Washington Systems Center - Storage

Accelerate with IBM Storage:

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Accelerate with IBM Storage Webinars

The Free IBM Storage Technical Webinar Series Continues in 2019...

Washington Systems Center – Storage 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.

Located in the Accelerate with IBM Storage Blog:
https://www.ibm.com/developerworks/mydeveloperworks/blogs/accelerate/?lang=en

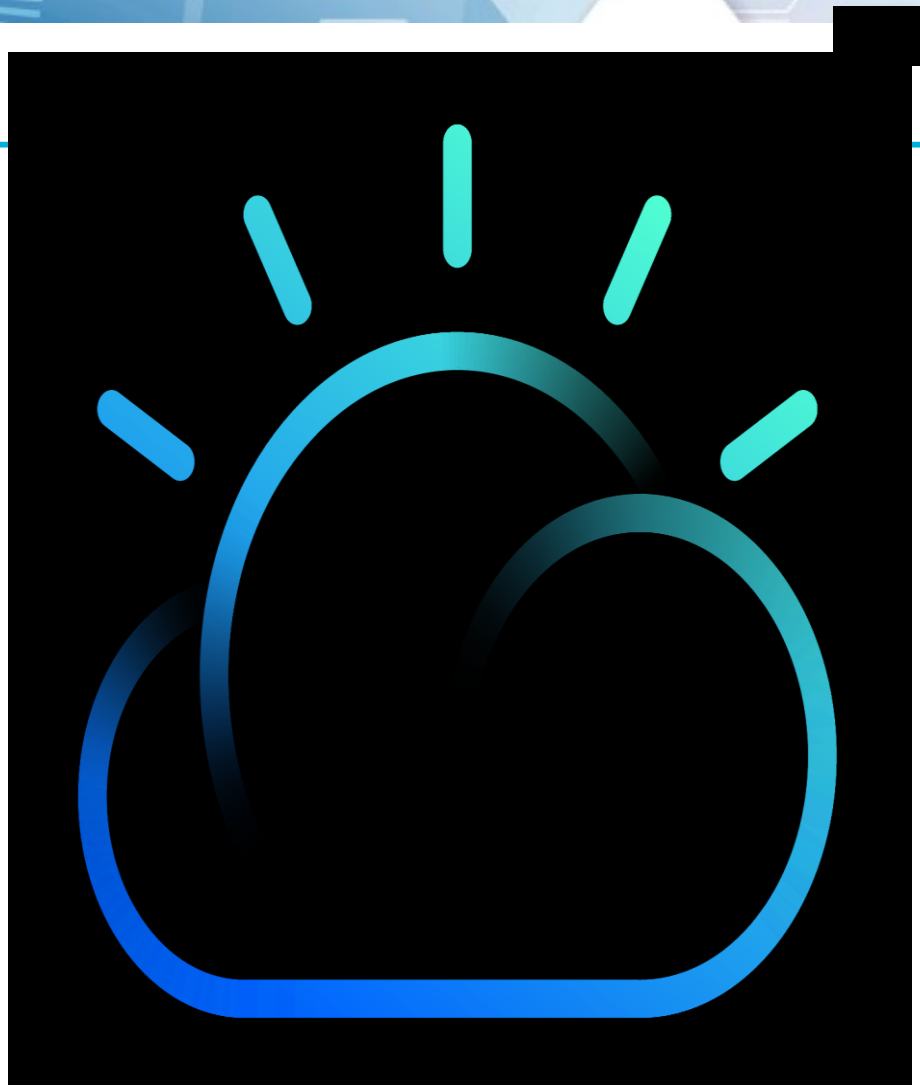
Also, check out the WSC YouTube Channel here:
https://www.youtube.com/channel/UCNuks0go01_ZrVVF1jgOD6Q

2019 Webinars:

January 24 - Discover how IBM Storage Insights and Storage Insights PRO can transform your IBM Storage Support Experience
January 31 - Elastic Storage Server (ESS) Architecture and use cases
February 28 - Data Protection and High Availability in Spectrum Virtualize
March 7 - Overview of IBM's New Spectrum Discover
March 14 - Why IBM Storage is relevant for IBM Cloud Private deployments

April 11 - GDPS V4.2 and SPEs: What's new?
Register Here: https://ibm.webex.com/ibm/onstage/g.php?MTID=e61d75ca7e23bfa037668e23ca4262749
April 18 - IBM DS8880 R8.5 GUI Demo
Register Here: https://ibm.webex.com/ibm/onstage/g.php?MTID=ea2d6470284e858931dedd393edf2cc58
April 23 - Copy Services Manager and zHyperLink Update
Register Here: https://ibm.webex.com/ibm/onstage/g.php?MTID=e4ad33b2fc4451f8fb205ab6cad2f125c

IBM Storage Solutions for IBM Cloud Private



A solution for simplifying your Cloud Operations

Accelerate Cloud Native!

"IBM has labored to leave no customer behind in the journey to cloud-first IT. If your shop is about to make a jump to cloud-first – which will require multicloud commitments to bring cloud capabilities to legacy systems" –

"IBM should be on your storage solution shortlist."

Thriving in a Data Driven World

The Economist

The world's most valuable resource is no longer oil, but data.

IBM IBV C-Suite Study, IDG 2018 State of Digital Transformation

20% of the world's data is searchable and anybody can get to it.

The other 80% is like gold.

"80% of the world's data, whether it's decades of underwriting, pricing, customer experience, risk in loans... That is all with our clients. You don't want to share it. That is gold. This is what we do: We help you use that."

