

IBM Storage 1Q22 Announcement

Lead story – Data Resilience

- Rapid recovery from Cyber Attack
 - IBM FlashSystem Cyber Vault
- New systems designed for cyber resilience without compromise
 - New FlashSystem 9500 and 9500R
 - Next gen FlashSystem 7300
 - New SVC
- Improved data density for lower cost
 - Next gen FCM 3
- Built in security and resilience
- Improved density, scalability and connectivity

Rapid recovery
from cyber
attacks

Performance for
demanding
workloads

Essential cyber
resilience
capability

IBM Storage



1Q Release (February 8, 2022)

What is IBM Cyber Vault.....

Immutable Copies of Data

Created with IBM Safeguarded Copy
Can not be changed once created

Proactive Monitoring

Early warning signs of attack with
IBM Storage Insights
Recommend integration with SIEM
such as IBM QRadar



Methodology &
Automation

Rapid Recovery

Restore production from validated data copies on primary storage
Recovery from point-in-time copy

Data Copy Test and Validation

Recover data copies to isolated environment to check they are
corruption free
Test recovery procedures
Forensics & Diagnostics Services

IBM FlashSystem Family 2022

New For 2022

More secure FlashSystem models with the power to support cyber resilience functions without comprising production workloads

Entry Enterprise

Midrange Enterprise

High-End Enterprise

Hybrid Cloud

FlashSystem 5200



FlashSystem 5015
& 5035



FlashSystem 7300



FlashSystem 9500
and 9500R


Spectrum Virtualize
for Public Cloud



IBM Spectrum Virtualize

Storage function, scalability, interoperability, cloud integration and automation



IBM Storage Insights

Anomaly detection, fabric monitoring, full stack visibility, predictive support

IBM FlashSystem and SVC Family 2022

FlashSystem 5200



FlashSystem
5015 and 5035



FlashSystem
7300

NEW for 2022



FlashSystem
9500 and
9500R



SVC SV3

Hybrid Cloud



Spectrum Virtualize
for Public Cloud



IBM Spectrum Virtualize

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IBM Storage Insights

Anomaly detection, fabric monitoring, full stack visibility, predictive support

Introducing the *NEW* FlashSystem 9500

Built for the growing Enterprise: The 9500 has 2X performance & connectivity vs 9200



4U

48 NVMe drive slots
FCM 3 with **improved metadata management deliver up to 3:1 Effective Capacity**

Four 24-core CPUs
2.4GHz Ice Lake CPUs
Up to 3TB cache

Up to 48, 32Gb FC ports
Ready for 64Gb FC*



100GbE iSCSI and NVMe RDMA
10/25GbE iSCSI and NVMe RDMA



* Statement of Direction

FS9200 vs FS9500

(Per Enclosure differences)

2x1U
Canisters



FlashSystem 9200

2 x 16c Cascade Lake 2.3GHz	CPU per Canister	2 x 24c Ice Lake 2.4GHz
1.5TB DDR4 2400MHz (6 Channels)	Max Memory	3 TB DDR 3200MHz (8 Channels)
48 (PCIe 3.0 – 1GBps/Lane)	PCIe Lanes per CPU	64 (PCIe 4.0 – 2GBps/Lane)
24 x PCIe 3.0 NVMe	Backend Drive Support	48 x PCIe 4.0 NVMe
96 GBps	Enclosure Frontend Int. Connectivity	192 GBps
64 GBps	Enclosure Backend Int. Connectivity	384 GBps
1x16 PCIe 3.0 + FC Failsafe Zone	Interconnect	2 x16 PCIe 4.0
2 x 10.4 GT/s	UPI	3 x 11.2 GT/s
2 x Fixed, Internal	NVMe Boot/Vault	2 x Hotswap
Fixed, Internal	Batteries	Hotswap
24 x 32Gb FC, 12 x 25GbE	Host I/O Support	48 x 32Gb FC, 12 x 100GbE, 20 x 25GbE



2x2U
Canisters

FlashSystem 9500

2 x 16c Cascade Lake 2.3GHz	CPU per Canister	2 x 24c Ice Lake 2.4GHz
1.5TB DDR4 2400MHz (6 Channels)	Max Memory	3 TB DDR 3200MHz (8 Channels)
48 (PCIe 3.0 – 1GBps/Lane)	PCIe Lanes per CPU	64 (PCIe 4.0 – 2GBps/Lane)
24 x PCIe 3.0 NVMe	Backend Drive Support	48 x PCIe 4.0 NVMe
96 GBps	Enclosure Frontend Int. Connectivity	192 GBps
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1x16 PCIe 3.0 + FC Failsafe Zone	Interconnect	2 x16 PCIe 4.0
2 x 10.4 GT/s	UPI	3 x 11.2 GT/s
2 x Fixed, Internal	NVMe Boot/Vault	2 x Hotswap
Fixed, Internal	Batteries	Hotswap
24 x 32Gb FC, 12 x 25GbE	Host I/O Support	48 x 32Gb FC, 12 x 100GbE, 20 x 25GbE

FS9500



Also Available As FlashSystem 9500R

Enterprise infrastructure in a box



Pre-assembled to optimize time to first IO

Contains 2 FlashSystem 9500s clustered together
*8 CPUs, 6TB cache, 96 FC ports, 9PB**

High-performance dedicated backbone

Can be expanded in the field with SAS
expansion enclosures

Statements of Direction

IBM plans to incrementally deliver additional features to the FlashSystem 9500 at no extra cost beyond the planned 1H22 release date. On announce, IBM plans to make a Statement of Direction regarding the features below which will not be part of the initial release :

- The FlashSystem 9500 has been designed to support **64Gb Fibre Channel** cards. These are currently planned for delivery in 1H23 or as the market demands.
- The FlashSystem 9500 will support 48 4.8, 9.6, 19.2TB NVMe FlashCore Modules, and 24 38.4TB FCMs on release. Support for **48 38.4TB NVMe FlashCore Modules** to give a maximum capacity of 4.5PB per controller (18PB with clustering) is planned for delivery in 2022.
- The FlashSystem 9500 will support up to 16,000 host mappable volumes on release. Support for **32,000 host mappable volumes** is planned for delivery in 2023.

A powerful new midrange FlashSystem 7300

Creating Family Differentiation



**30% Increase in
performance over
FlashSystem 7200**

- 24 NVMe drive slots
- FCM 3 with improved metadata management deliver 3:1 Effective Capacity
- Four 10-core CPUs
- 2.4Ghz Cascade Lake CPUs
- Up to 1.5TB cache
- Dual Boot drives
- Up to 24, 32Gb FC ports
- 100GbE iSCSI & NVMe RDMA
- 10/25GbE iSCSI & NVMe RDMA



Key Upgrades

Higher Core Count and Clock Speed

FS7200

- Dual 8-core+HT
2.1GHz Cascade
Lake

FS7300

- Dual 10-core+HT
2.4GHz Cascade
Lake

Dual internal NVMe drives

Doubles write-throughput for vaulting/hardened RAM

Expands bitmap support, metadata, higher CPU speed under same battery envelope

Hardware Support

Support FCM3 Only

Dual 100GbE (with oversubscription)

Remains PCIe 3.0 (Cascade Lake), but throughput competes with FS9200

Licensed Machine Code

The FS7300 is now licensed machine code

Clusters with 7300s only

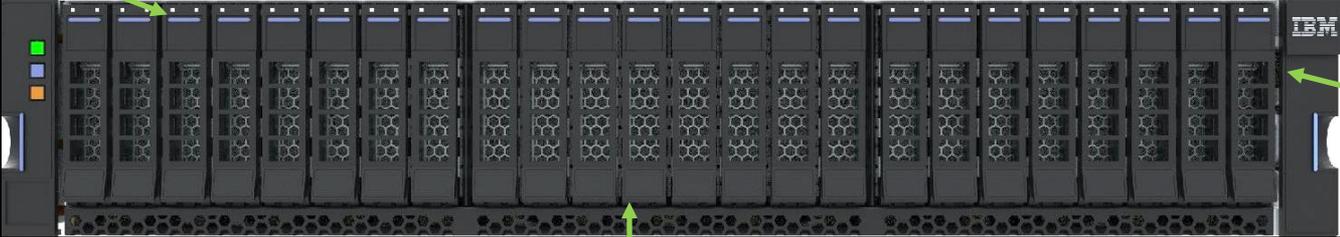
Does not cluster with FS7200/9200 but does Volume Mobility (8.4.2+)

All CSP calls are “Hardware”

“How To” support comes with Expert Care

FlashSystem 7300

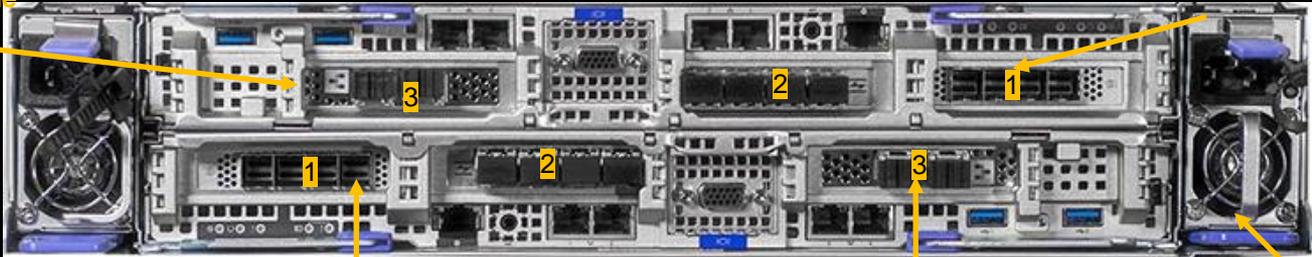
Up to 1.5TB of Memory



24 Slots for FCM3 and/or NVMe SSDs and/or SCMs

Support for FCM3

Optimized Write Cache Message Passing



Dual 10-core 2.4Ghz Cascade Lake

Host Attach (1-3 per node)

