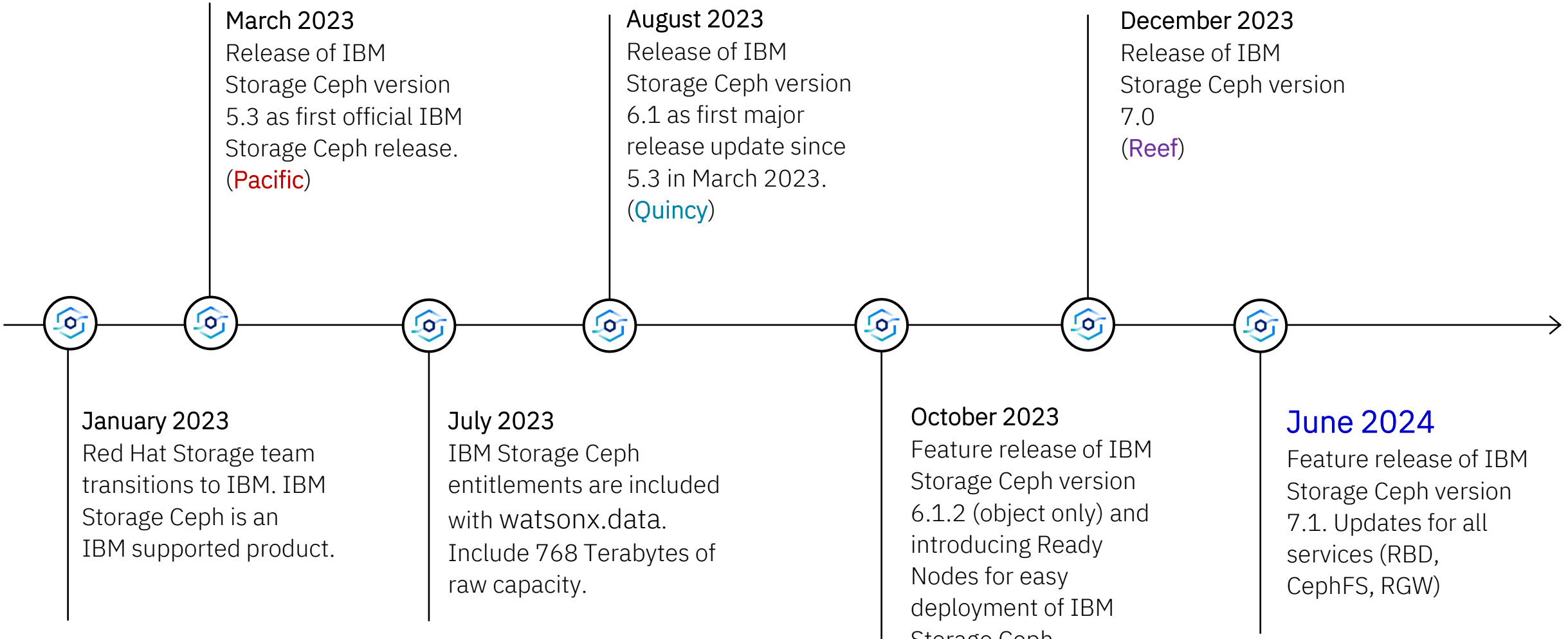
Ceph for OpenStack
 # 1 in OpenStack storage

- Cinder block storage
- Nova ephemeral storage
- Glance image storage
- Swift object store
- Manila file storage
- Advanced integration
- Unified management
- Hyperconverged and Edge capabilities

IBM Storage Fusion
Ceph for OpenShift

- Self-managing storage powered by Red Hat Ceph Storage
- Automated by Rook and completed with Multicloud object gateway (MCG)
- Advanced integration, automation, ease of use
- Persistent storage for OpenShift stateful workloads

IBM Storage Ceph timeline from 2023 to the present



IBM Storage Ceph Easy

Easy installation setup

IBM Storage Ceph initial cluster setup

Start with a minimum of 4 industry-standard x86-servers running Red Hat Enterprise Linux and easily scale out to business needs.

Or simply choose IBM's complete ready to run solution:

IBM Storage Ready nodes for IBM Storage Ceph

IBM Storage Ceph software internals

IBM Storage Ceph software internally runs Linux containers, removing any needs for specific dependencies.

More flexible, faster and easier to deploy and maintain, compared to conventional package-based software deployment.

IBM Storage Ceph installation

An IBM Storage Ceph cluster can be installed by running a single command.

With this, installing IBM Storage Ceph has never been easier.

What's new in IBM Storage Ceph 7.1

What's new
TL;DR

Storage Ceph

Fully supported Unified Storage release

IBM Storage Ceph 7.1 supports File, Block and Object storage.

Enabling IBM clients for new use cases, that are supported by IBM.

NVMe/TCP access to Ceph block storage

Fast network-based Block storage for VMware

NVMe/TCP to access Ceph RBD block storage for non-Linux clients.

NFS access to CephFS

Export CephFS volumes via NFS v3 or v4

For servers and applications which cannot natively access CephFS.

RADOS Gateway RGW Updated features

Archive Zone
General availability

Bucket granular sync replication

Functional enhancements

New supported use cases with IBM Storage Ceph

VMware Block storage

General purpose File
File Sharing as a Service

IBM Cloud regional file service

AI/ML Data Lakehouse

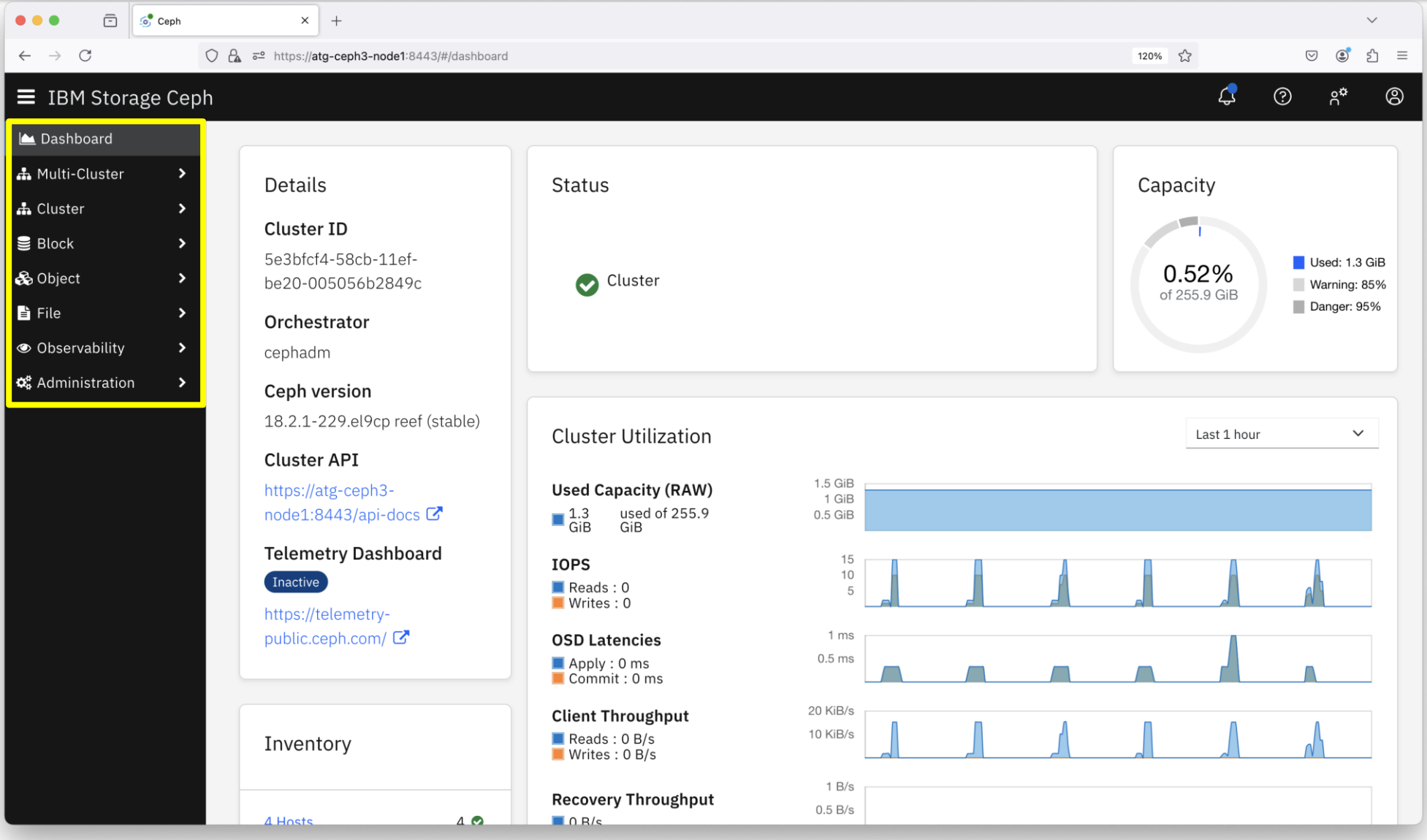
Dashboard UI management capabilities

Significant UX improvements for more ease of use.

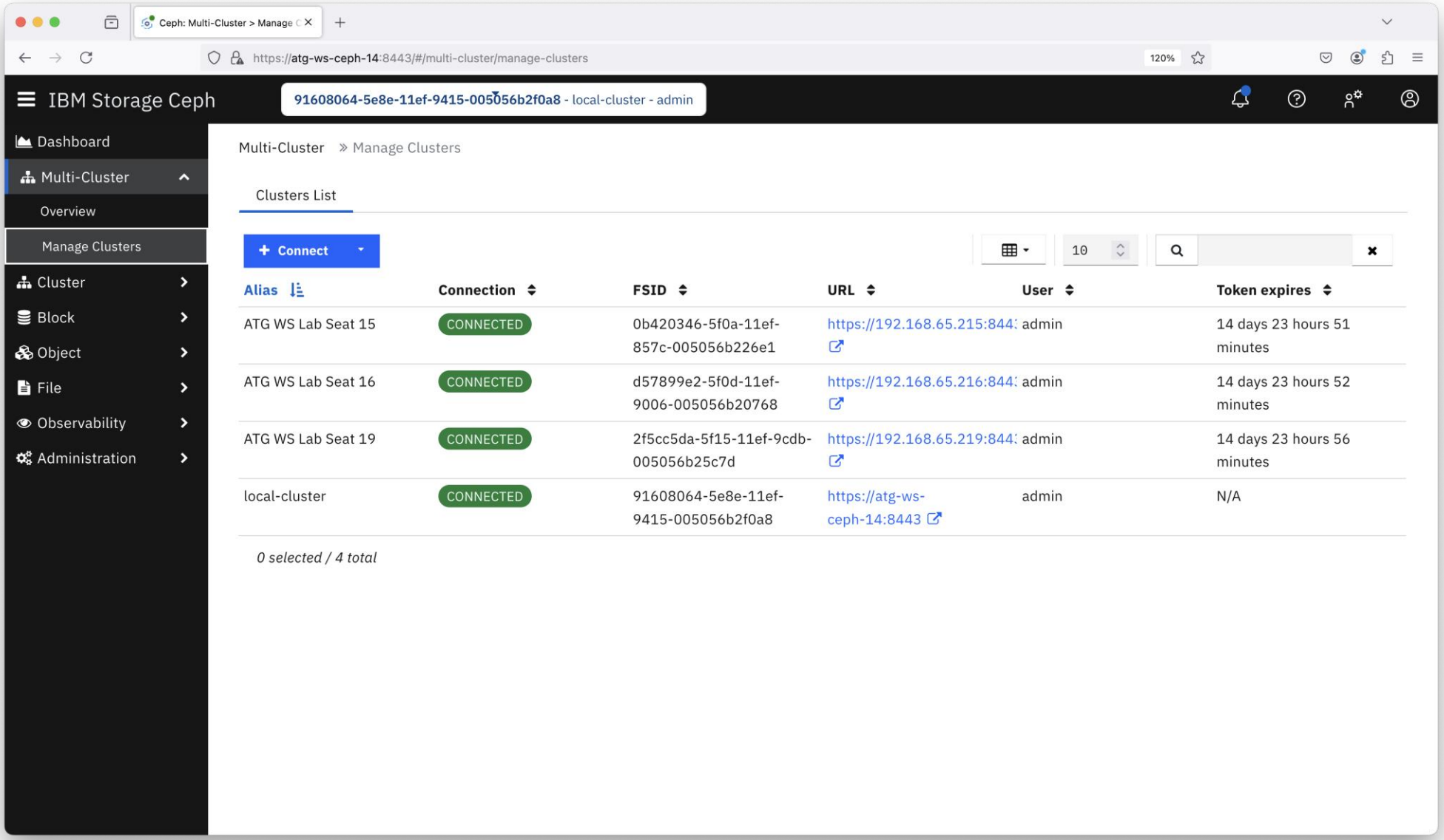
Snapshot management
Log filtering and viewing

Upgrade Ceph cluster by using the dashboard.