- Ginni Rometty

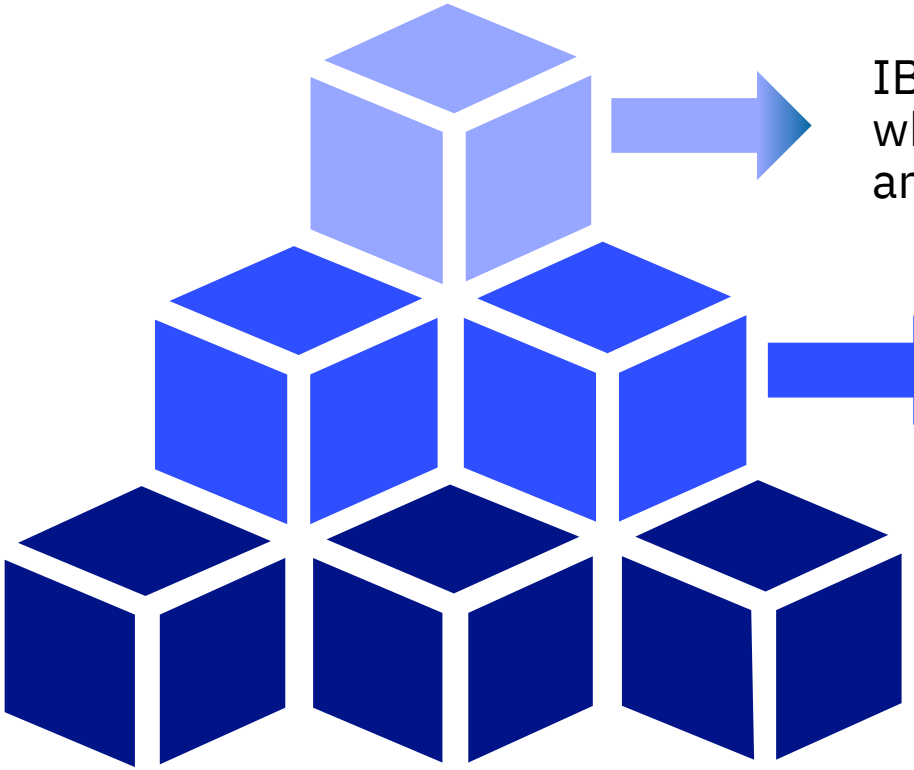
Data is unlimited, reproducible, and reusable, whose value increases as it is combined and analyzed.

10X

growth in data 2016 to 2025

Those who can harness the power of their data have a *competitive advantage.*

Data is the Foundation
For all Hybrid Multicloud Solutions

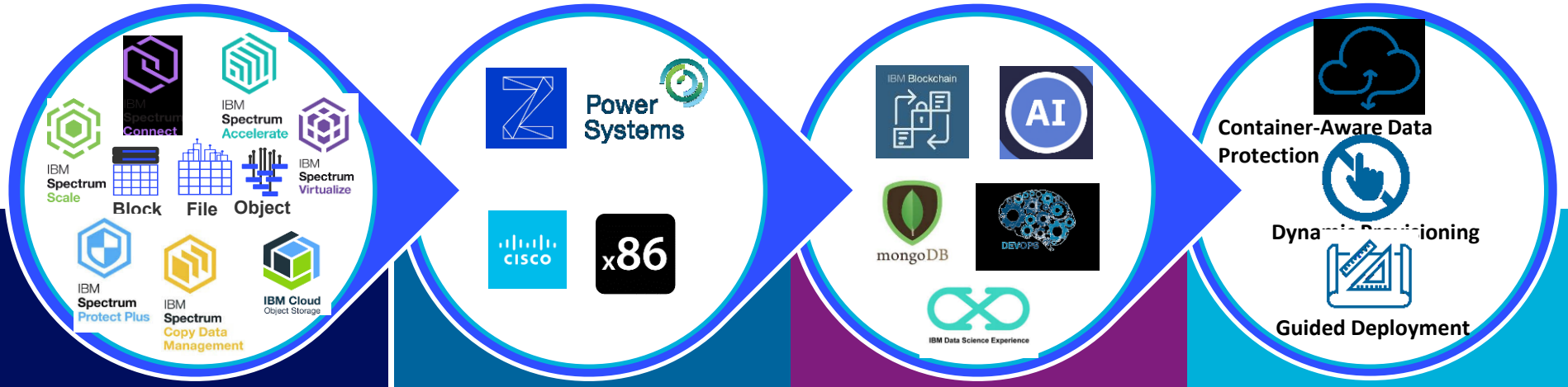


IBM Cloud Private is the platform on which DevOps, Analytics, Blockchain, and AI solutions are built

Data is the resource on which they all depend

IBM storage delivers great performance, security, data agility, and modern data protection to accelerate cloud native.

What is IBM Storage for IBM Cloud Private?



Data Persistence

Choice of Compute

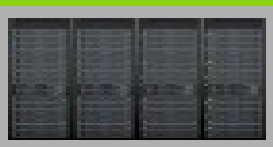
Leading Workloads

Operational Agility

Delivering Cloud Data services across IBM Storage Platforms

Scale-out File

IBM Spectrum Scale



Elastic Storage Server

High-performance, highly scalable hybrid cloud storage for unstructured data

Workloads:
- Scientific and commercial HPC
- Big data analytics
- Artificial Intelligence (AI)
- Home directories,
- Backup, and active archiving

Scale-out Block

IBM Spectrum Accelerate

FlashSystem A9000

FlashSystem A9000R

XIV Gen3

Enterprise block storage for hybrid cloud deployed in minutes instead of months

Workloads:
- Large-scale Virtual Desktop consolidation
- Big data analytics
- Enterprise Resource Planning

Virtualized Multi-vendor Block

IBM Spectrum Virtualize

Storwize V5000
Storwize V5030F

FlashSystem 9100

SAN Volume Controller

Storwize V7000
Storwize V7000F

FlashSystem V9000

Reduces CAPEX, OPEX and management of multi-vendor block environments through storage virtualization - stores up to 5x more data

Workloads:
- Medium-scale Virtual Desktop consolidation
- Analytics /AI sequential
- Enterprise Database
- Cloud Data mobility

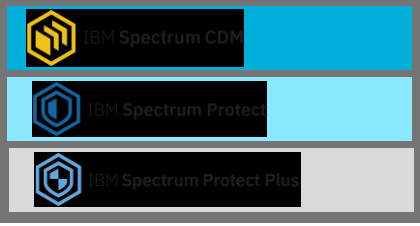
Business Critical Block

DS8XXX family

Integrated with IBM z platform delivering hybrid cloud storage for LoZ.