Optional SAS Expansion

2 KW PSU

Drives

Support for
simultaneous
use of SCM,
FCM3 and
NVMe SSDs



Up to 12 Storage Class Memory Devices (max drive size = 1.6TB)

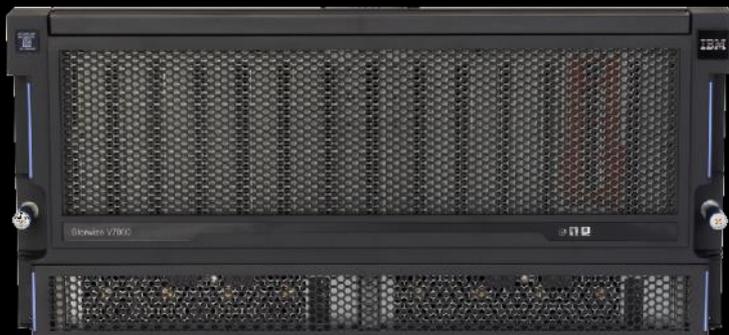
FlashCore Module 3, as well as support for industry standard NVMe SSDs

12Gb SAS Drives - Drive Personality TBD
Nearline SAS (on FS7300), Tier 1 SSD, Tier 0 SSD
10K supported (on FS7300)
No 15K drives

Scale up expansion (not valid for SAN Volume Controller)



2U 2.5" x 24 SAS enclosure



5U 3.5" x 92 SAS enclosure



2U 3.5" x 12 SAS enclosure
not supported with FS9500

Scale-out clustering



4 Way, All SVC Nodes capable of running the 1Q22 software

All SVC Nodes Running 8.3.1+ are able to cluster and hardware replace



FlashSystem 5015



FlashSystem 5035



2 WAY, Also with V5030E
And FlashSystem 5030



FlashSystem 5200



4 Way*



FlashSystem 7300



4 Way



FlashSystem 9500



2 Way

Clustering is supported across the FlashSystem family

as a way of linearly scaling performance, connectivity and capacity

Expanding IBM Storage Expert Care

	Warranty	Basic 5200, 7300	Advanced 5200,7300,9500	Premium 7300, 9500
IBM Spectrum Virtualize fixes, updates and new releases	1 year	Yes	Yes	Yes
Guidance on installation, usage and configuration		Yes	Yes	Yes
Automated ticket management and alerting		Yes	Yes	Yes
Use of Storage Insights for collaborative problem resolution		Yes	Yes	Yes
Predictive issue alerting			Yes	Yes
Storage Insights Pro entitlement				Yes
IBM Installation	Standard with 9500	Additional paid service	Additional paid service	Additional paid service for 7300
Remote code upgrades (2x year) ***				Yes
Dedicated Technical Account Manager (TAM)				Yes
30 minutes Severity 1/2 response				Yes
Hardware service / parts replacement	9x5 NBD* or 24x7 Same day**	9x5 NBD, IBM on-site	24x7 Same day, IBM on-site	24x7 Same day, IBM on-site

Simple to plan

Configure system and support in one tool

Up-front and predictable pricing

Fixed percentage of system cost

Simple to choose

Which tier?

Basic, Advanced or Premium

And for how long?

1-5 years

* Next business day, parts only for FS5200, FS7300

** Same day, IBM on-site for FS9500

*** On-site available as additional paid service

IBM SAN Volume Controller SV3



Expanding the SVC family

Improved connectivity and performance

2X Increase in Read performance and connectivity

SVC – SA2



- Dual 8-core CPUs per node
- 2.1GHz Cascade Lake CPU
- Up to 768GB of cache per node
- 3 HBA card slots per node

SVC – SV2



- Dual 16-core CPUs per node
- 2.3GHz Cascade Lake CPU
- Up to 768GB of cache per node
- 3 HBA card slots per node

SVC – SV3



- Dual 24-core CPUs per node
- 2.4GHz Ice Lake CPU
- Up to 1.5TB of cache per node
- Dual Hot Plug batteries
- 6 HBA card slots per node
- 100GbE iSCSI & NVMe RDMA

New

1Q 2020

1Q 2022

IBM SAN Volume Controller SV3



Key SV3 Points

- As of December 2022, DH8 nodes will be End of Service (EOS)
- Extended Support Contracts WILL NOT be allowed – IBM cannot get parts
- The SV3 node is 2X as fast as the SV2
- The SV3 has 2X the connectivity of the SV2
- The SV3 has externally accessible boot drives and batteries

The Next Generation of FlashCore Modules

Building on IBM's FlashCore technology, the latest FCM 3 drive delivers increased performance and greater storage density

Up to
50%
More Effective
Capacity

2018: FCM 1

3DTLC technology

4.8, 9.6 and 18.9TB
physical

2:1 inline h/w
compression

2020: FCM 2

SLC/QLC tech for performance
and cost

4.8, 9.6, 18.9 and 38.4TB
physical capacities

2:1 inline h/w compression

2022: FCM 3

Same SLC/QLC tech

4.8 to 38.4TB physical capacities

3:1 h/w compression

22, 29, 58, 116TB effective capacities

**PCIe gen 4 on 7nm FPGA for 19.2 and
38.4TB capacities**

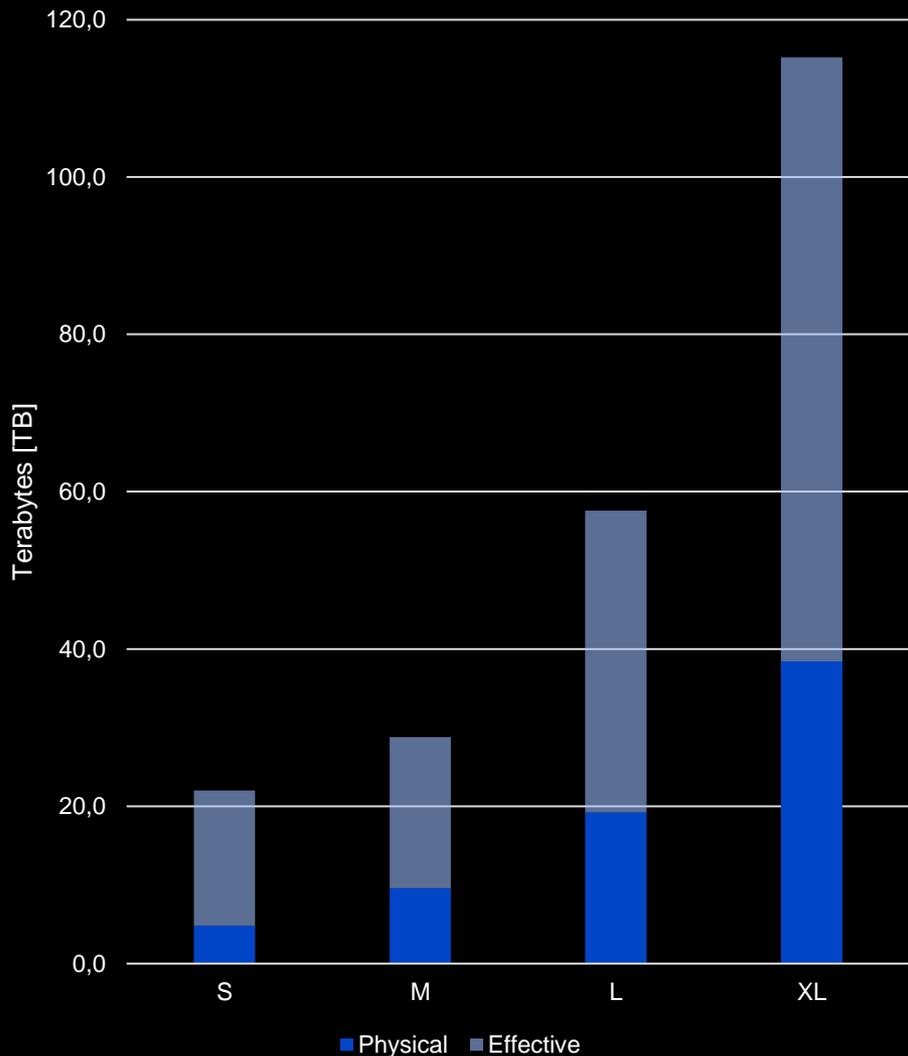
Significantly increased throughput

**Available on FlashSystem 5200, 7300
and 9500**

FCM3 New Effective Capacity Limits

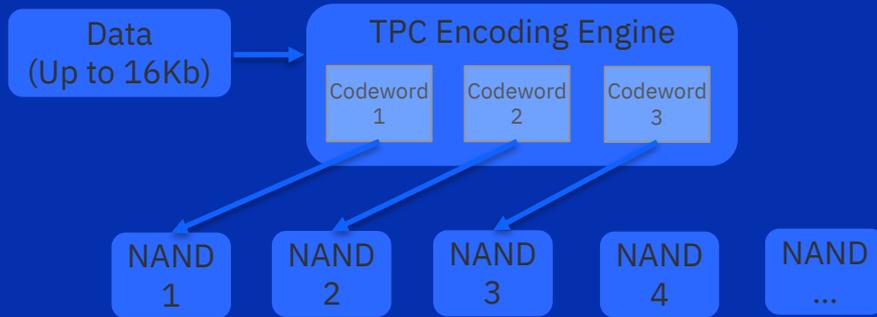
Same Gzip Compression Engine

- 100% hardware → No CPU / RAM / System-level garbage collection
- Lempel-Ziv with Pseudo-dynamic Huffman Encoding
- Stronger than LZ77/LZ78 alone used in most software → some additional savings even in application-level compression
- 6.5us of deflate overhead
100ns inflate overhead, **yes, that's nanoseconds!**