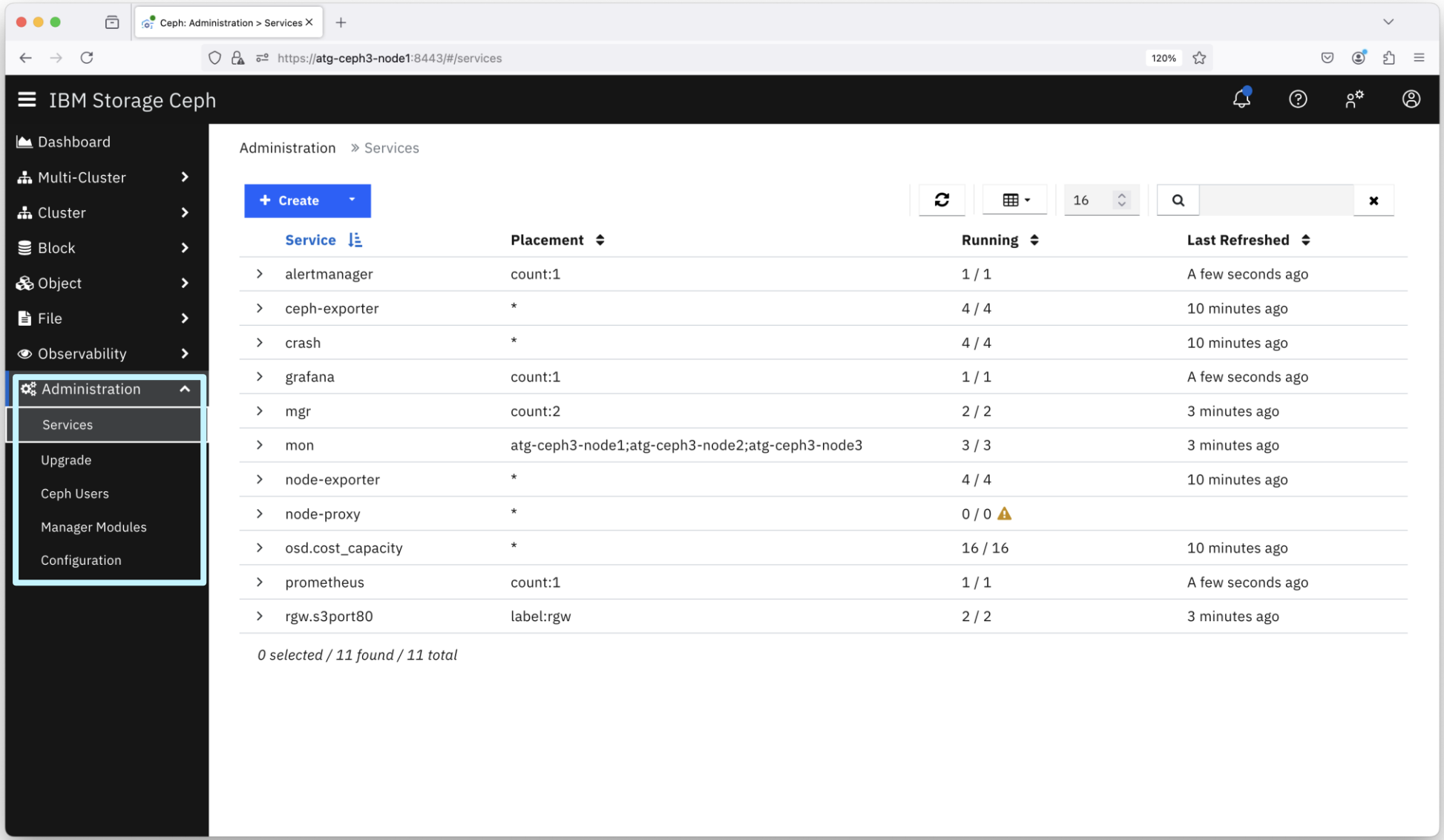
Ceph Dashboard navigation panel



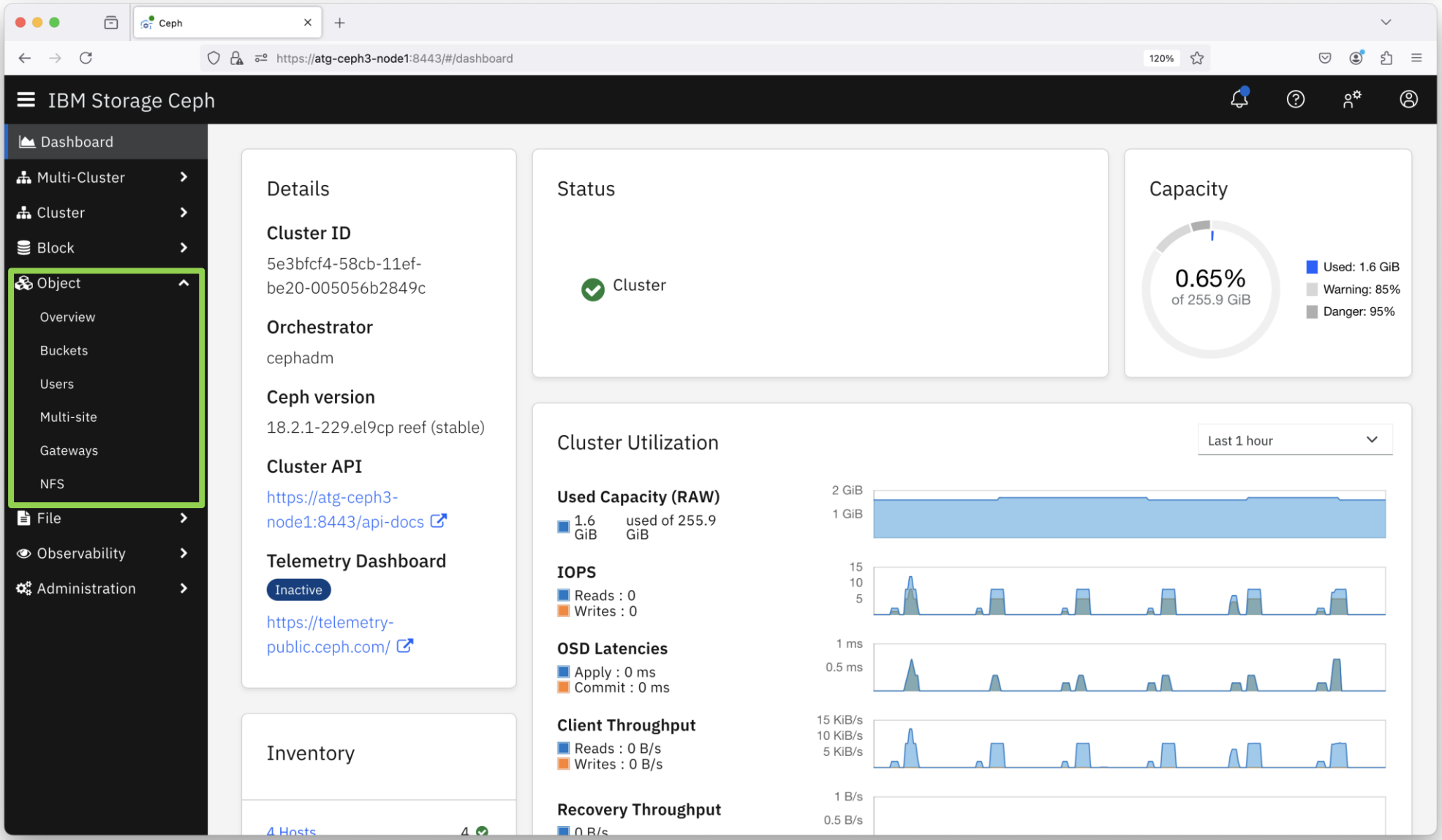
Multi-Cluster Dashboard link and launch



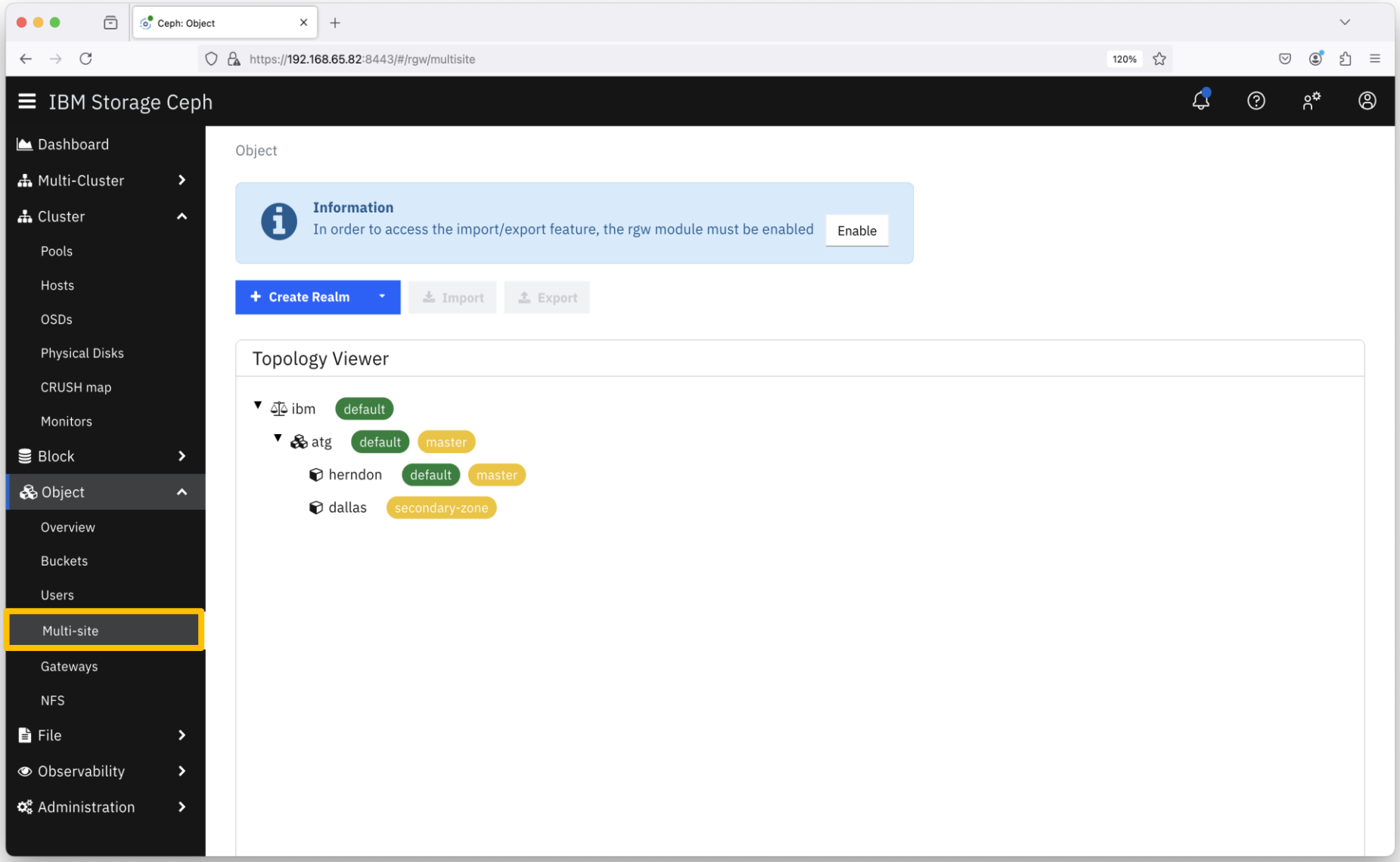
New Administration group and migrated property pages



Object storage group enhancements



Multi-site topology viewer



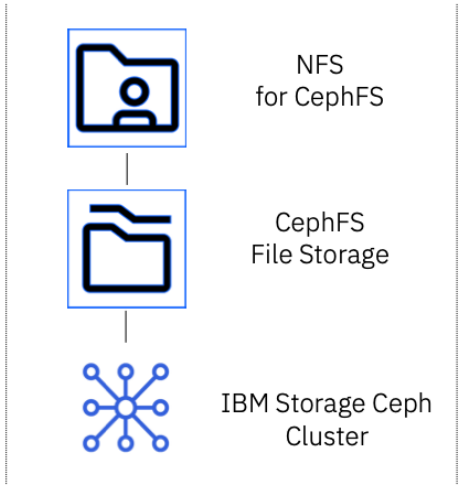
Multi-protocol access

Network File System (NFS) Service - Ganesha

Functionality

IBM Storage Ceph

NFS access capabilities on top of CephFS



NFS service for CephFS

IBM Storage Ceph CephFS volume file access through NFS.