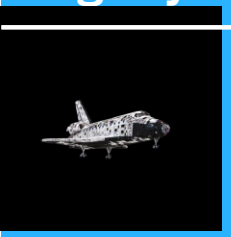
Workloads:
- Medium-scale Virtual Desktop consolidation
- Analytics /AI sequential
- Enterprise Database
- Cloud Data mobility

Modern Data Protection



Why - IBM Storage for IBM Cloud Private?

Maximize business agility



Deploy stateful containers for Private or Hybrid Cloud consumption.

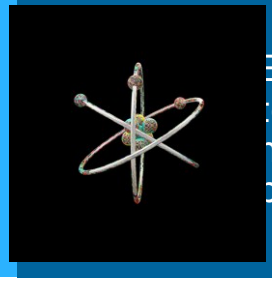
Gain operational efficiency with built-in integration and validated design

Simplify routine task with automation and Self-service Storage provisioning.

Investment Protection

Choice of Storage capabilities with consistent features and benefits.

Security-rich, modern data-protection with encryption, air-gap, and role-based access capabilities.



Enable AI deployments to multiple users with multi-tenancy and role-based access controls.

Expedite your journey to cloud native

Pre-tested and validated blueprints sized right for quick deployments

Run IBM Cloud Private workloads with self-service storage and secure microservices

Respond to business initiatives quickly while easily scalling to meet demands

Hybrid Multicloud is the platform

85% of companies operate in a Hybrid multicloud environment today

91% of public cloud adopters use internal private cloud

IDC; IBM IBV C-Suite Study; Rightscale
Source: IDC's Cloud and AI Adoption Survey, January 2018

Companies average almost

5

Private and Public clouds

Reasons to migrate from public cloud

Security, Performance, Cost, Control

IDC Survey

80% of companies moved applications or data from Public Cloud in 2018

- *IDC Survey*

98% will be Hybrid Multicloud in three years

Transformation is well underway

Leading enterprises are…

- Transforming the way they develop, test and release software
- Adopting containers and Kubernetes as the new standard for cloud
- Seeking intelligent insights to speed problem determination
- Moving to cloud - public & private
- Seeing multicloud as the “new normal”

DevOps

90%

are going through a DevOps transformation or are planning to

Forrester

Management

90%

90% of enterprises will use multiple cloud services and platforms by 2020

IDC

Application Platforms

60%

consider deploying a private cloud as critical or a high priority in next 12 months

Forrester

Use Cases for Transforming IT?

Modernize and optimize existing applications

Opening up enterprise data centers to work with cloud services

Create new cloud-native applications

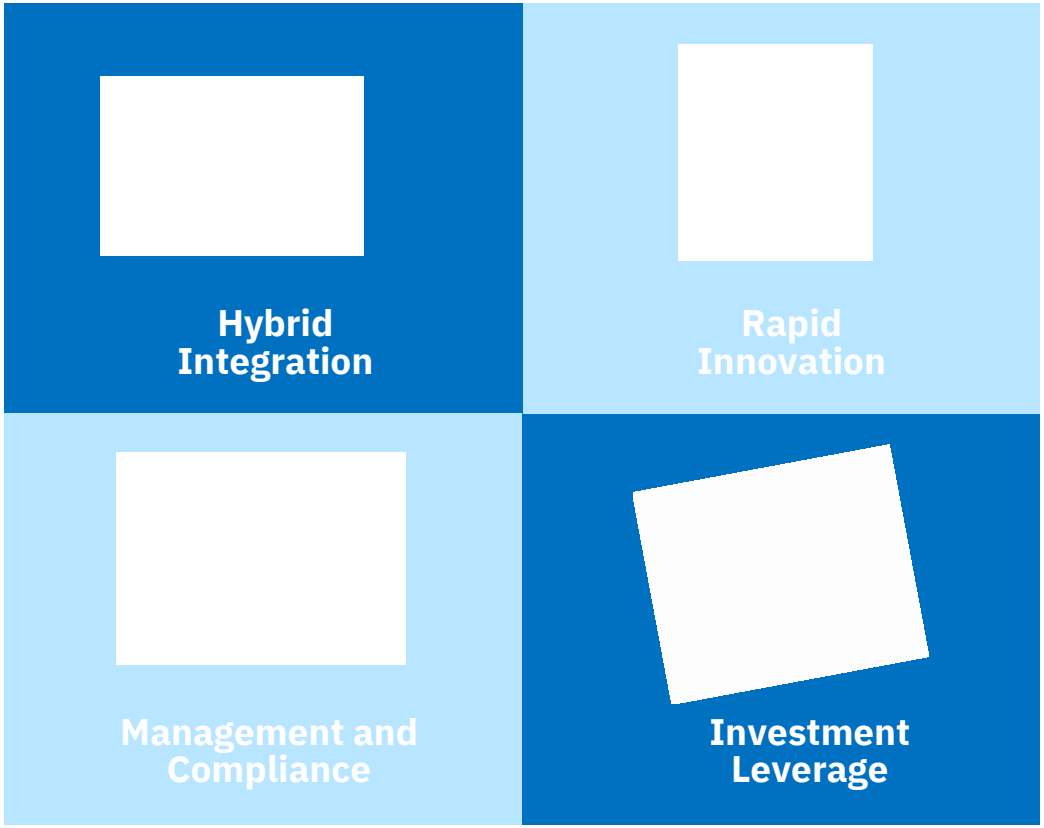
Unlock your data for Private Cloud applications or Micro Services consumption