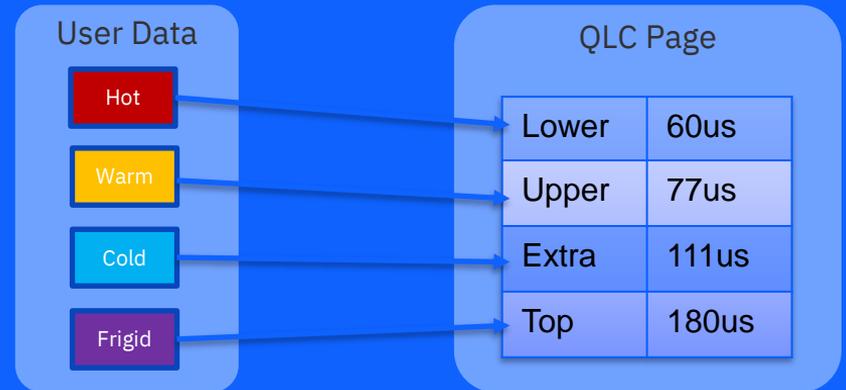


QLC w/ FlashCore™

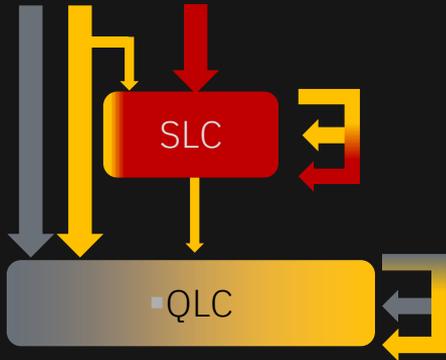
1. More Efficient Data Straddling



3. Read Heat Segregation



2. SLC Write Cache



4. Stronger/More Efficient ECC Encoding

Product	Code Word Size	User Data	CRC Data	Efficiency
FCM 1 TLC	9296 Bytes	7744 Bytes	1552 Bytes	83.3%
FCM 2/3 QLC	9296 Bytes	7920 Bytes	1376 Bytes	85%

QLC in enterprise storage is not for the faint of heart

Most companies can't handle...

- ✓ Programming times get longer
- ✓ Read latency gets longer
- ✓ Read retention gets shorter
- ✓ More susceptible to cell-to-cell interference
- ✓ Inherently less endurance

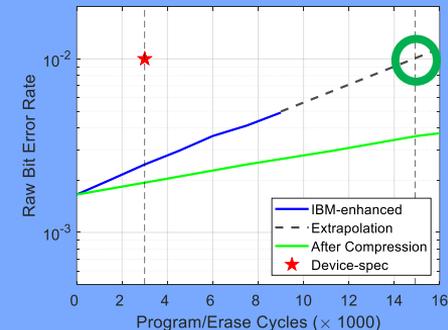
IBM had the know-how to deliver

- System Performance even better than TLC
- 3rd Generation Computation storage platform
- Inline Compression
- Dynamic SLC allocation
- Hinting architecture to dynamically place certain blocks on SLC or fast pages
- Smart Data Placement
- Make use of Key Micron features

IBM's knowledge benefited clients...

- Read throughput increased 22 to 44%
- Write throughput increased 33%
- Read latency cut up to 40%
- Write latency cut up to 30%
- IOPs increased 10 to 20%

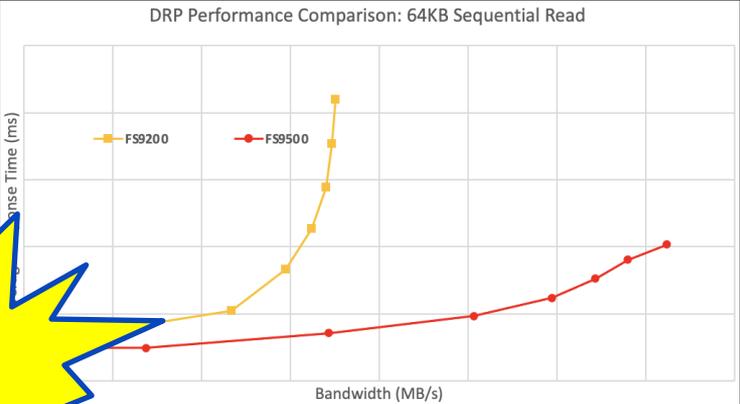
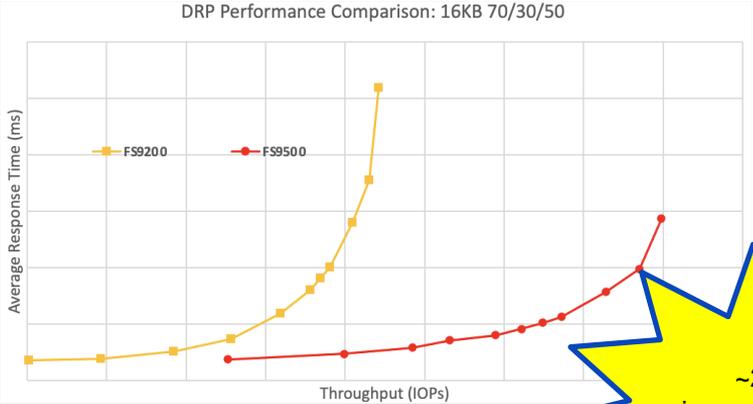
Endurance after IBM IP



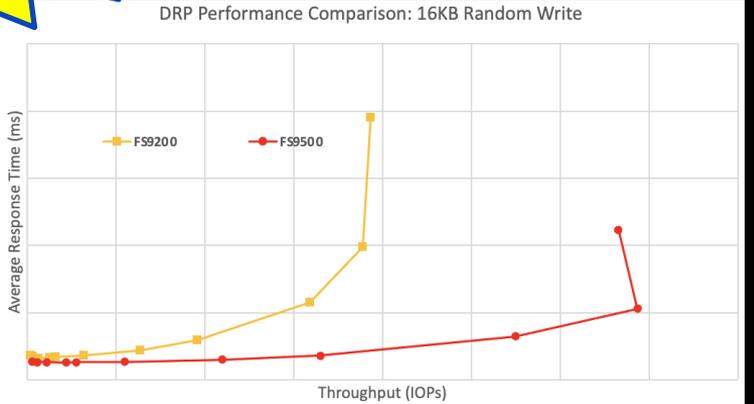
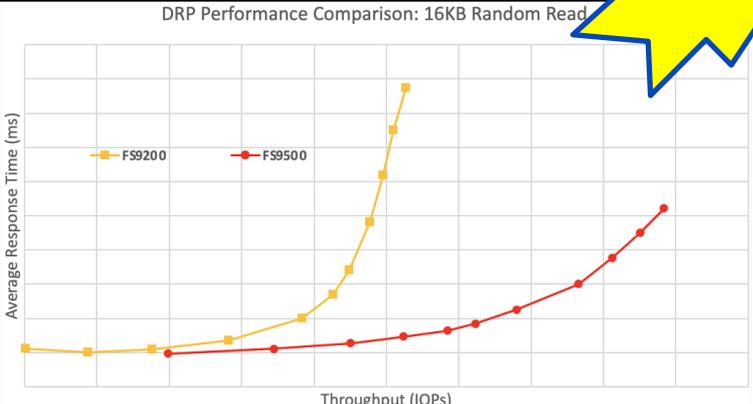
FS9500/7300/SV3 Performance Highlights

Product Names	“Max IOPS”	“Max IOPS Cache Miss Random”	“Min Latency”	“Max Bandwidth”
	4k read Hit	4k read miss from Flash	Min latency for 4k Read Hit	Read BW, 256KB reads from Flash
FS9500	8 million	2.5million	Under 50us	100GB/s
FS7300	3.5 million	1million	Under 50us	45GB/s
SV3	8 million	3.6million	Under 50us	120GB/s

FS9500 vs. FS9200 DRP Config (Data Reduction Pool)

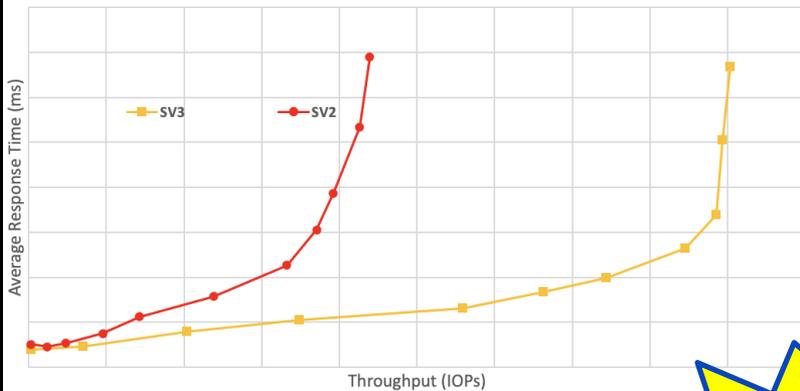


~2X improvement

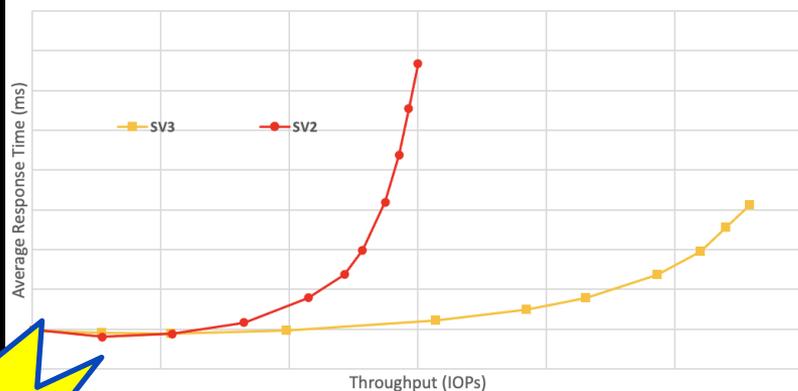


SV3 vs. SV2 DRP Config (Data Reduction Pool)