For legacy applications and MS Windows clients.

Supported NFS versions NFSv4.1 and NFSv3

Management of NFS clusters through CLI and dashboard UI

NFS service properties

Resilience against storage node failure with automatic failover.

Supports hundreds of NFS shares.

Support for external load balancer tooling (i.e. HAproxy, F5)

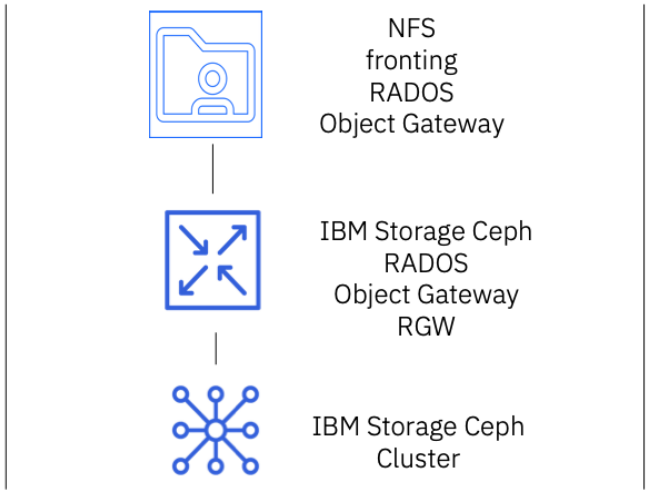
Integrates with Kerberos.

Multi protocol for data interchange

Functionality

IBM Storage Ceph RGW

NFS with RGW backend



NFS with RGW backend integration

Provides an easy way to ingest existing enterprise data from Linux and Windows clients into a Ceph object store via dropping file on an easy to access NFS fileshare..

Provides clients, in example, data scientists, with an easy way to export results from analytics jobs to share results with consumers, that cannot access object storage.

NFS object access alternative option

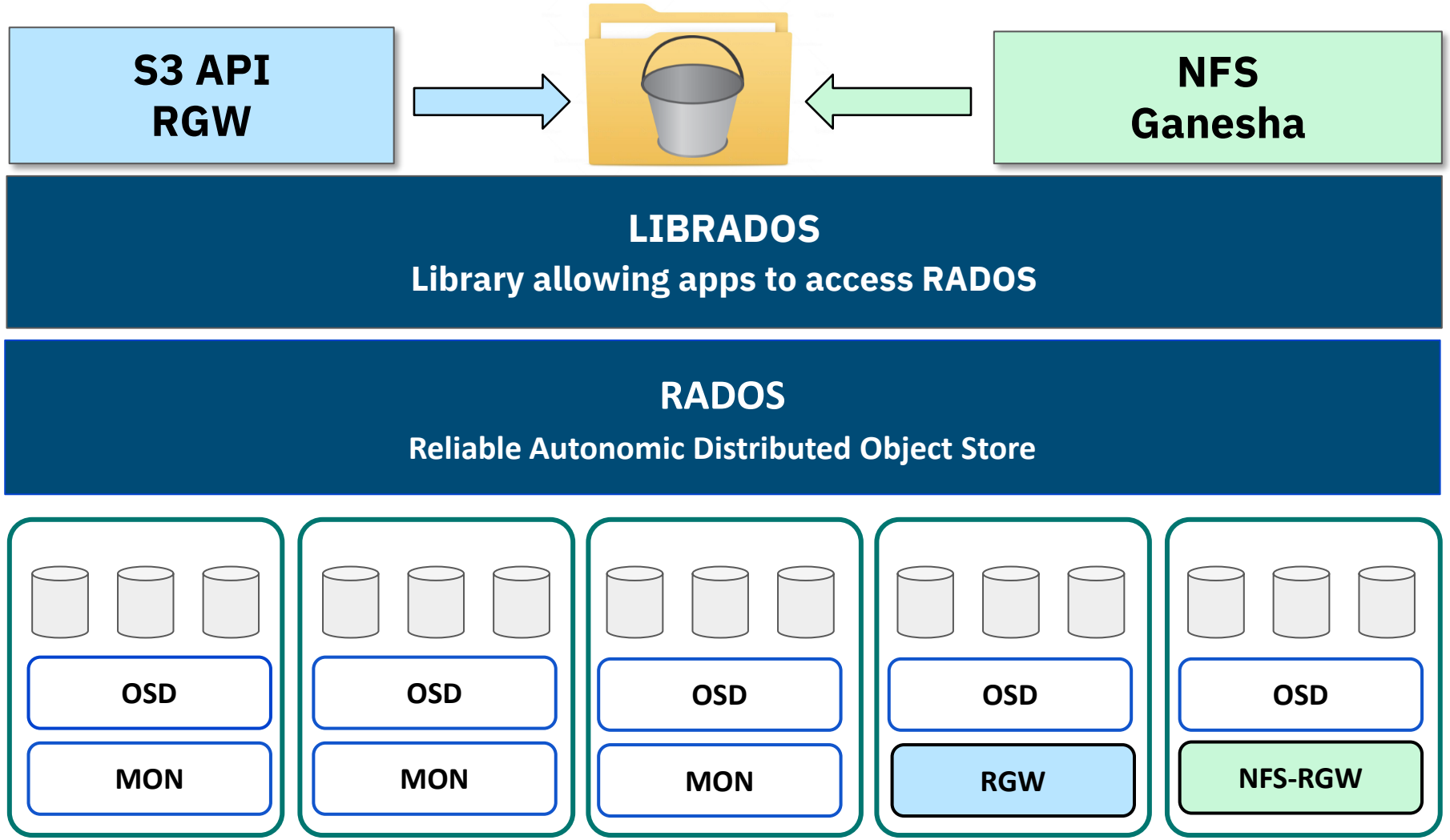
Enables regular users on other platforms to ingest or access result data on an IBM Storage Ceph Object store.

Object data can be made available to applications or platforms which do not have capabilities for S3 object access natively.

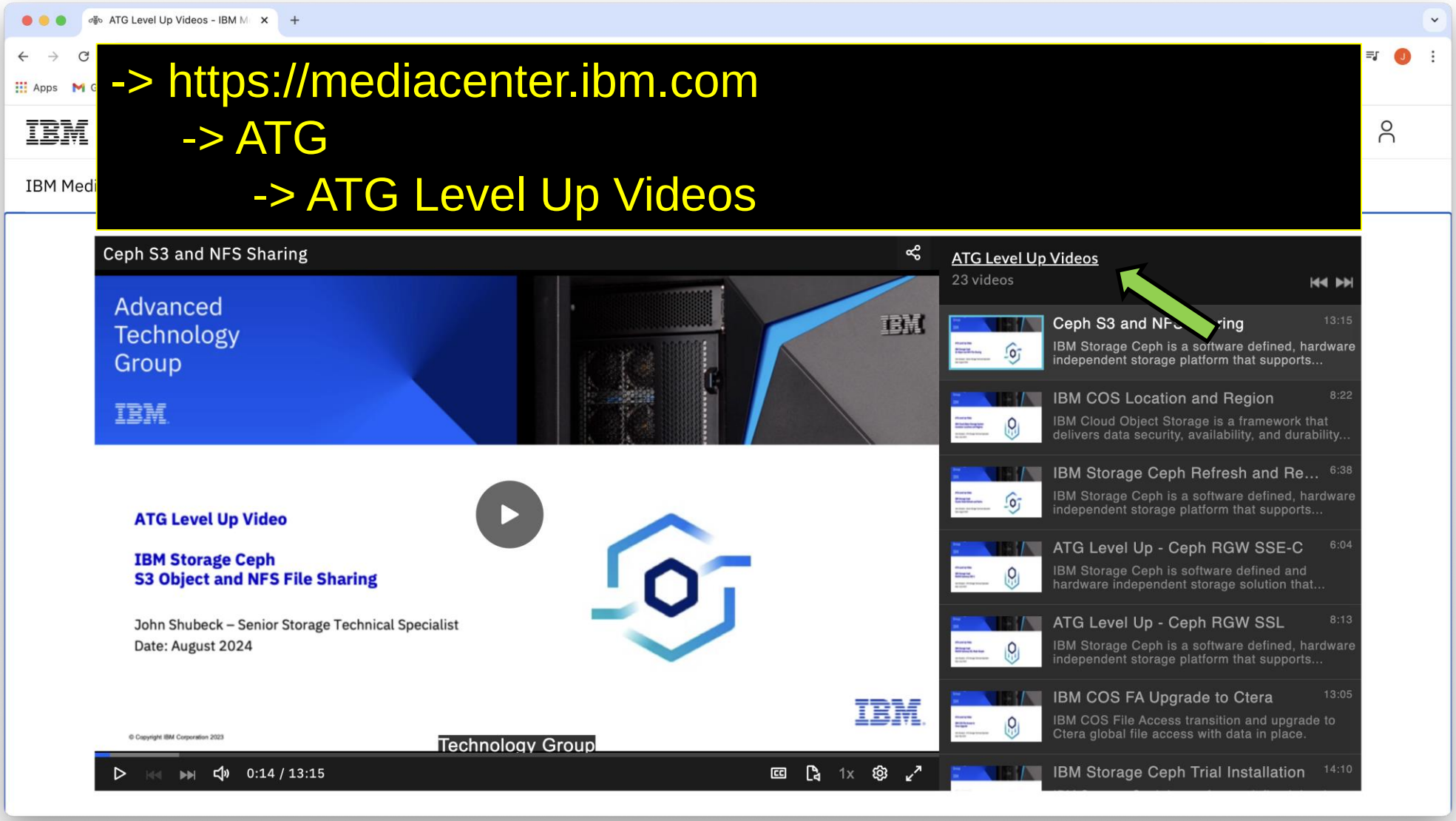
In example, legacy applications or hardware equipment.