IBM Cloud Private

Full stack multicloud software offering

Built using industry standard open source projects including Kubernetes, Docker, Terraform, Cloud Foundry, 40+

Enterprise grade, open by design: **Accelerated by IBM Storage Solutions for IBM Cloud Private**



IBM Cloud Private Basics

Open-source matures to deliver a platform experience

Executable package of software that includes everything needed to run it

Containers

Automate deployment, scaling, and management of containerized applications

Orchestration

Define, install, and upgrade Kubernetes applications

Management

Deliver consistent user experience, services, applications and tools

Across industry standard and accelerated servers for any workload

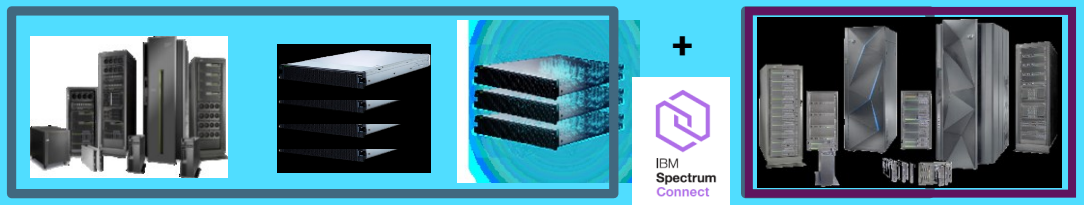
For Administrators AND Developers

Enterprise Content Catalog
Open Source and IBM Middleware, Data, Analytics, and AI Software

Core Operational Services
Log Management, Monitoring, Security, Alerting

Kubernetes Container Orchestration Platform

Cloud Automation Manager
Multicloud & VM



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IBM Spectrum Connect

IBM Spectrum Virtualize

IBM Spectrum Accelerate

IBM Spectrum Scale

VersaStack™ Solution by Cisco and IBM

Use Case Focus

Modernize existing applications; integrate with enterprise data

Create new cloud native apps; innovate with modern DB's

Deliver deep insights faster with accelerated AI and ML/DL frameworks

IBM Storage Solutions for IBM Cloud Private Workload accelerators...

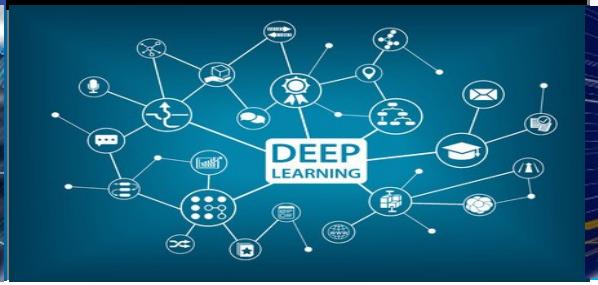
IBM Cloud Private

Blockchain | HPC | Information Governance | AI | DevOps | VDI and more.....

IBM Storage

▪ Storwize V5000/V7000/V9000 ▪ FlashSystem 9110 / 9150 ▪ FlashSystem A9000/A9000R ▪ DS8000	▪ Storwize V5000/V7000/V9000 ▪ FlashSystem 9110 / 9150 ▪ FlashSystem A9000/A9000R ▪ DS8000 ▪ IBM Spectrum Scale / ESS	▪ Storwize V5000/V7000/V9000 ▪ FlashSystem A9000/A9000R ▪ IBM Spectrum Scale / ESS
z	POWER9™	VersaStack™ Solution by Cisco and IBM

Compute



Overview of IBM Cloud Private, Containers and Storage Enabler for Containers

The Storage challenge with running Containerized App

Challenge – Containers are Ephemeral

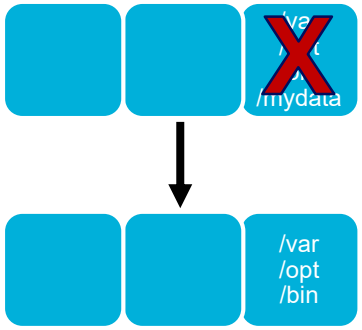
Solution for Stateful applications – Storage Enabler for Containers

Stateless Environment

1. When I run a Stateless (non-persistent Storage) application in a container, I don't expect my data to be stored for future usage.

Note: One container holds the directory and structure of the application.

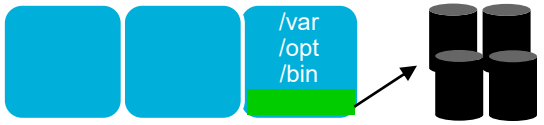
2. If container should reconstitute, there will be no reference to any data-set outside of the container.



Stateful Environment

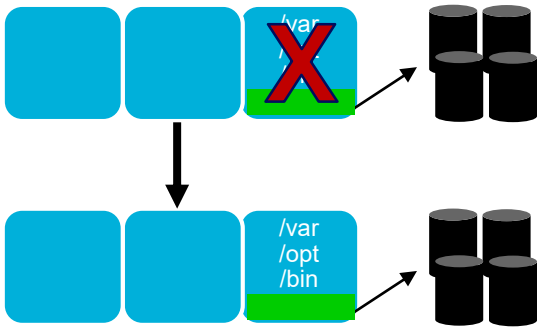
1. When I run a Stateful (Persistent Storage) application in a container, I expect my data to be stored for future usage.

Note: Persistent Volume is created on attached storage.