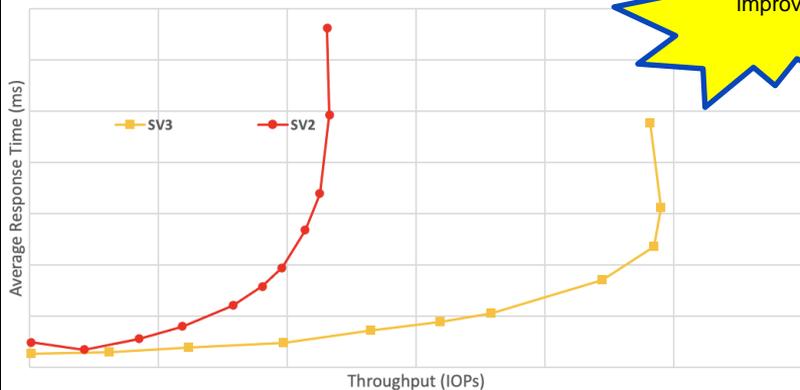
DRP Performance Comparison: 16KB Random Write



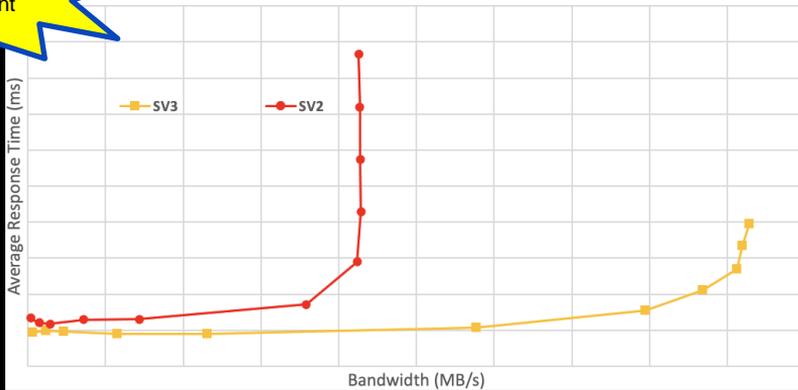
DRP Performance Comparison: 16KB Random Read



DRP Performance Comparison: 16KB 70/30/50

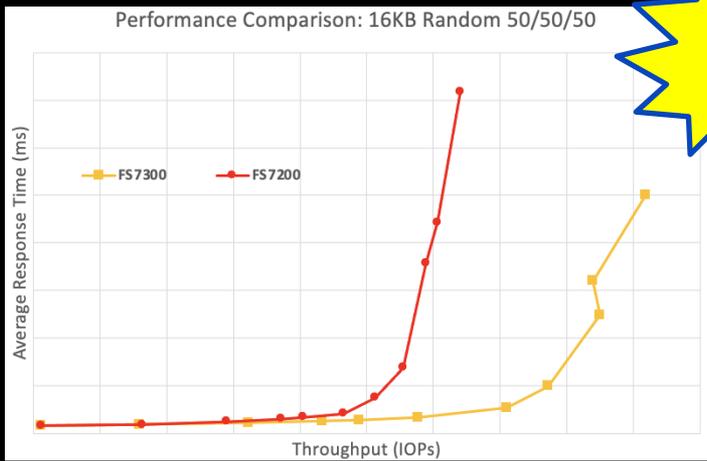
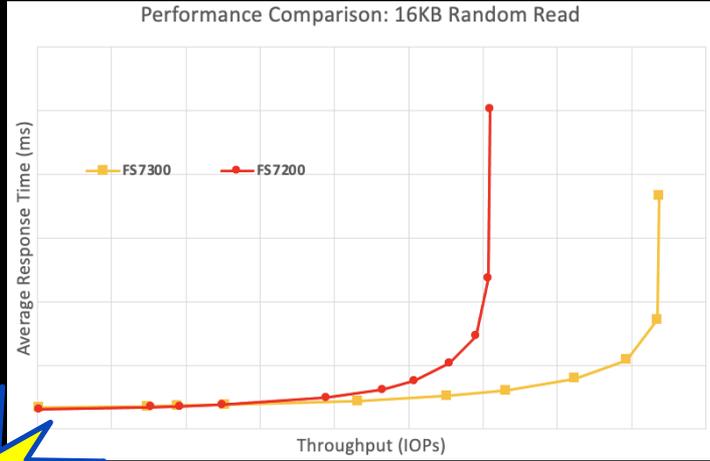
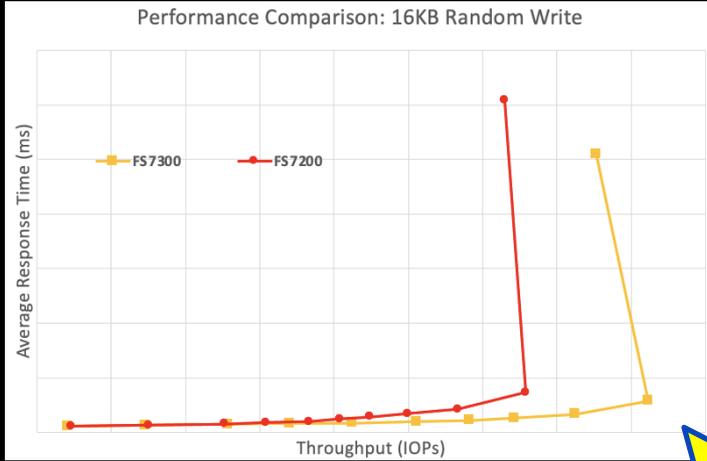


DRP Performance Comparison: 64KB Sequential Read

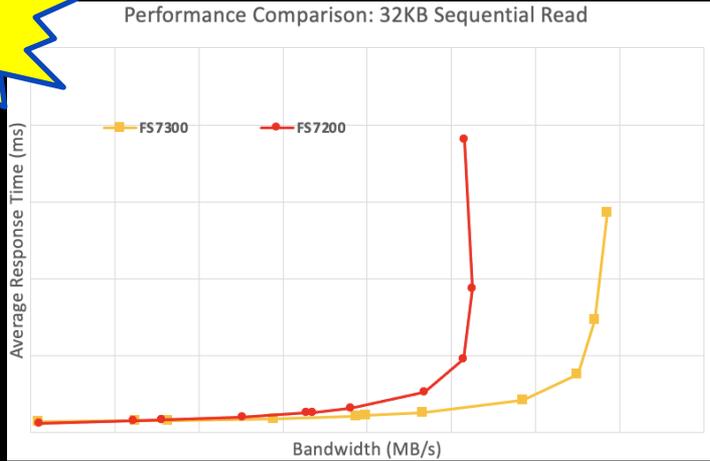


~2X improvement

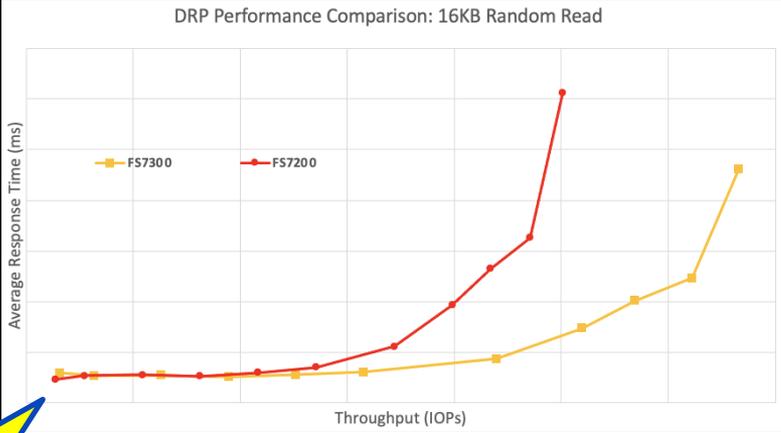
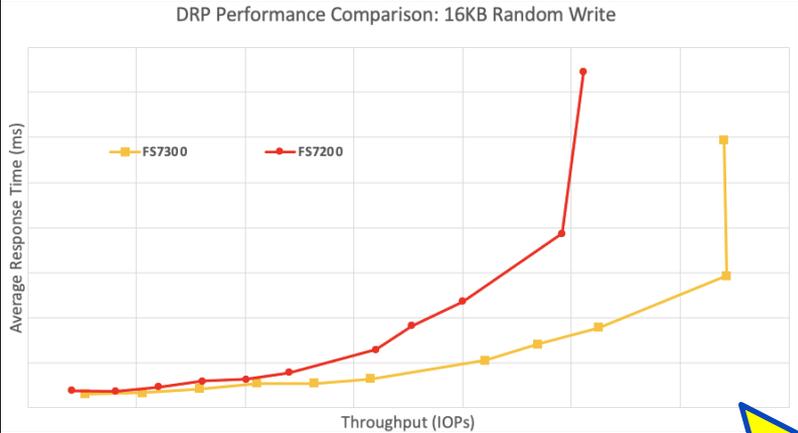
FS7300 vs. FS7200 Full Allocation Config (Regular Pool)