IBM Storage Ceph data access

Multi protocol S3 and NFS access for data migration and interchange



ATG Level Up Video – S3 Object and NFS File Sharing

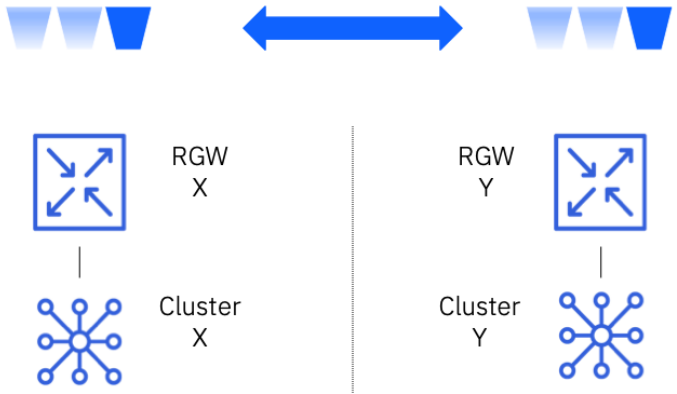


Multi-site replication

RADOS Gateway (RGW) bucket replication

Functionality

Multi-site replication
with bucket granularity



Bucket level granularity

Ability to replicate a selected bucket or group of buckets to a different IBM Storage Ceph cluster

RGW multi-site similarity

Similar functionality as RGW multi-site, but now with bucket granular support

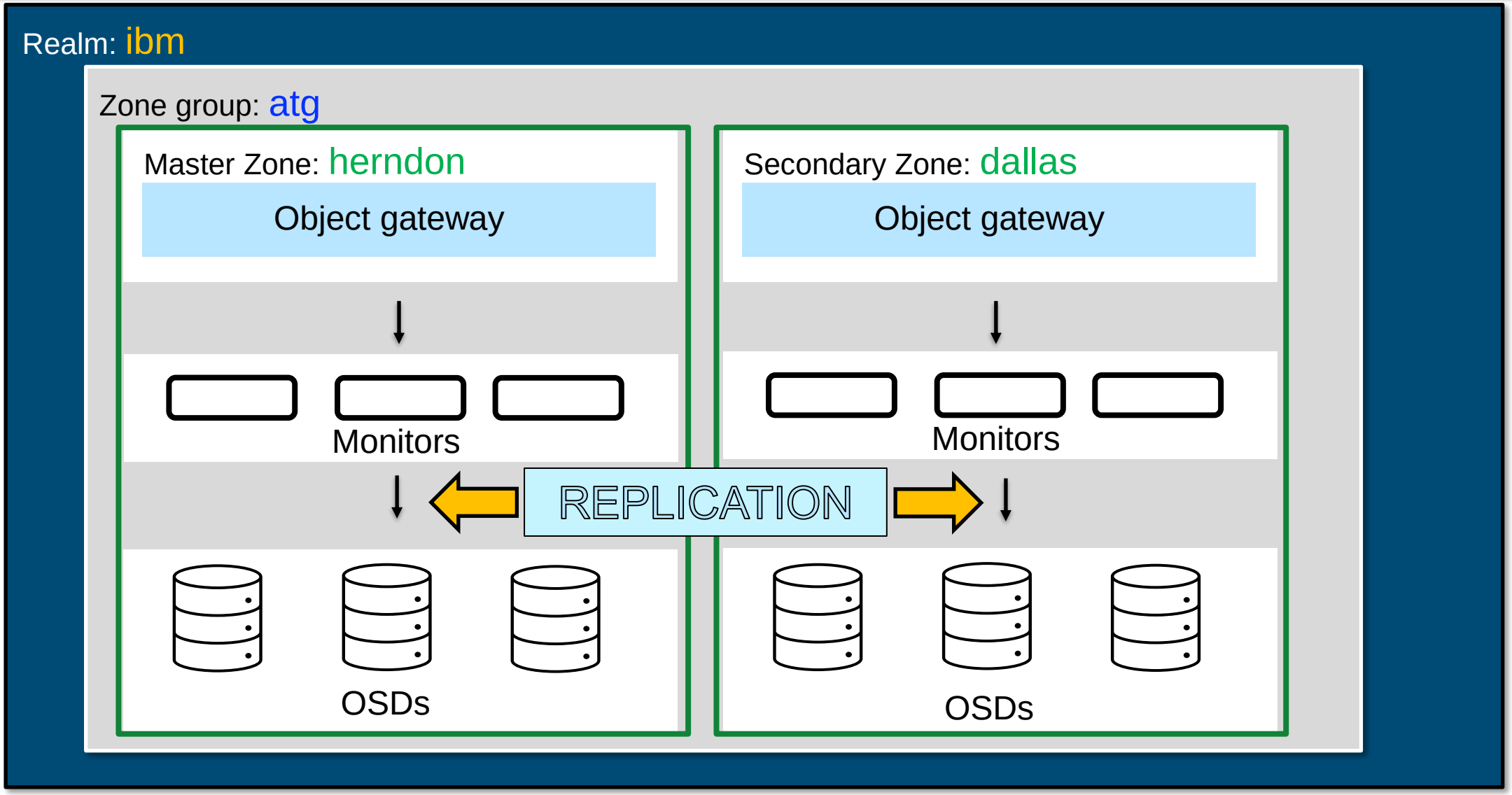
Bi-directional

Bi-directional replication of selected buckets

Active-Active

Active-active replication between two sites, with bucket granularity

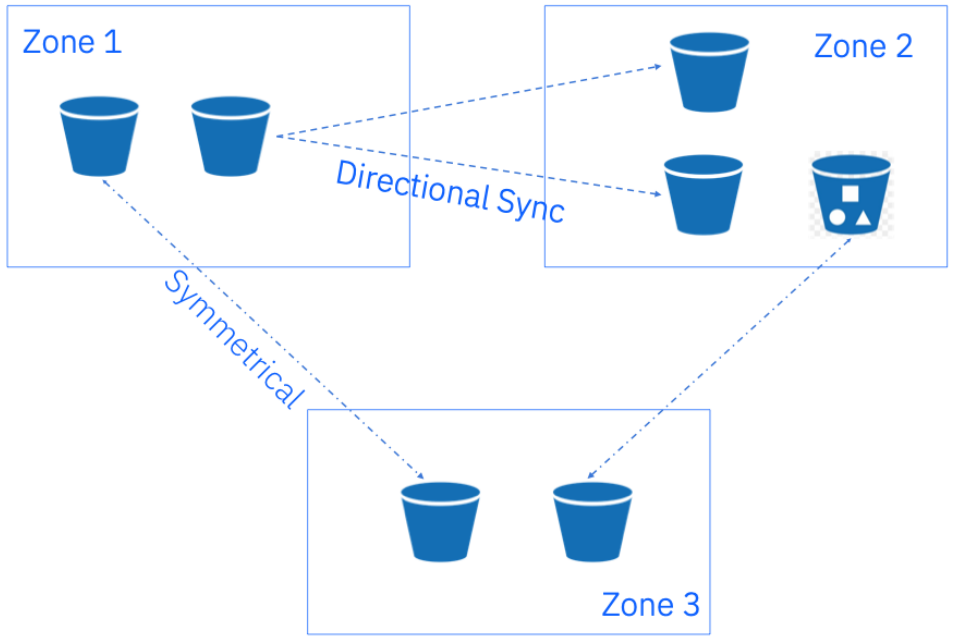
RADOS Gateway multi site configuration (SAMPLE)



Complex replication scenarios

Functionality

Multi-site replication
with bucket granularity



Flexible sync policy

Configure sync policies per zonegroup or bucket, ability for fine grained replication control

Per bucket sync

Enable/disable synchronization per bucket.

Enable full zone replication and opt-out on specific bucket replication

One-to-many

Replicate from one source bucket to many destination buckets.

Source and destination bucket names can be different.

Configure flows

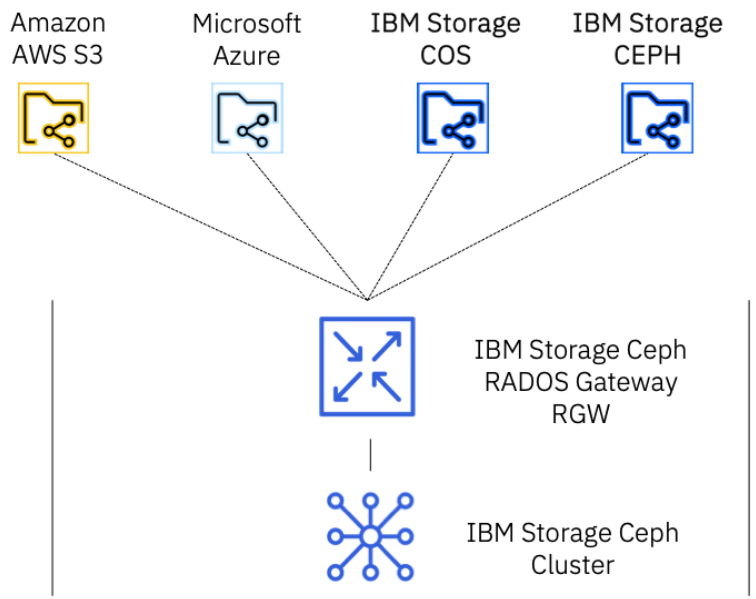
Configure different data flows between zones. Symmetrical or directional

RADOS Gateway (RGW) cloud transitions

Functionality

IBM Storage Ceph RGW

New supported S3-compatible platforms



Transitioning of RGW data to public cloud

Transition data to a remote cloud service as part of the lifecycle configuration using storage classes to reduce cost and improve manageability.

Transition can be unidirectional, but data cannot be transitioned back from the remote zone.

S3 compatible platforms

Data transition can be directed to multiple cloud providers, such as Amazon AWS and MS Azure.

Key difference with Azure is that multi-cloud gateway (MCG) is required to translate S3 protocol to Azure Blob.

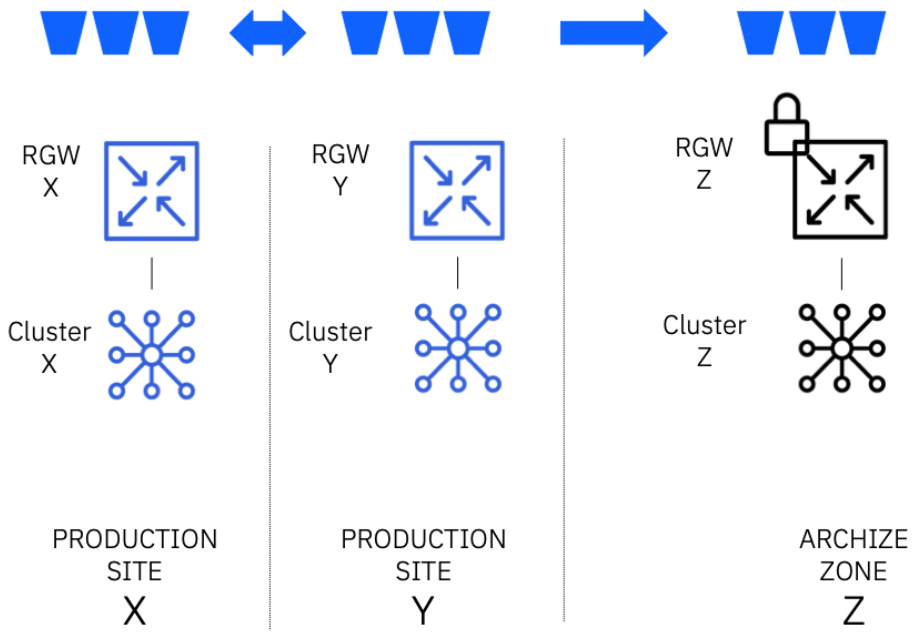
IBM Storage COS and IBM Storage Ceph are now both supported as new target destinations.

Immutability and cyber-resiliency protection

Functionality

Object archive zone

General availability



IBM Storage Ceph archive zone

The archive zone receives all objects from the production zones.

It keeps every version for every object, providing the user with an object catalogue that contains the full history of the object.

Archive zone provides immutable objects that cannot be deleted nor modified from RGW endpoints.

Archive zone purpose and benefit

Ability to recover data from the archive zone.

Enables for recovery of any version of any object that existed on production sites.