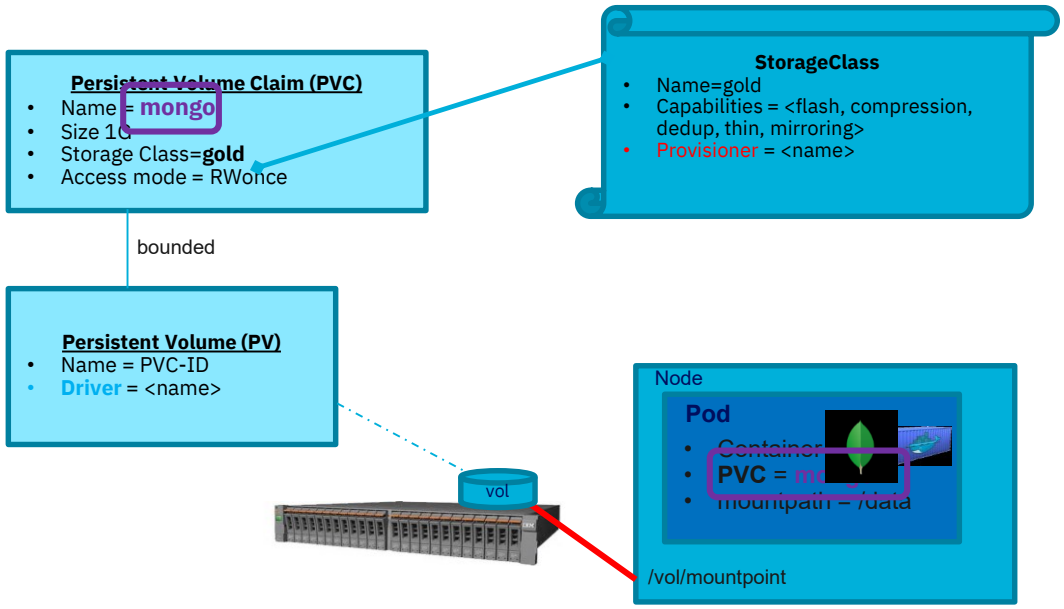


2. If container should reconstitute, data remains intact on the attached volume.

Note: Volume can be attached to a new container on different host



Kubernetes Storage Terminology



https://kubernetes.io/docs/concepts/storage/volumes/

Storage Class

To achieve dynamic volume creation, the admin must define a k8s **StorageClass** (e.g : gold, silver).

Provision a volume

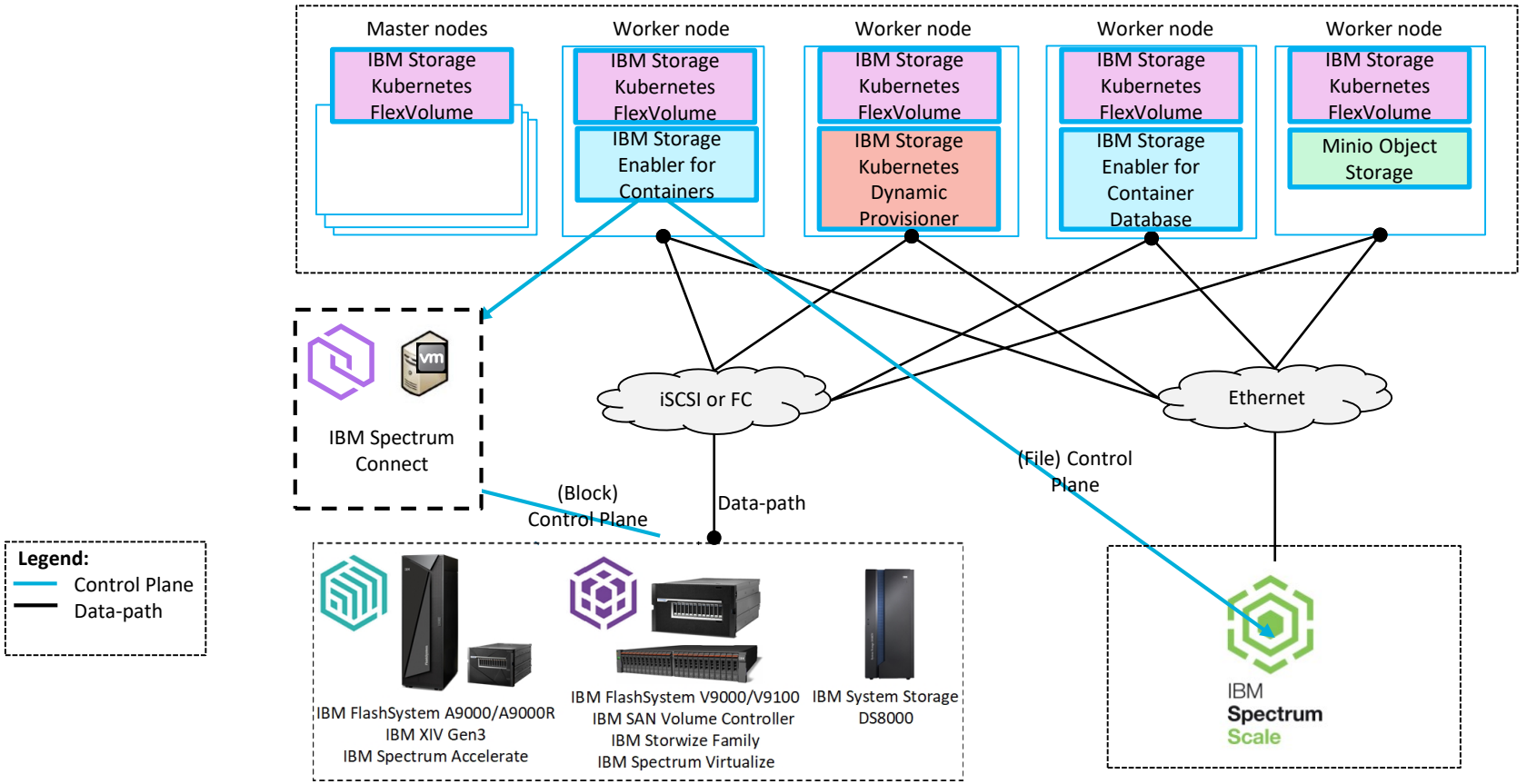
1. The user creates a claim for volume (**PVC).**
2. The "**Provisioner**" (vendor specific) listens to new PVC requests, and dynamically creates the volume on the storage system (if no PV already matched)
   - The **PV** is created with "**Driver**" setting. The Driver(vendor specific) handles the volume attach\detach to the node.