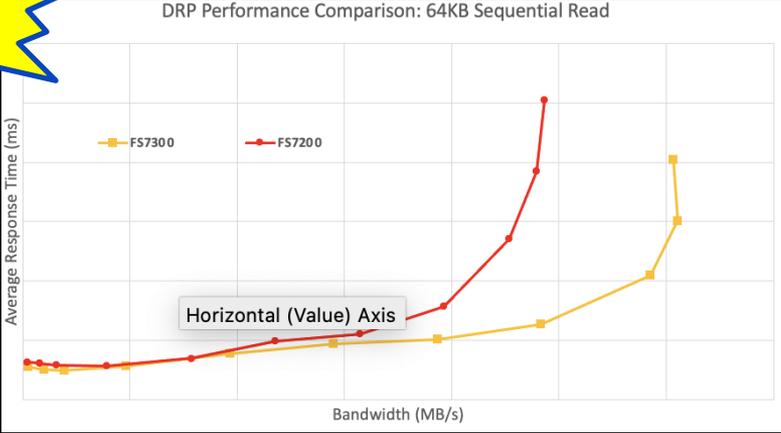
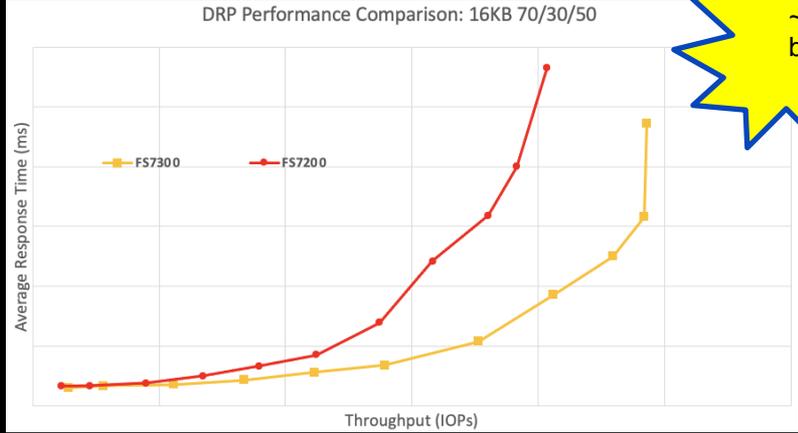
~30% better



FS7300 vs. FS7200 DRP Config (Data Reduction Pool)



~30% better



Enhanced security controls

Tighten up security with new enhanced security controls.



Combined password and SSH key authentication now supported as a first factor for local users



Restrict methods of access to the system at a user group level. GUI, CLI and Rest access can now be restricted



Configurable login grace time and session timeout duration



8.5.0 brings two flavours of
Multifactor Authentication support
to IBM Spectrum Virtualize

1. Cloud-based IBM Security Verify Integration

2. Single Sign-on support via Microsoft Active
Directory Federation Services (on-premise)

Native MFA with IBM Security Verify

Protect local and remote users with an end-to-end IBM solution.

MFA for GUI and CLI users

Configure users logging in to the Spectrum Virtualize GUI or CLI to be prompted for multi-factor authentication.

Supports a range of second factors for both GUI and CLI users.

Fully on-cloud MFA

IBM Security Verify is running as a highly available cloud-based service.

No need to install the software on an on-premise server.

MFA for all users

Ability to protect existing local users with MFA, including the superuser.

Remote users can also be configured with a second factor.

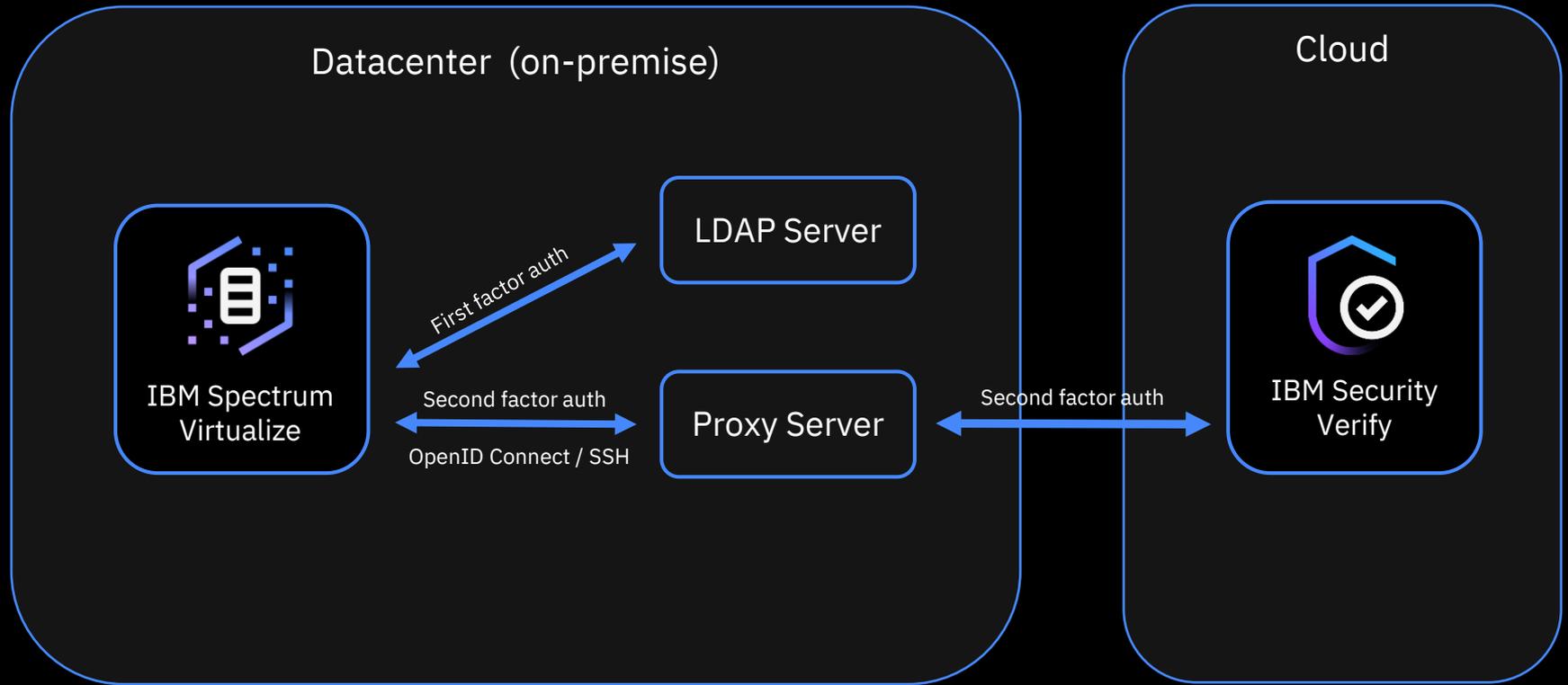
Enhance system security without compromising on accessibility.

Local first factor

First factor authentication is always performed locally by Spectrum Virtualize as it is today.

Second factor authentication is delegated to IBM Security Verify.

IBM Security Verify authentication flow



Second factor support matrix

IBM Security Verify supports a wide range of second factors:

Factor	Supported?	Works over CLI ? (via PAM module)	Works over GUI ? (via OpenID Connect)	Notes
SMS OTP	Yes	Yes	Yes	
Email OTP	Yes	Yes	Yes	
Voice OTP	Yes	Yes	Yes	
Time-based OTP (aka authenticator apps)	Yes	Yes	Yes	IBM Verify app, Google Authenticator, Microsoft Authenticator, any third party
FIDO2	Yes	No	Yes	Yubikey, Mac Touch ID, etc
Push notification	Yes	Yes	Yes	IBM Verify App
QR code	Yes	No	Yes	

One time passcode login example



FlashSystem 9100

Storage Management (SecurityStand-01)

Sign In

OR

Sign In with SSO



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One time passcode login example

IBM **Security** Verify

One-Time Password Submission

Enter the one-time password (OTP) that is sent to vla*****@rs.ibm.com.

Time remaining: 04:28

7518-

Submit

[Resend OTP](#)

MFA via Single Sign-on (SSO)

Plug into an existing ADFS configuration for on-premise MFA via SSO.

MFA for GUI-based logins

Configure users logging in to the Spectrum Virtualize GUI to be prompted for multi-factor authentication.

Supports a range of second factors for GUI users.

Remote authentication

Both the first factor and second factor authentication are completely delegated to the Identity Provider (IdP).

Plug in seamlessly to your existing AD FS configuration.