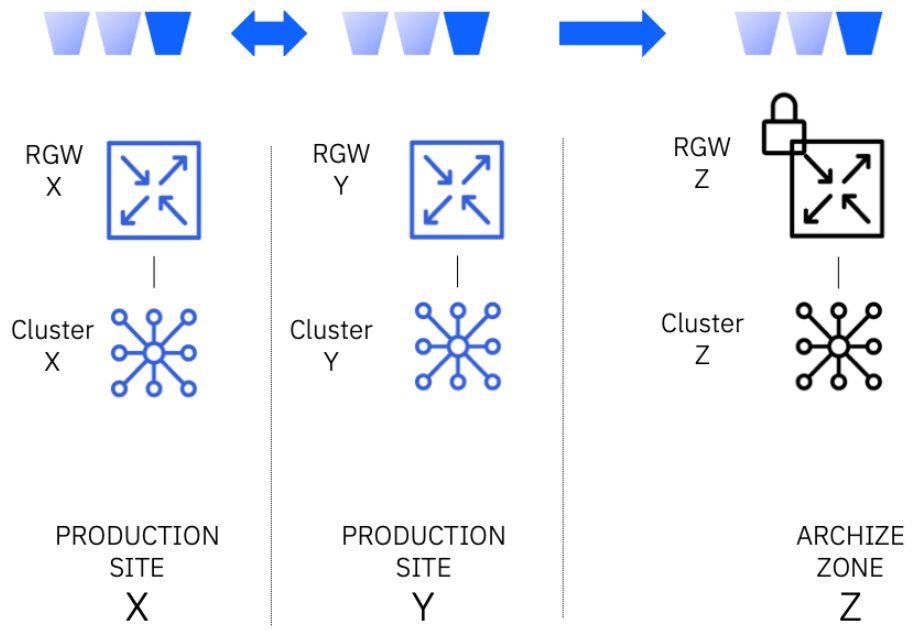
In case of data loss, ransomware or disaster recovery, still all valid versions of all objects can be recovered easily.

Also suitable for compliancy related use cases.

Fine grain replication control

Functionality

Object archive zone
with bucket granularity



Object archive zone bucket granularity

Allows clients to enable or disable replication to the archive zone on a per object bucket case.

Distinctions can be made based on a single bucket granular level.

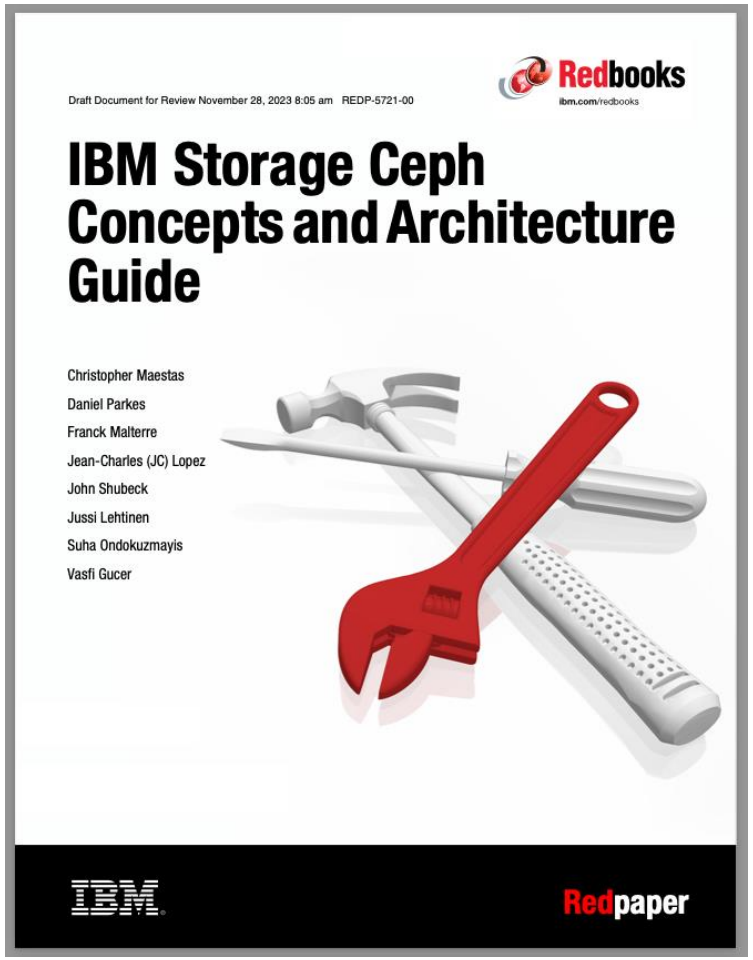
Object archive zone granular choice

Goal is to reduce data storage in the archive zone.

In example, a set of test/development buckets are probably non-business critical.

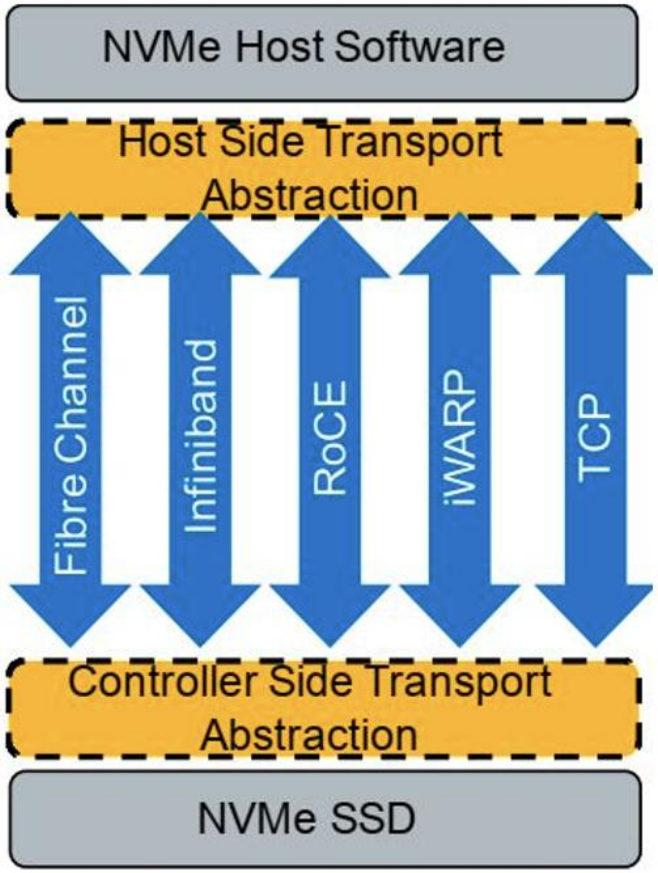
System administrators may than decide to disable replication to the archive zone for these types of object data buckets.

Block storage enhancements



Introduction to NVMe over Fabrics – What is it?

- NVMe: Non-Volatile Memory Express
  - Fast PCIe attached storage
  - Local storage
- Expand NVMe efficiency and performance over network fabrics
  - Eliminate unnecessary protocol translations
  - Enable low-latency and high IOPS remote NVMe storage
- TCP
  - Well-known and common transport
  - No networking infrastructure requirements and constraints
  - Ratified Nov. 2018



Source: https://en.wikipedia.org/wiki/NVM_Express

Why NVMe over TCP?

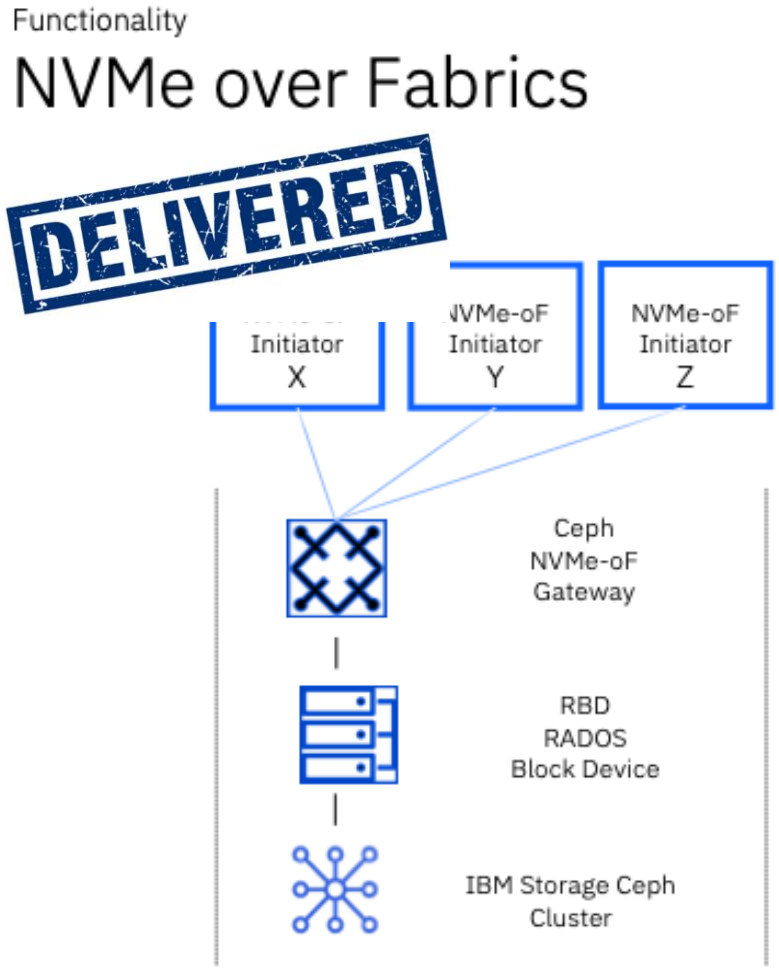
RADOS Block Device (RBD)

- Native RADOS protocol
- Distributed n-to-m protocol
- Reliable access to sharded and replicated/erasure coded storage

NVMe-over-Fabrics (NVMe-oF)

- EXTEND access to Ceph RBD to an open, widely adopted industry standard
- Enable use-cases where NVMe-oF is already part of ecosystem
- Take advantage of NVMe-oF offloading in DPUs
- Don’t we already have iSCSI for this?

NVMe-oF (NVMe over TCP) – Where do we use it?



NVMe over Fabrics for block storage

Similar in scope and design to RBD over iSCSI in the past.

A new management layer via a new ceph-NVMe-of daemon, coordinates configuration of NVMe-oF targets, across multiple cluster nodes.

No kernel dependencies. SPDK-based code.

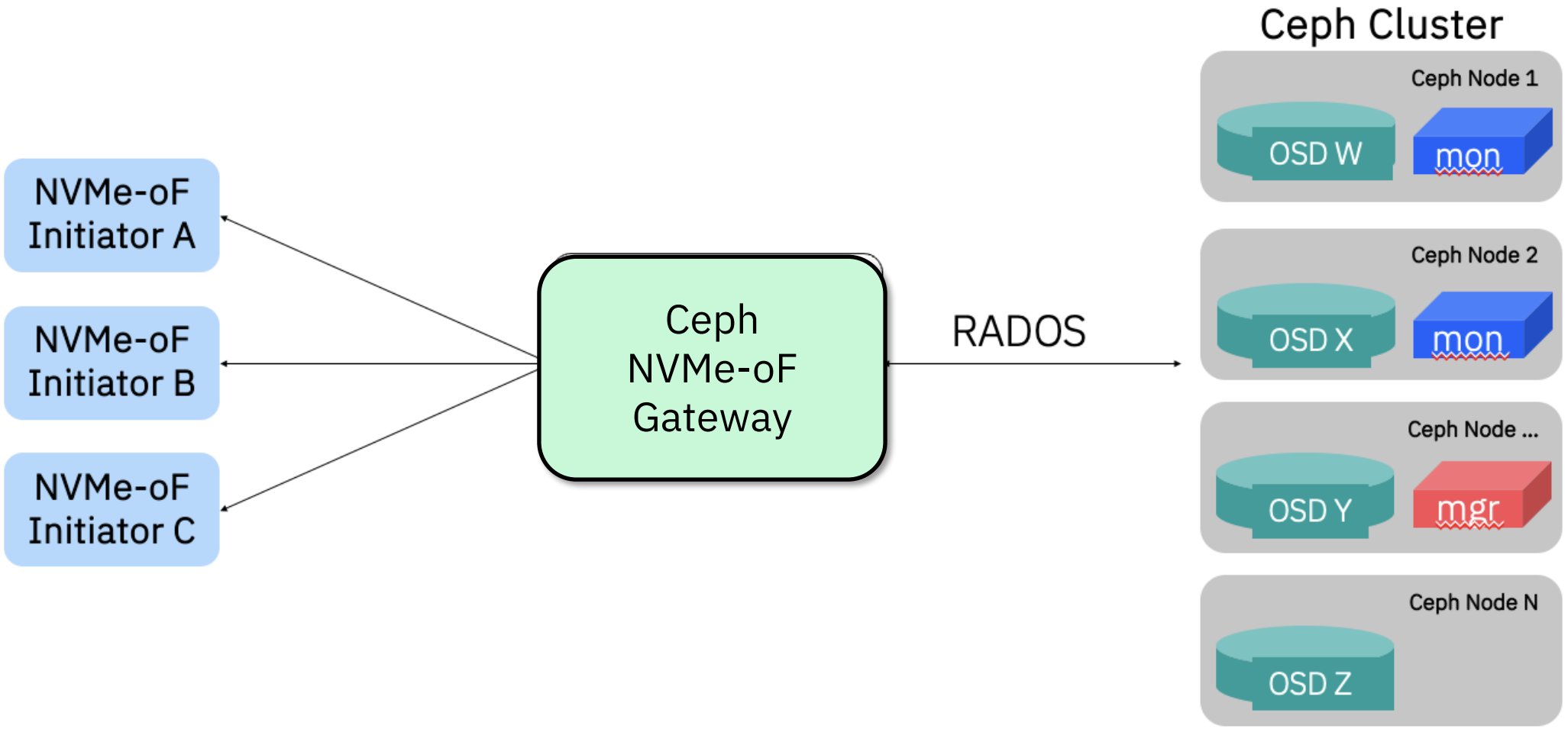
NVMe over Fabrics use case examples

Initial target use case is providing bare metal storage support.