Create a stateful POD

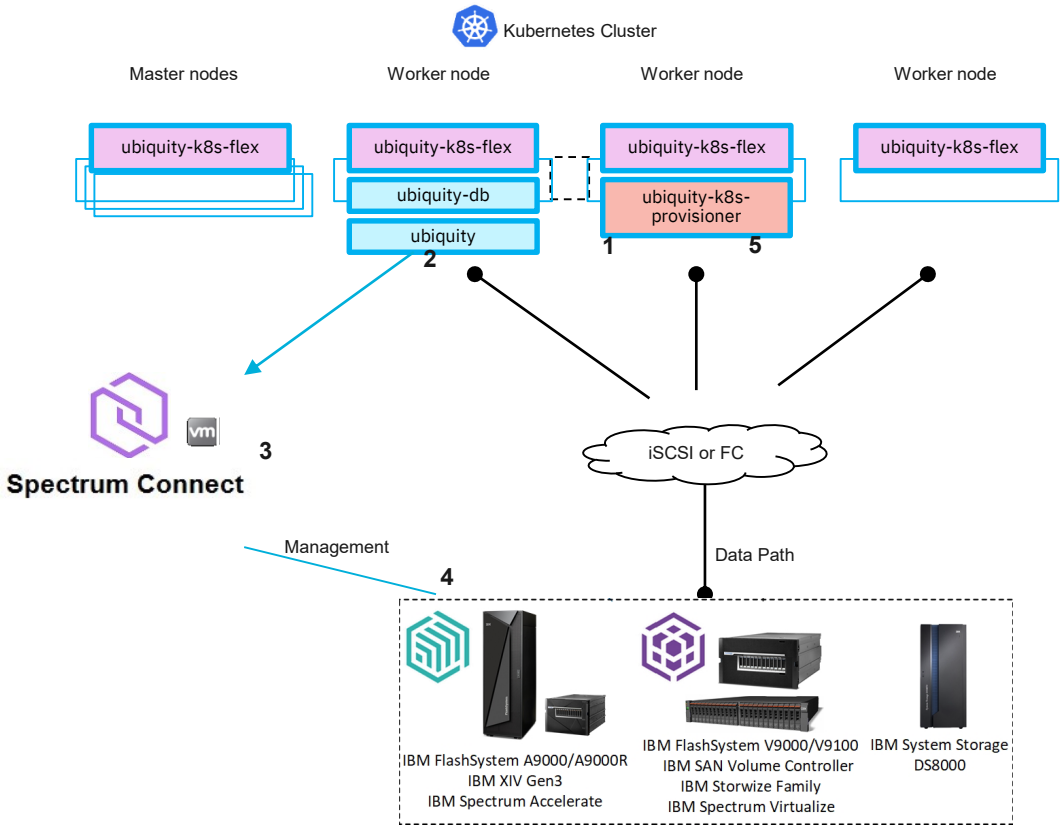
1. The user creates a **POD** with the new PVC.
2. K8s triggers the "**Driver**" in order to attach the PV to the node.
3. The volume is now mapped and mounted to the node.
4. k8s starts the POD with the PV mounted to /data inside the container.