Fully on-premise MFA (Single Sign-on + ADFS)

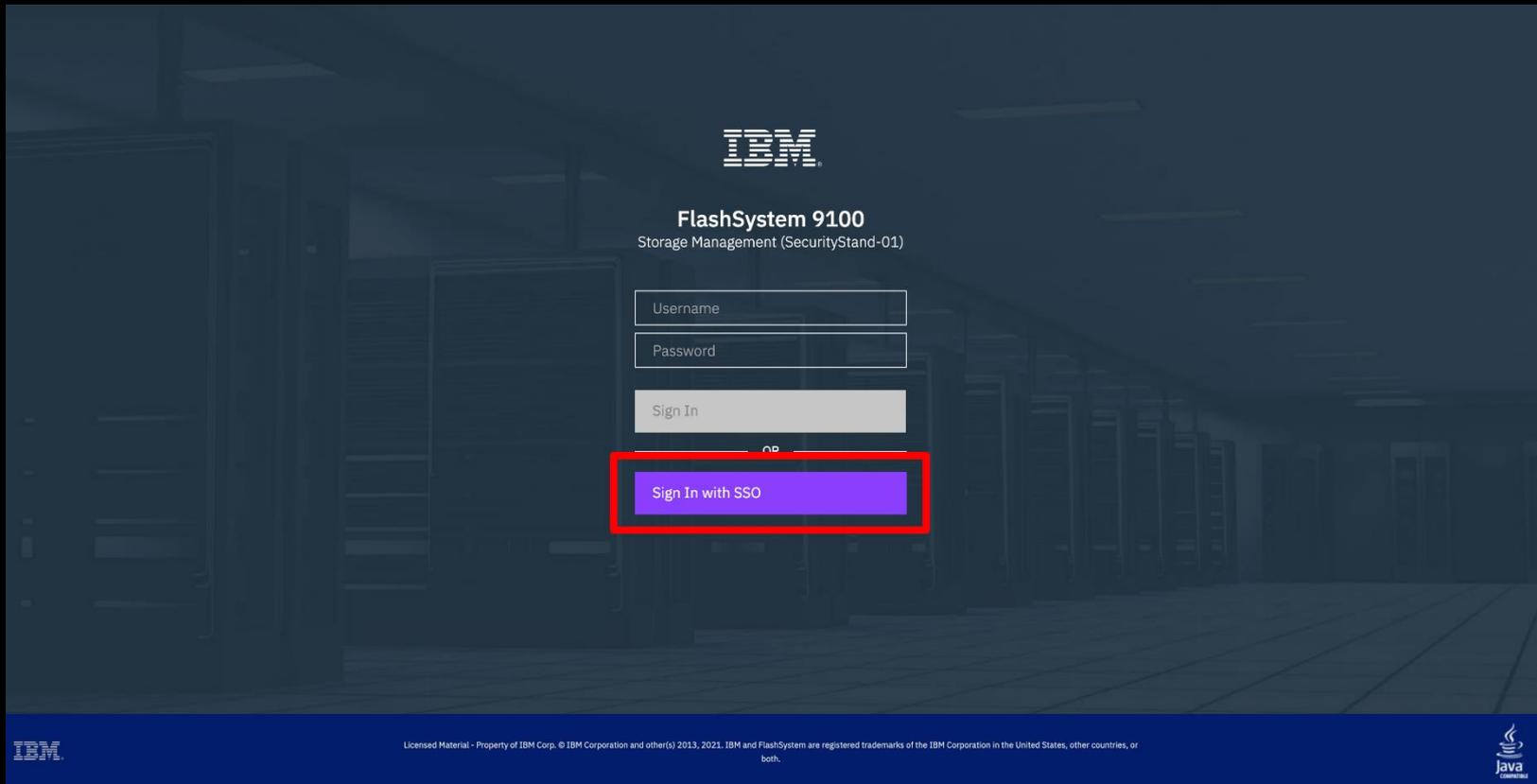
The SSO Identity Provider can either be running on-premise or as a cloud-based offering.

Various third-party MFA solutions can be plugged in behind ADFS for extra factors.

Certificate and smartcard authentication

ADFS supports both SSL certificate and smart card authentication, two options typically lacking from cloud-based solutions.

Single sign-on example



The image shows a login interface for IBM FlashSystem 9100 Storage Management (SecurityStand-01). The page features the IBM logo at the top center. Below the logo, the product name and version are displayed. There are three input fields: 'Username', 'Password', and a 'Sign In' button. Below these, there is an 'OR' separator and a 'Sign In with SSO' button, which is highlighted with a red rectangular border. The background of the page is a dark blue gradient with a faint image of server racks.

IBM

FlashSystem 9100
Storage Management (SecurityStand-01)

Username

Password

Sign In

OR

Sign In with SSO

IBM

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java
COMMUNITY

Single sign-on example



IBM Manchester Lab - ADFS

Sign in



Sign in

[Sign in using a certificate](#)

Authentication Options Summary

	Remote Authentication	Multifactor Authentication	Single Sign-on
First Factor handled by	LDAP Server	Spectrum Virtualize or LDAP server	Identity Provider (IdP)
Second Factor handled by	N/A	Multifactor Authentication service (e.g. IBM Security Verify)	Identity Provider (IdP)
Supports CLI logins?	Yes	Yes	No
Supports GUI logins?	Yes	Yes	Yes
Supports local users?	No	Yes	No
Supports remote users?	Yes	Yes	Yes
Services supported	Microsoft Active Directory, IBM Tivoli Directory Server, Other (e.g. OpenLDAP)	IBM Security Verify	Microsoft Active Directory Federation Services (ADFS)
Protocol	LDAP	OpenID Connect (OIDC)	OpenID Connect (OIDC)
Notes		Can be used in conjunction with LDAP	Can be used in conjunction with LDAP

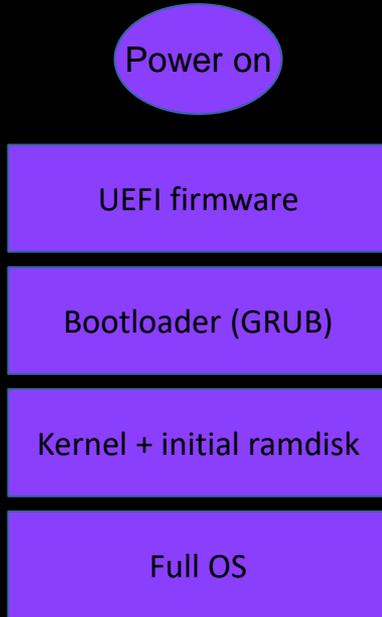
Hardware Root of Trust



For the FlashSystem 9500 and SVC hardware we have added features to enable a hardware root of trust in order to protect against physical access attacks and to prevent running foreign code.

Secure & Trusted Boot

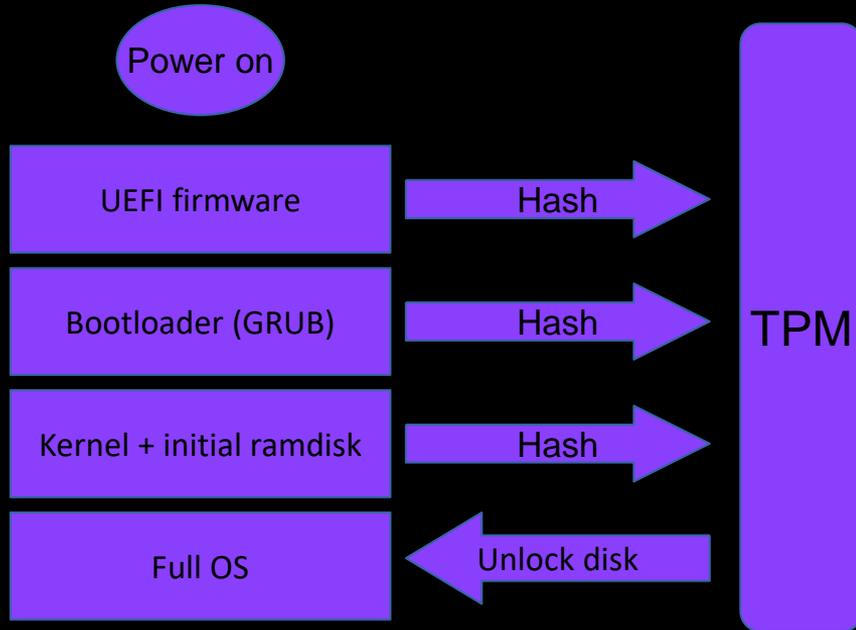
The boot process



- UEFI firmware started by the CPU
- UEFI finds and loads the bootloader
- Which loads the kernel + initial ramdisk
- Which mounts the bootdrive, and starts the full OS

Secure & Trusted Boot

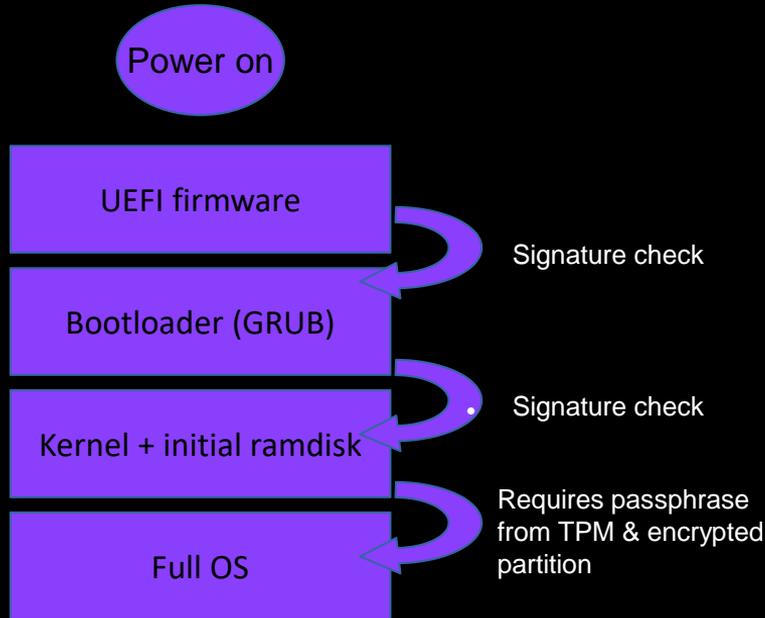
Trusted boot



- “Physical access is king” – not anymore!
- On traditional servers someone with physical access can change any code on the system
- Encrypting the partitions of the boot drive with code on prevents the code from being modified
- Passphrase is stored within TPM
- TPM only gives out the passphrase in a *trusted* environment

Secure & trusted boot

Secure boot



- UEFI Secure boot checks bootloader signature
- Bootloader checks Kernel + initial ramdisk signature
- Initial ramdisk requires encrypted partition & passphrase from TPM to continue boot
- Attacker cannot impersonate our code with their own boot drive

SSL Certificate Chain Support

Support for customer supplied SSL certificates added in 2015 – but can only install the signed certificate with no CA (certificate authority) certificates.