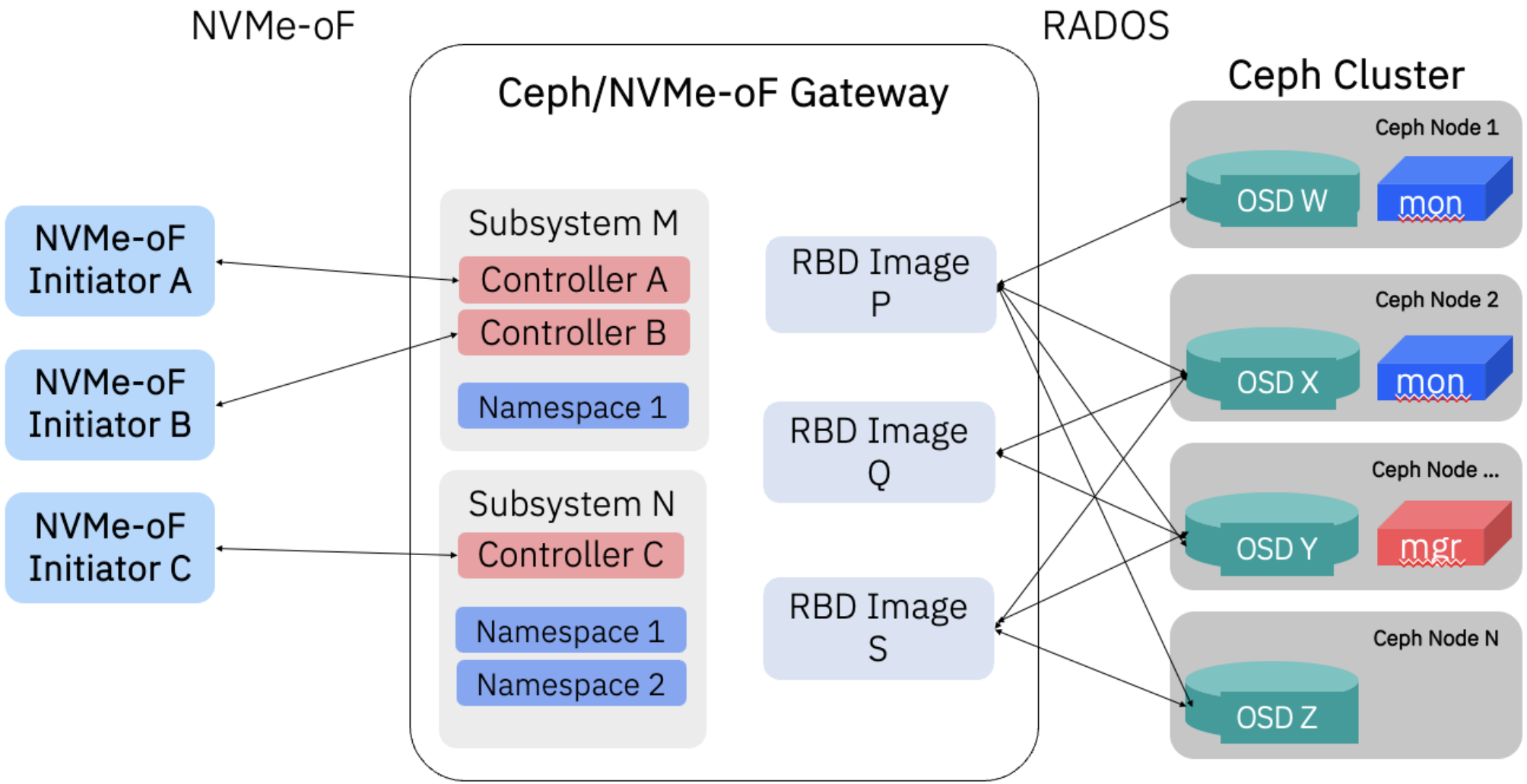
An NVMe-oF target and initiator combination to access storage from the Ceph RADOS subsystem.

Block storage for VMware or Windows storage consumption.

NVMe over TCP – What does it look like (Level 1)



NVMe over TCP – What does it look like (Level 2)

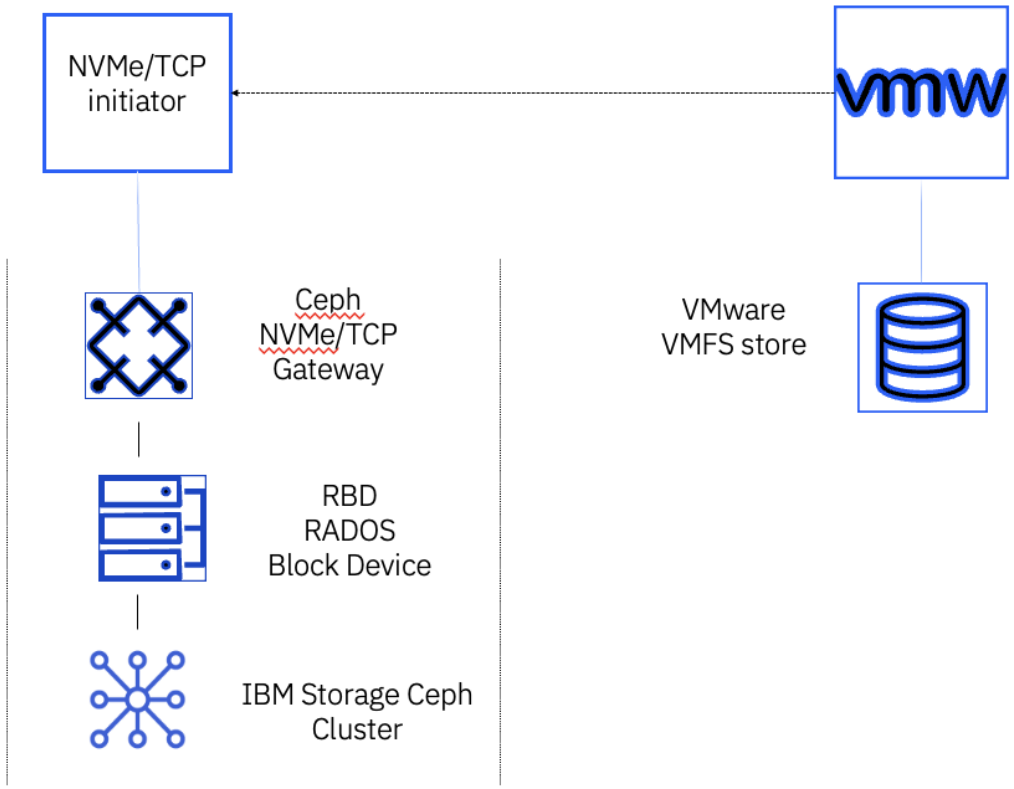


NVMe over TCP – Block storage for VMware

Functionality

NVMe/TCP volumes

supported as VMFS datastore



IBM Storage Ceph block storage

Provides:
IBM Storage Ceph RBD block volume

Accessible by NVMe/TCP

Use case:
VMware VMFS datastore.

For VMware vSphere deployments.

Vmware ESXi interactions

Connect ESXi hypervisor's NVMe/TCP Initiator to Ceph NVMe/TCP Target

Access IBM Storage Ceph RBD block volume using NVMe/TCP.

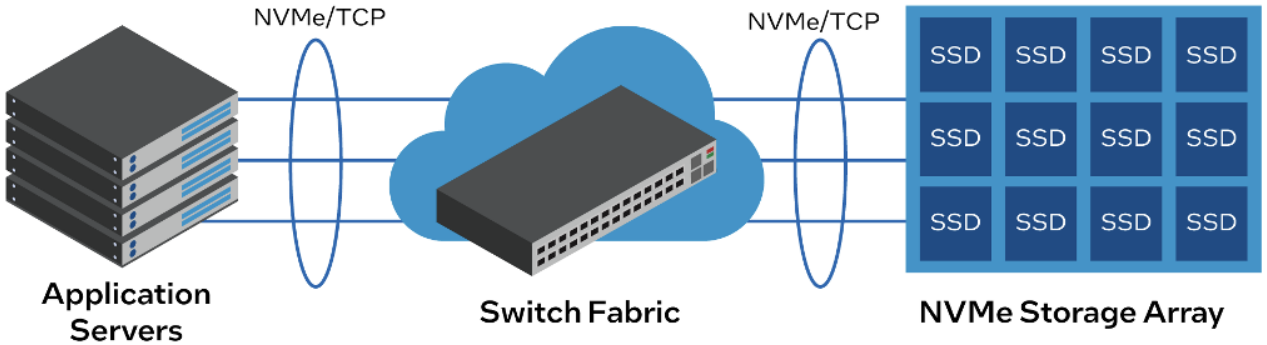
Create a VMFS6 VMware datastore based on IBM Storage Ceph

VMWare 7 update 3 and above are supported.

NVMe over TCP – What do I need?

Single gateway scale requirement/limitations
- Max/total namespaces per GW: 400
- Subsystems per gateway: up to 16
- Max number of controllers per GW: 256

Single IP address and port per gateway
GA Support as of IBM Storage Ceph 7.1
GA to support 4 GW for HA and scaleout
- auto-balance across GWs per controller



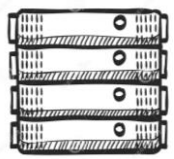
Initiator types
- RHEL 9.0+ (9.2+ preferred)
- VMware 7.0u3 and above
- Pensando (hardware) | SmartNICs

- Gateway CLI & API (GUI workflow targeted for late 2024)
- Cephadm install

IBM Storage Ready Node Update

Ceph buying & delivery options

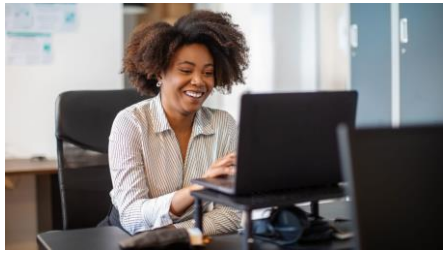
1 Software only



3rd Party Hardware

2 Ready Node

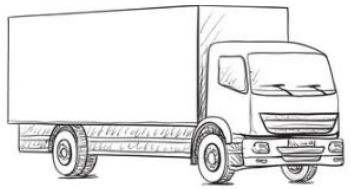
3 NVMe



IBM Storage Ready Nodes

Future - *exploring…*

4 Appliance



Turn key hardware and software IBM Storage Ceph

Why IBM Storage Ready Node

Why IBM Storage Ready Node for Ceph

Storage Ceph

IBM validation

IBM qualified and supported hardware for running IBM's Storage Ceph cluster platform.

Single point of contact

Single point of contact for procurement, support, services and lifecycle care.