✓ The stateful container is UP

Solution Architecture



Solution Architecture for Block



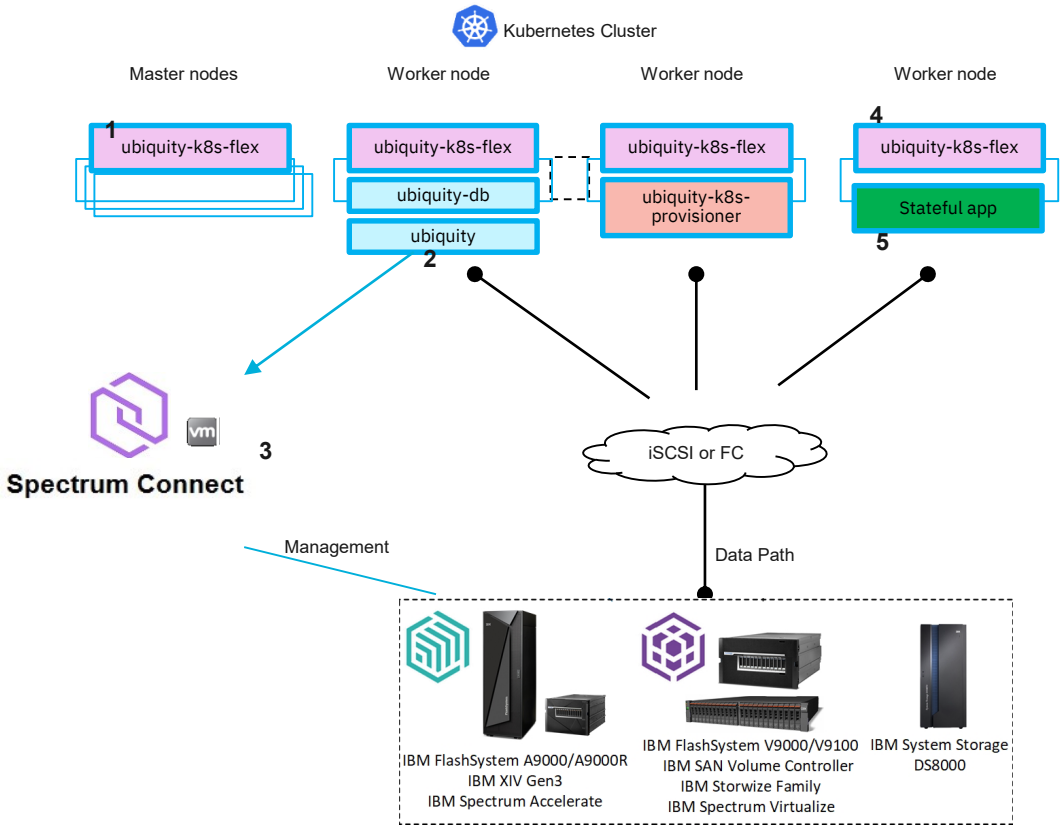
Provision flow

The k8s user creates a new PVC and then:

1. The provisioner identifies the pending PVC and passes the request to ubiquity
2. Ubiquity validates the authentication of the request, and then passes it to SC.
3. SC provisions the volume on the relevant array based on the profile.
4. A volume is created on the storage.
5. The provisioner creates PV object for the newly created volume.

✓ Provisioning done

Solution Architecture for Block



Create stateful container

The k8s user creates a Pod (with the PVC) and then:

1. K8s controller-manager (master node) triggers the flex attach API (with PV and host). Flex passes the request to ubiquity
2. Ubiquity validates the authentication of the request, and then passes it to SC.
3. SC maps the volume on the storage to the worker node.
4. Flex on the worker node rescans the OS and identifies the new multipath device, creates a filesystem and mount to /ubiquity/<WWN>.
5. K8s starts the container and exposes the hosts mountpoint inside the container.

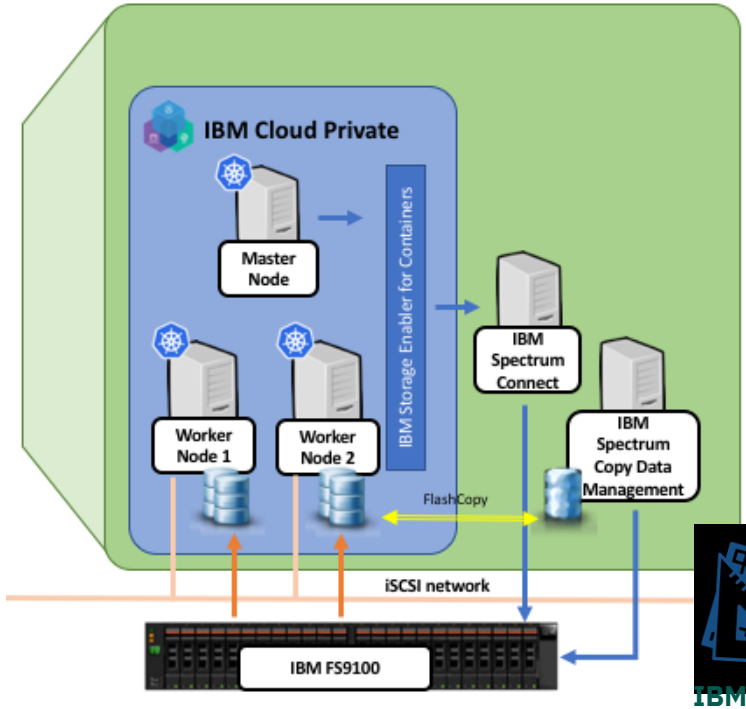
✓ Stateful Container is running

IBM FlashSystem 9100 Solution for Private Cloud Flexibility and Data Protection

Deploy multicloud environments for business continuity and data reuse to reduce cost and improve agility

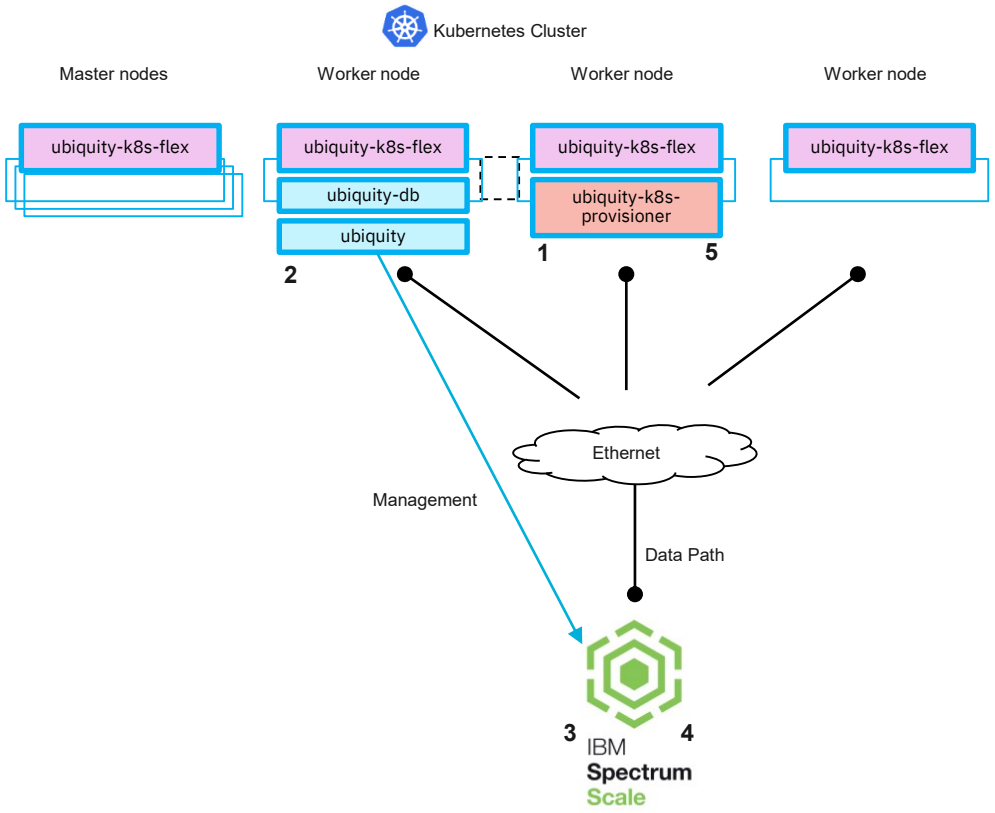
- Pretested
- Easy and quick to deploy
- Enables you to build a strong private cloud environment
  - Deliver on-premises via container services
  - Enable cloud admins to self-provision storage
  - No need to be a storage expert
  - Delegate capacity provisioning securely via pre-defined storage classes and quotas
  - Build microservices in hours or minutes not days or weeks
  - Protect and re-use your data both on and off premises