With this Epic, the user can now install a signed certificate and the full chain of CA certificates that signed it. This applies to the system (cluster) certificate.

System SSL certificate and keys used for:

- GUI
- Encryption key servers
- IP Quorum
- CIMOM
- Rest API

Certificate chains

Security-conscious organizations want to use an intermediate CA certificate to sign the cluster's system certificate.



- There can be more than one intermediate CA certificate in the certificate chain.

IBM Storage

Misc. Enhancements

GUI Enhancements



IBM FlashSystem Family 2022

Entry Enterprise

FlashSystem 5200



FlashSystem 5015
& 5035

Midrange Enterprise



FlashSystem 7300

High-End Enterprise



FlashSystem 9500
and 9500R

Hybrid Cloud



Spectrum Virtualize
for Public Cloud



IBM Spectrum Virtualize

Storage function, scalability, interoperability, cloud integration and automation



IBM Storage Insights

Anomaly detection, fabric monitoring, full stack visibility, predictive support

Scaling for Capacity and Performance

	8.4.0	8.4.2	8.5.0
vdisk	10,000	15,864 ²	15,864 ²
Host-mappable volumes	10,000	15,864 ²	15,864 ²
FlashCopy Mappings	10,000	15,864 ²	15,864 ²
Async num volumes	5,000	7,932 ²	7,932 ²
Async max capacity	720TiB	2 PiB ¹	2 PiB ²
HA num volumes	2,000	2,000	2,000
HA max capacity	720TB	2 PiB ¹	2 PiB ²
HA + 3 site volumes	2,000	2,000	2,000
Data Reduction Pool Capacity	1PiB	1PiB	4PiB ³
Fibre Channel Hosts per IO Group	512	512	2,048 ⁴

1. Only applies to FS9200, FS7200, SA2 and SV2

2. Only applies to V7000, FS7200, FS9100, FS9200 and SVC

3. Assumes an 8GiB Extent

4. FS7300, FS9500, and SV3 only, System limit has not been increased

DRAID Changes

Numerous management issues have been hit as a result of systems running with multiple arrays of compressing drives in the same pool.

Increasing capacity on drives and the addition of DRAID-1 has reduced the need for DRAID-5 on new hardware

In 8.5.0.0 Spectrum Virtualize will no longer allow more than a single DRAID array made of compressing drives (e.g., FCM) in the same storage pool (mdisk group)

Always Use DRAID-6 policing

–No DRAID-5 on FS9500 or FS7300.

– Further limitation of DRAID-5 support on FS5200, FS5035, FS5015

Limiting of DRAID-5

As drive capacities increase, the rebuild time required following a failed drive increases significantly.

Together with the fact that with larger capacities the chance for a previously unreported (and uncorrectable) medium error also increases, customers that configure DRAID-5 arrays on newer platforms/products and/or with newer drive models are more exposed to having a second drive failure or a medium error found during rebuild which would result in an unwanted Customer Impact Event (CIE), and potentially a data loss

Throttles update

The screenshot shows a web interface for managing volumes. At the top, there's a navigation bar with '9.71.19.90' and 'Volumes'. Below it, there's a table with columns: Name, State, Synchronized, Pool, and Volume Group. The table contains one row: 'vdisk0', 'Online', 'Synchronized', 'Pool0', and 'Volume Group'. A modal dialog titled 'Edit Throttle for Volume' is open, showing options to modify the volume 'vdisk0'. It has two sections: 'Bandwidth limit' with a dropdown set to 'Not enabled' and a unit dropdown set to 'MBps', and 'IOPS limit' with a dropdown set to 'Not enabled' and a unit dropdown set to 'IOPS'. Both sections have a 'Create' button. A blue information box at the bottom of the modal states: 'Throttle limit is a per node limit. I/O operations that exceed the throttle limit are queued at the receiving node.' with a 'More Information' link. A 'Close' button is at the bottom right of the modal.

Name	State	Synchronized	Pool	Volume Group
vdisk0	Online	Synchronized	Pool0	Volume Group

Edit Throttle for Volume

Modify Volume vdisk0

Bandwidth limit:

IOPS limit:

Throttle limit is a per node limit
I/O operations that exceed the throttle limit are queued at the receiving node. [More Information](#)

Per node limit applies to throttles for:
volumes, hosts, host cluster,
system offload

Audit Log Filtering

The screenshot displays the 'Audit Log' interface. The main area contains a table of log entries with columns for Date and Time, User Name, Command, and Object ID. A 'Filter Audit Log' sidebar is open on the right, allowing users to specify date and time ranges. The sidebar includes 'Start Date Time' and 'End Date Time' sections, each with 'From' and 'To' fields for date and time selection. A 'Reset Filter' button is also present in the sidebar.

Audit Log Table:

Date and Time	User Name	Command	Object ID
1/13/22 11:00:13 AM	superuser	satask cpfiles -prefix /dumps/svc.config.cron.*_78F14V9-1 -source 01-1 01-2	:
12/17/21 12:47:39 AM	superuser	satask restartservice -service tomcat	:
12/17/21 12:52:11 AM	superuser	svctask chenclosurecanister -canister 2 -gui -identify yes 1	:
12/23/21 11:00:13 AM	superuser	satask cpfiles -prefix /dumps/svc.config.cron.*_78F14V9-1 -source 01-1 01-2	:
1/2/22 11:00:13 AM	superuser	satask cpfiles -prefix /dumps/svc.config.cron.*_78F14V9-1 -source 01-1 01-2	:
1/10/22 11:00:13 AM	superuser	satask cpfiles -prefix /dumps/svc.config.cron.*_78F14V9-1 -source 01-1 01-2	:
1/13/22 1:34:41 AM	superuser	svctask rmmdiskgrp -force -gui 2	:
12/24/21 11:00:13 AM	superuser	satask cpfiles -prefix /dumps/svc.config.cron.*_78F14V9-1 -source 01-1 01-2	:
1/13/22 1:33:15 AM	superuser	svctask mkmdiskgrp -unit mb -datareduction no -easytier auto -encrypt no -ext 4096 -gui -guidid 0 -name Pool1 -warning 80%	1
12/17/21 12:47:39 AM	superuser	svctask settimezone -timezone 246	:

Items per page: 10 | 1-10 of 54 items | 1 of 6 pages

MFA support

9.90 Security 6

Multifactor Authentication

Multifactor authentication requires users to authenticate using additional factors when logging in.

Configure DNS server [Configure](#)

A DNS server must be defined to utilize Multifactor Authentication.

Export the system certificate. On the authentication server, upload and install this certificate as the signer certificate with the name **00000204E1C000A6**.

[Export Certificate](#) 

Authentication server [?]

Host name	Port number
<input type="text" value="Enter host name"/>	<input type="text" value="443"/>

OpenID Credentials [?]

Client ID	Client secret
<input type="text" value="Enter client ID"/>	<input data-bbox="985 753 1371 775" type="text" value="Enter client secret"/>

API Client Credentials [?]

Client ID	Client secret
<input type="text" value="Enter client ID"/>	<input data-bbox="985 879 1371 900" type="text" value="Enter client secret"/>

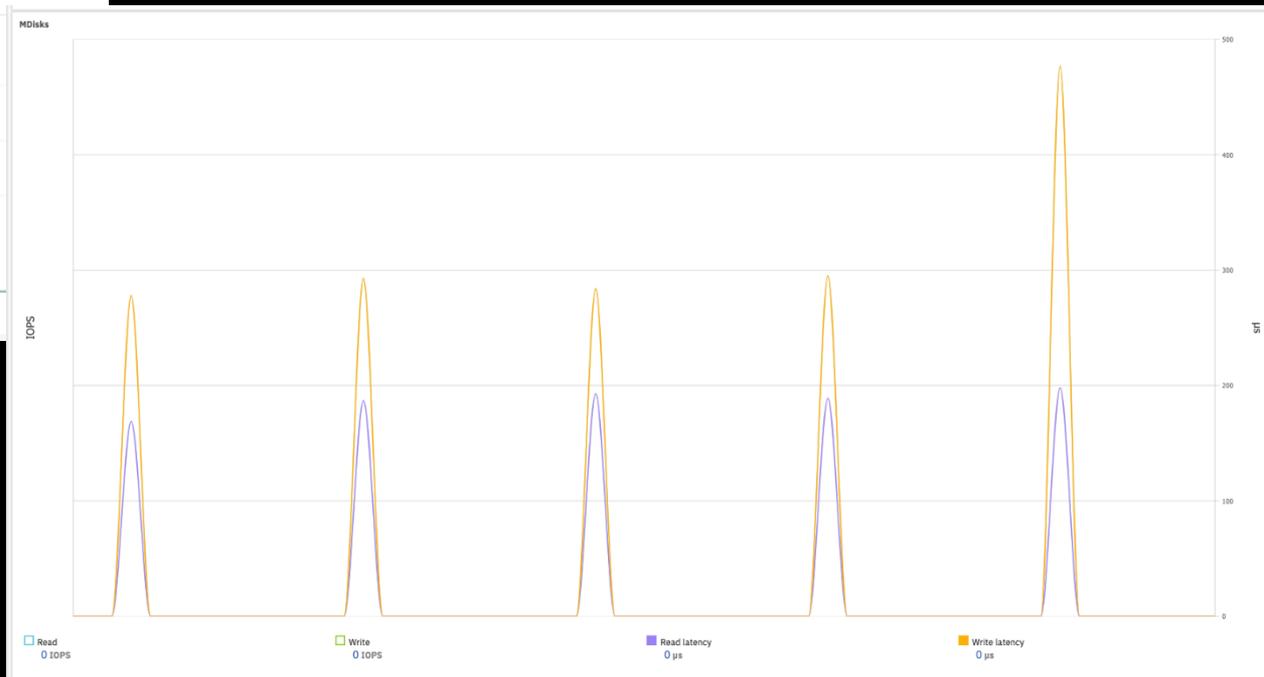
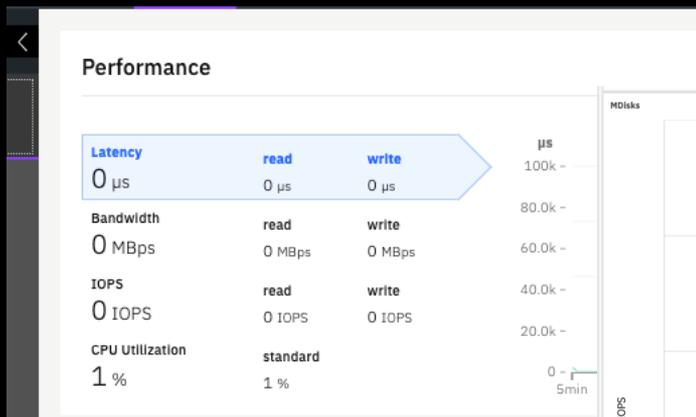
[Reset](#) [Save](#)