One vendor: IBM

IBM Storage Insight

IBM Storage Insights for monitoring health, capacity and performance of your IBM Storage Ceph environment.

Storage use patterns

An IBM Storage Ceph cluster supports object, block, and file access methods from a centralized underlying pool of storage capacity.

High resilience

Self healing storage solution with no single point of failure.

Erasure coded storage for efficiency and cost effectivity.

Predictive analytics

To quickly identify health, performance and capacity of IBM Storage Ceph cluster–or server nodes that need attention.

IBM Storage Ceph Ready Node with NVMe

Descriptions	Specifications
CPU	2 x Intel® Xeon® Gold 6438N 2G, 32C/64T, 16GT/s, 60M Cache, Turbo, HT (205W) DDR5-4800
Memory	16 x 32GB RDIMM (512GB)
OS Disks	BOSS-N1 controller card + with 2 M.2 480GB (RAID 1)
Data Disks	3.84TB, 7.68, 15.36TB NVMe
Data Disk Quantities	8, 16, or 24 Disks
Network	2 x 10GbE (SFP+ Optical Transceivers Included)
Network	2 x 100GbE (QSFP28 Optical Transceivers Included)
Dimensions	3.41" H x 18.97" W x 29.85" D (2U Rack Height)
Software Support	IBM Storage Ceph 7.0, 7.1

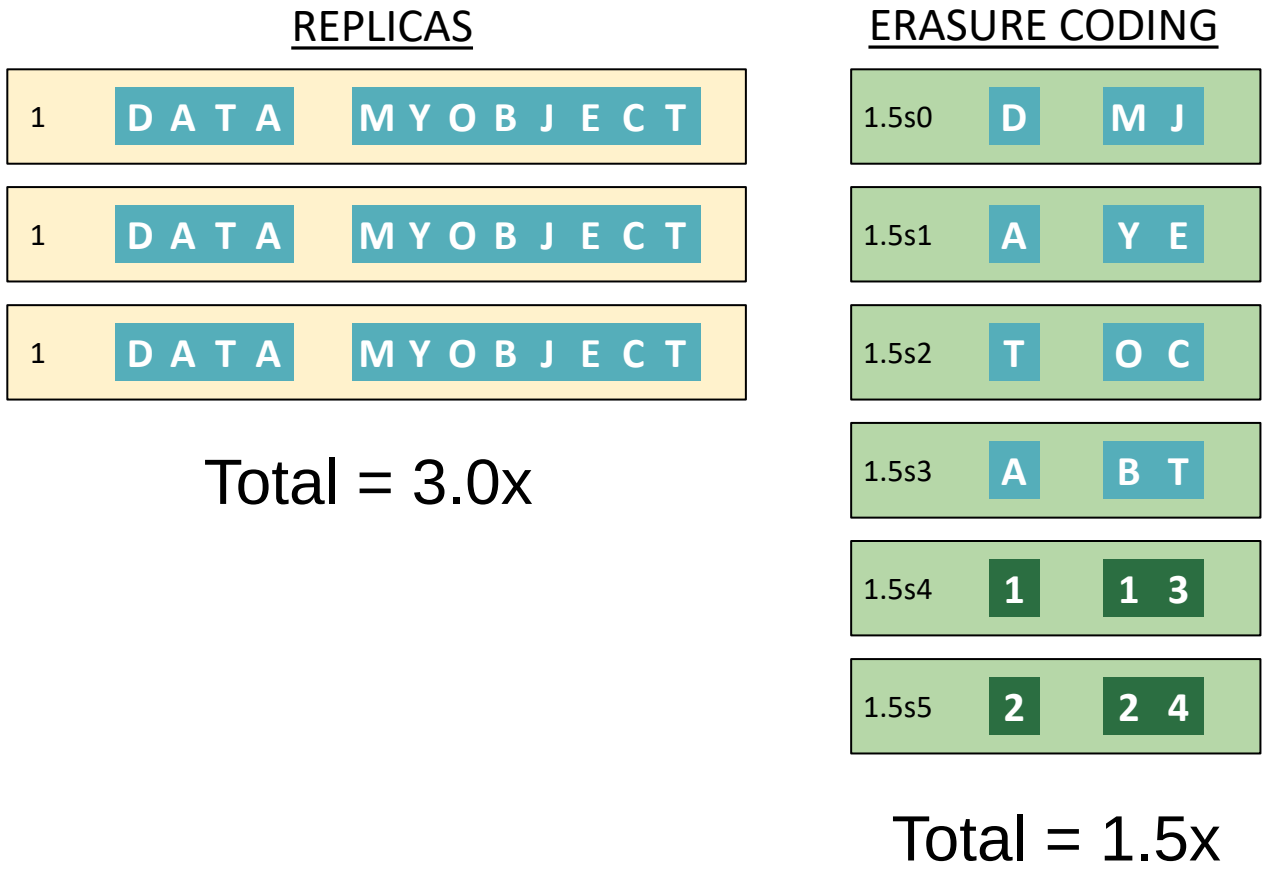
New data protection policies for replicas and erasure coding

Replicas

- Replica 2x (NVME/SSD pool)
- Replica 3x (HDD pool): min 4 nodes
- **Replica 4x (Metro cluster)**

Erasure Coding (EC Profiles)

- EC 4+2 : minimum 7 hosts
- EC 8+3 : minimum 12 hosts
- EC 8+4 : minimum 13 hosts
- **EC 2+2 : minimum 4 nodes**

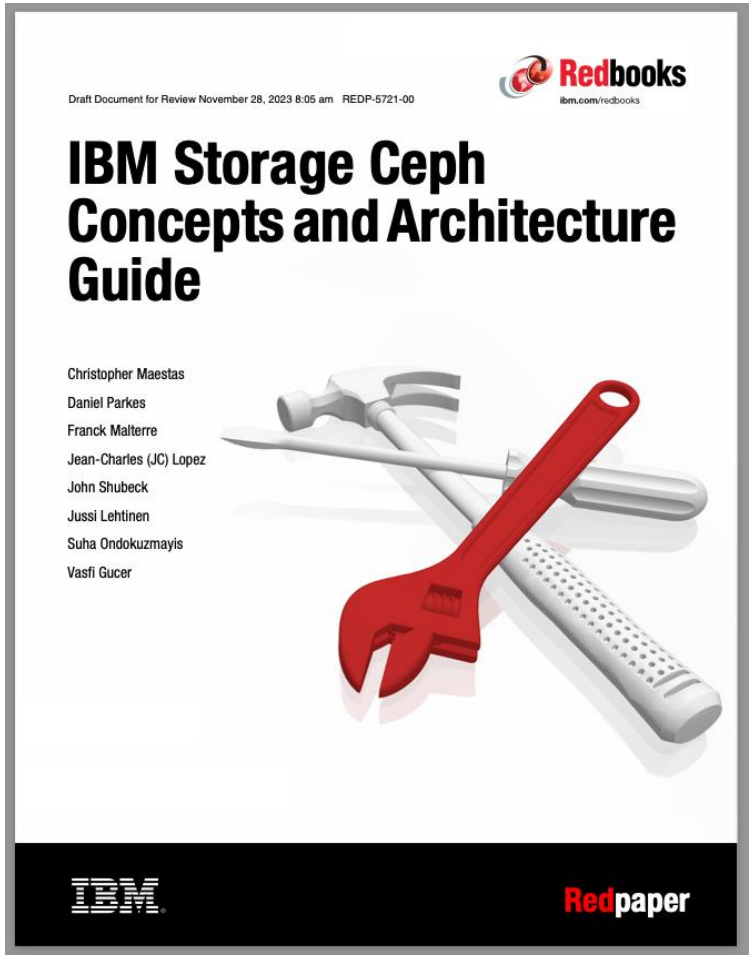


IBM Storage Ceph 7.1 – Summing it up

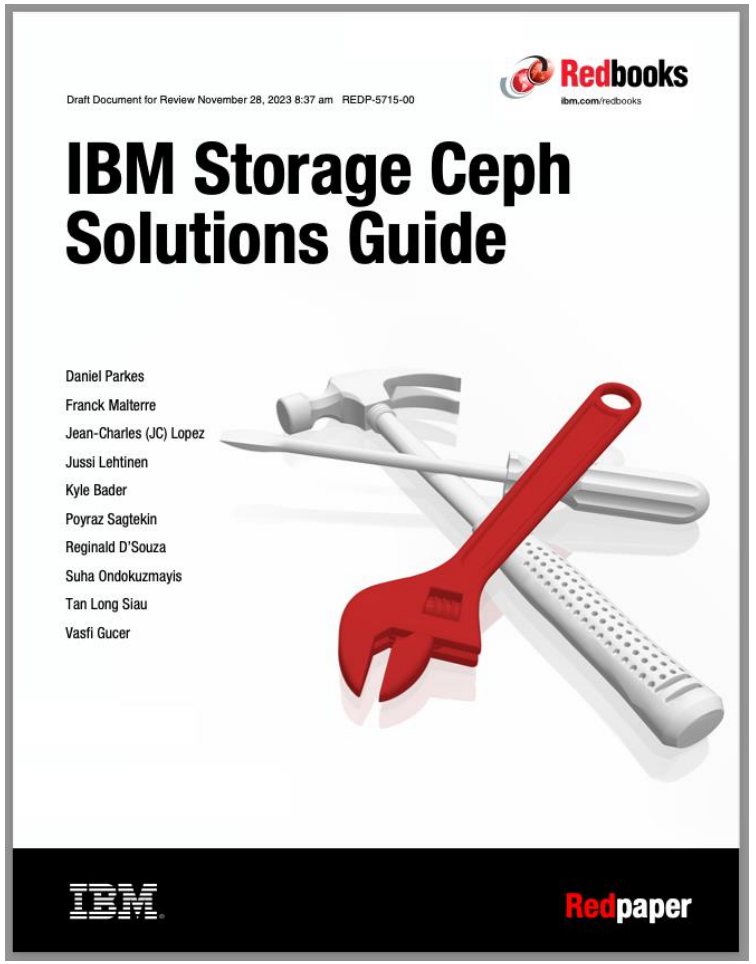
- Dashboard reorganized and expanded
- Object storage replication, tiering, cloud transitions
- General availability of NFS over CephFS, NFS over Object
- General Availability (GA) of NVMe over Fabrics (NVMe over TCP)
- Integration with VMware ESXi and vSphere
- IBM Storage Ready Node with NVMe
- Enhanced data protection for Replicas and Erasure Coding
- New IBM Redbooks paper on IBM Storage Ceph for watsonx.data