- The options are only limited by your creativity and imagination.
- Feel secure as you move to the cloud.
- Leap ahead of your competition under budget and ahead of schedule.



IBM Solution Specific Blueprint

Solution Architecture for Spectrum Scale



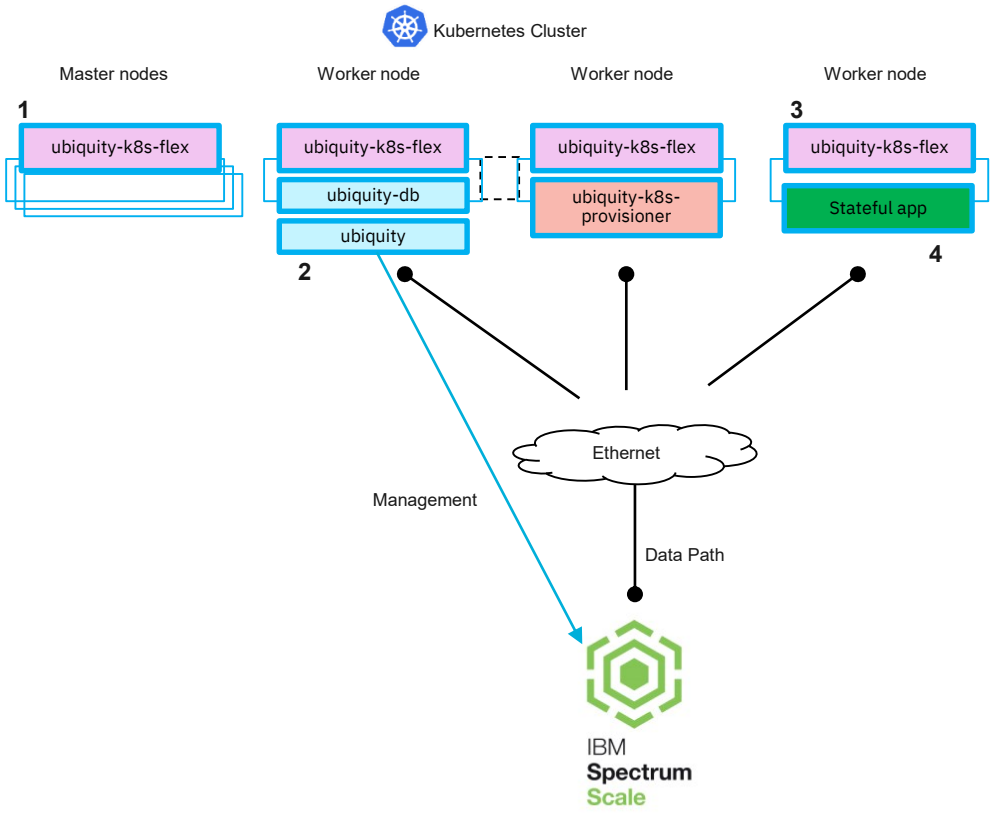
Provision flow

The k8s user creates a new PVC and then:

1. The provisioner identifies the pending PVC and passes the request to ubiquity
2. Ubiquity validates the authentication of the request, and then passes it to Spectrum Scale, via a REST API call.
3. Spectrum Scale provisions the fileset on the relevant filesystem.
4. A fileset is created on the filesystem.
5. The provisioner creates PV object for the newly created volume.

✓ Provisioning done

Solution Architecture for Spectrum Scale



Create stateful container

The k8s user creates a Pod (with the PVC) and then:

1. K8s controller-manager (master node) triggers the flex mount API (with PV and host). Flex passes the request to ubiquity
2. Ubiquity validates the authentication of the request, and then passes it to Flex Volume Driver.
3. Flex on the worker node creates a softlink between fileset path and pod volume directory.
4. K8s starts the container and exposes the hosts mountpoint inside the container.

✓ Stateful Container is running

Demo

Call-to-Action / Q&A

1. Visit the IBM Spectrum Access Blueprint for IBM Cloud Private
2. Experience an online demo.
3. Schedule an Executive Briefing or Design Workshop.
   - Washington Systems Center (VersaStack Hybrid Cloud demo)
   - IBM Raleigh Hybrid Cloud briefing Center
   - Montpelier, France Executive briefing Center
4. Visit IBM Cloud Private web page and demo
5. Engage with the IBM Cloud Garage Method
5. Partner with your IBM Cloud or IBM Systems Sellers or with your preferred Business Partner.