SSO support

The screenshot shows the 'Single Sign-on' configuration page in the IBM Security console. The left sidebar contains navigation options: Multifactor Authentication, Remote Authentication, Single Sign-on (selected), Secure Communications, Password Policies, and Inactivity Logout. The main content area is titled 'Single Sign-on' and includes a descriptive paragraph: 'Single sign-on enables users to log on once and access services without re-entering other authentication factors. You can define a single authentication server to manage user authentication for an entire system and its resources.' Below this is a blue callout box with a warning icon and the text: 'Configure DNS server You must define a DNS server to enable single sign-on. Configure'. The configuration section is divided into several fields: 'Authentication server' with an 'OpenID Configuration Endpoint' and an 'Enter URL' field; 'OpenID Credentials' with 'Client ID' and 'Client secret' fields; 'Claims' with 'User claim' (containing 'upn') and 'Group claim' (containing 'group') fields; and a 'Proxy server' section with an unchecked checkbox 'Use proxy server'. At the bottom are 'Reset' and 'Save' buttons.

The screenshot shows the login page for the SAN Volume Controller. At the top is the IBM logo. Below it, the text reads 'SAN Volume Controller' and 'Storage Management (Cluster_9.186.9.132)'. The login form consists of three input fields: 'Username', 'Password', and a 'Sign In' button. Below the 'Sign In' button is an 'OR' separator, followed by a blue button labeled 'Sign In with SSO'.

Performance Chart (microsecond support)



Orchestration and Automation using Red Hat Ansible for IBM Spectrum Virtualize



Spectrum Virtualize Ansible Collection:

- **Collect facts:** Collect basic information including hosts, host groups, snapshots, consistency groups, and volumes
- **Manage hosts:** Create, delete, or modify hosts
- **Manage volumes:** Create, delete, or extend the capacity of volumes
- **Manage mdisk:** Create or delete a managed disk
- **Manage pool:** Create or delete a pool (managed disk group)
- **Manage volume map:** Create or delete a volume map
- **Manage consistency group snapshot:** Create or delete consistency group snapshots
- **Manage snapshot:** Create or delete snapshots
- **Manage volume clones:** Create or delete volume clones
- **Manage Mirror Volumes:** Create or delete mirror volumes (HyperSwap and Standard Mirror) and convert a standard volume to mirror volume and vice-versa
- **Manage replication:** Create or delete relationships

[Automate and Orchestrate Your IBM FlashSystem Hybrid Cloud with Red Hat Ansible Redbook](#)

https://galaxy.ansible.com/ibm/spectrum_virtualize

IBM Spectrum Virtualize Modules certified on Automation Hub

<https://www.ansible.com/integrations/infrastructure/ibm-storage>

A screenshot of the Ansible Galaxy web interface showing the details for the 'ibm.spectrum_virtualize' collection. The page header includes 'GALAXY' and navigation links for 'About', 'Help', 'Documentation', and a user profile 'bfsherman'. The main content area shows the collection name 'spectrum_virtualize' with the IBM logo and a score of '5 / 5' and '17400 Downloads'. There are buttons for 'Unfollow Collection', 'Issue Tracker', 'Repo', and 'Docs Site'. Below this, there are tabs for 'Details', 'Read Me', and 'Content'. The 'Read Me' tab is active, displaying the collection's description: 'This collection provides a series of Ansible modules and plugins for interacting with the IBM Spectrum Virtualize Family storage products. These products include the IBM SAN Volume Controller, IBM FlashSystem Family members built with IBM Spectrum Virtualize (FlashSystem 5000, 5100, 5200, 7200, 9100, 9200, 9200R, and V9000), IBM Storwize Family, and IBM Spectrum Virtualize for Public Cloud. For more information regarding these products, see the IBM Documentation.' There is also a 'Requirements' section listing 'Ansible version 2.9 or higher'.

New Spectrum Virtualize Ansible Modules – R1.7

Ansible Modules that will be new for 2022



RED HAT®
ANSIBLE®
Automation

https://galaxy.ansible.com/ibm/spectrum_virtualize



Modules

- `ibm_svc_initial_setup` - Manages initial setup configuration on IBM Spectrum Virtualize system
- `ibm_svc_manage_callhome` - Manages configuration of call home feature on IBM Spectrum Virtualize system
- `ibm_svc_manage_sra` - Manages 'support remote assistance' configuration on IBM Spectrum Virtualize system
- `ibm_svc_manage_user` - Manages user on IBM Spectrum Virtualize system
- `ibm_svc_manage_usergroup` - Manages user groups on IBM Spectrum Virtualize system
- `ibm_svc_manage_ownershipgroup` - Manages ownership groups on IBM Spectrum Virtualize system

Spectrum Virtualize Ansible Modules – R1.7

Complete Ansible Modules now available for 2022



https://galaxy.ansible.com/ibm/spectrum_virtualize

- `ibm_svc_auth` - Generates an authentication token for a user on IBM Spectrum Virtualize Family storage system
- `ibm_svc_host` - Manages hosts on IBM Spectrum Virtualize system
- `ibm_svc_hostcluster` - Manages host cluster on IBM Spectrum Virtualize system
- `ibm_svc_info` - Collects information on IBM Spectrum Virtualize system
- `ibm_svc_initial_setup` - Manages initial setup configuration on IBM Spectrum Virtualize system
- `ibm_svc_manage_callhome` - Manages configuration of call home feature on IBM Spectrum Virtualize system
- `ibm_svc_manage_consistgrp_flashcopy` - Manages FlashCopy consistency groups on IBM Spectrum Virtualize system
- `ibm_svc_manage_cv` - Manages the change volume in remote copy replication on IBM Spectrum Virtualize system
- `ibm_svc_manage_flashcopy` - Manages FlashCopy mappings on IBM Spectrum Virtualize system
- `ibm_svc_manage_mirrored_volume` - Manages mirrored volumes on IBM Spectrum Virtualize system
- `ibm_svc_manage_migration` - Manages volume migration between clusters on IBM Spectrum Virtualize system
- `ibm_svc_manage_ownershipgroup` - Manages ownership groups on IBM Spectrum Virtualize system
- `ibm_svc_manage_replication` - Manages remote copy replication on IBM Spectrum Virtualize system
- `ibm_svc_manage_replicationgroup` - Manages remote copy consistency group on IBM Spectrum Virtualize system
- `ibm_svc_manage_sra` - Manages 'support remote assistance' configuration on IBM Spectrum Virtualize system
- `ibm_svc_manage_user` - Manages user on IBM Spectrum Virtualize system
- `ibm_svc_manage_usergroup` - Manages user groups on IBM Spectrum Virtualize system
- `ibm_svc_manage_volume` - Manages standard volumes on IBM Spectrum Virtualize system
- `ibm_svc_manage_volumegroup` - Manages volume groups on IBM Spectrum Virtualize system
- `ibm_svc_mdisk` - Manages MDisks for IBM Spectrum Virtualize system
- `ibm_svc_mdiskgrp` - Manages pools for IBM Spectrum Virtualize system
- `ibm_svc_start_stop_flashcopy` - Starts or stops FlashCopy mapping and consistency groups on IBM Spectrum Virtualize system
- `ibm_svc_start_stop_replication` - Starts or stops remote copy relationship or group on IBM Spectrum Virtualize system
- `ibm_svc_vol_map` - Manages volume mapping for IBM Spectrum Virtualize system
- `ibm_svcinfo_command` - Runs `svcinfo` CLI command on IBM Spectrum Virtualize system over SSH session
- `ibm_svctask_command` - Runs `svctask` CLI command(s) on IBM Spectrum Virtualize system over SSH session

New Storage Insights Capabilities

Q4 2021 update of IBM Storage Insights and IBM® Storage Insights Pro



[What's new in IBM Storage Insights - IBM Documentation](#)

What's New	IBM Storage Insights	IBM Storage Insights Pro
Support for monitoring VMware hosts and virtual machines	✓	✓
Monitoring capacity that is protected by Safeguarded Copy	✓	✓
Monitoring enhancements for IBM Spectrum Virtualize		✓
More views of your capacity		✓
The upgrade process for data collectors just got smarter	✓	✓

IBM