Additional learning resources

IBM Redbooks **for IBM Storage Ceph**



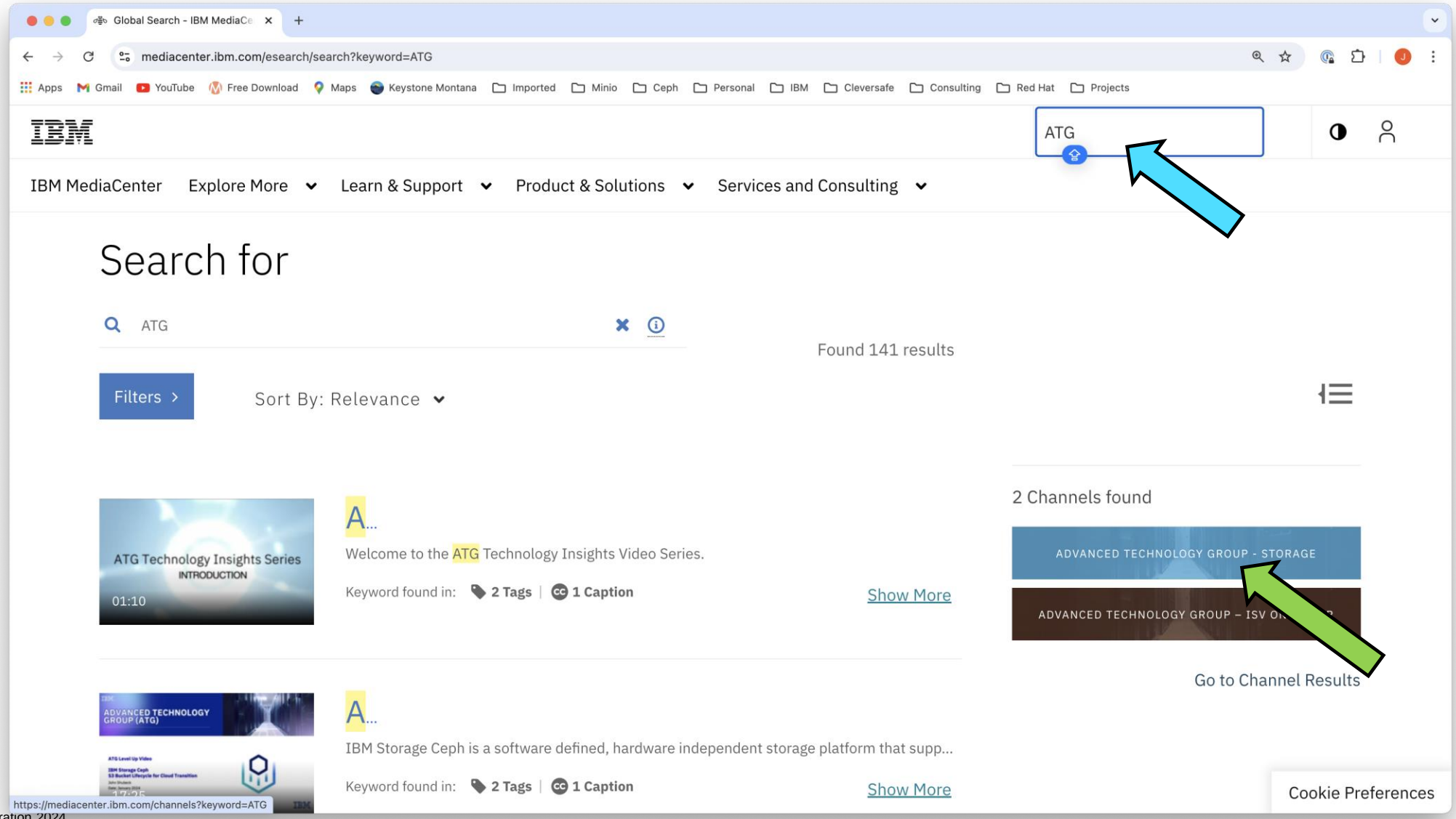
https://www.redbooks.ibm.com/abstracts/redp5721.html



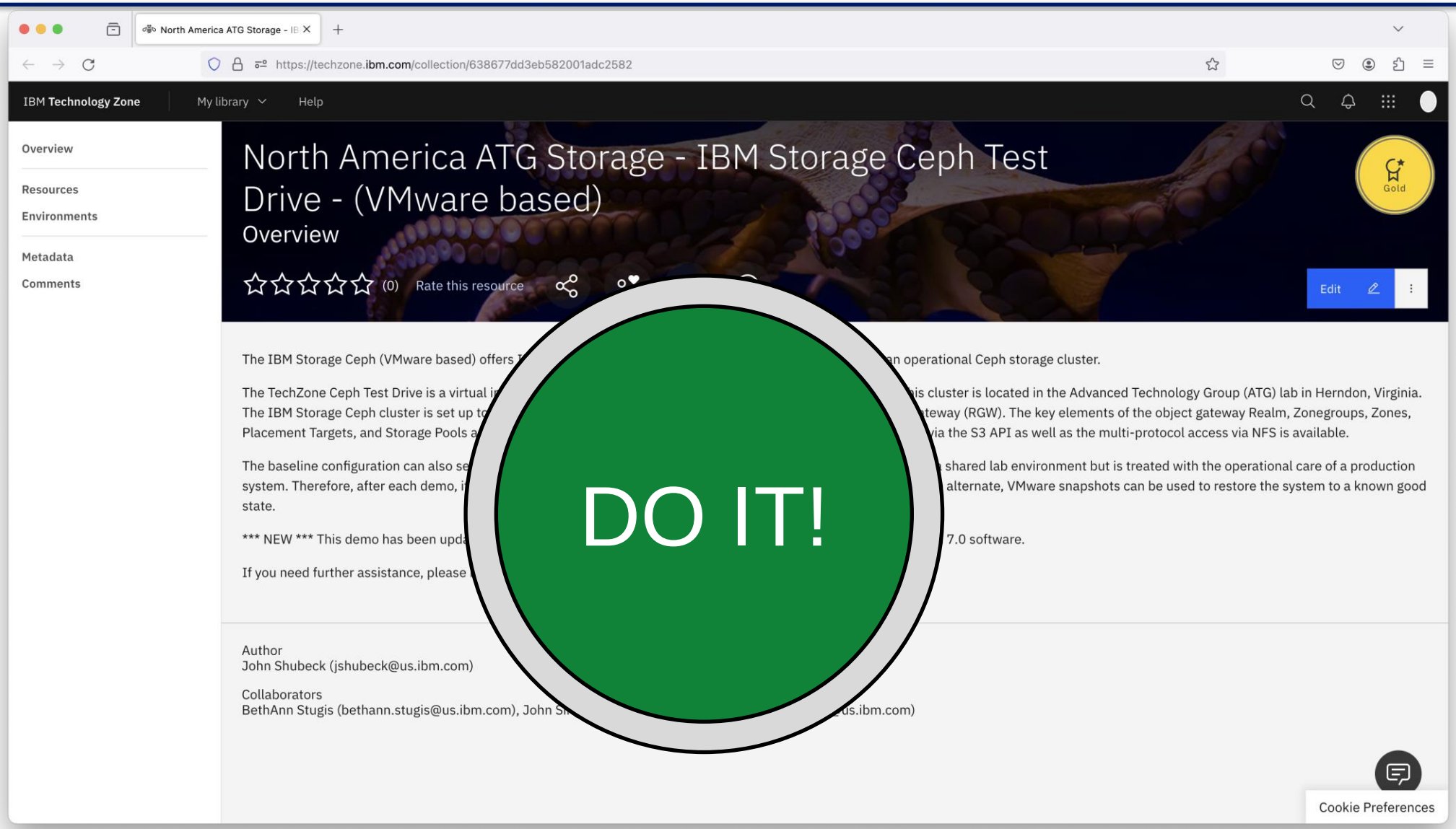
https://www.redbooks.ibm.com/abstracts/redp5715.html

https://www.redbooks.ibm.com/abstracts/sg248563.html

IBM MediaCenter (https://mediacenter.ibm.com)

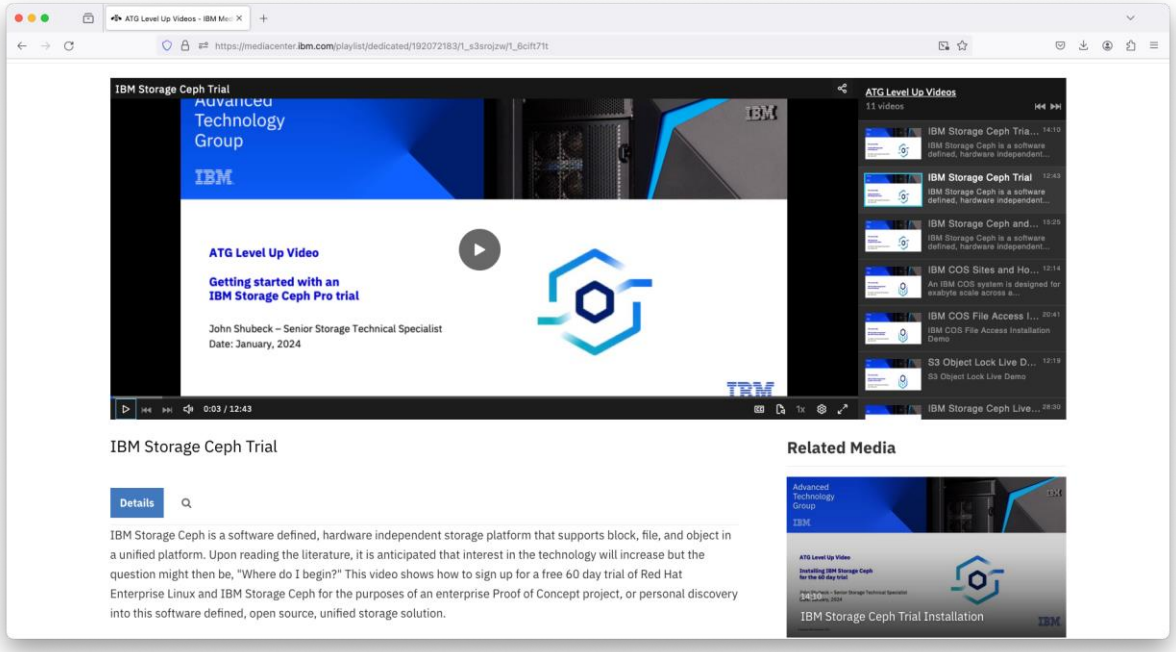


IBM TechZone self guided demonstrations – IBM Storage Ceph Dashboard experience



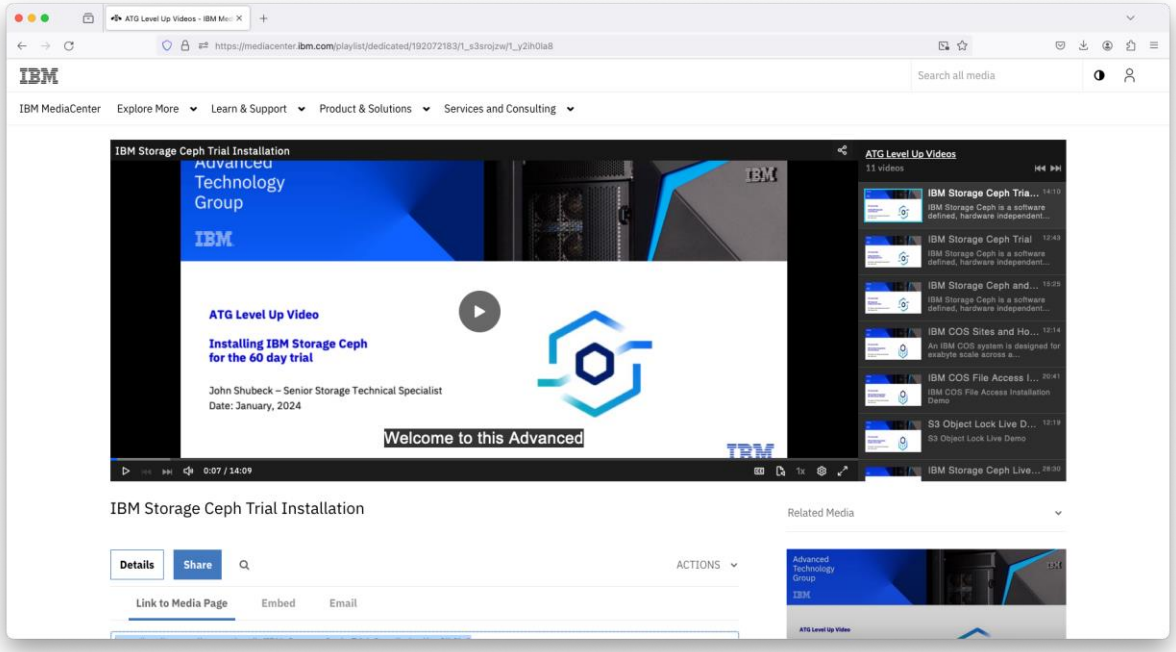
IBM Storage Ceph 60 day trial

How to sign up and get subscriptions



https://mediacenter.ibm.com/media/IBM+Storage+Ceph+Trial/1_6cift71t

How to install a POC cluster



https://mediacenter.ibm.com/media/IBM+Storage+Ceph+Trial+Installation/1_y2ih0la8

Thank you!

Accelerate with ATG Survey

Please take a moment to share your feedback with our team!

You can access this 6-question survey via Menti.com with code 1708 6924 or

Direct link https://www.menti.com/alwhyze7z1gz

Or

QR Code


IBM