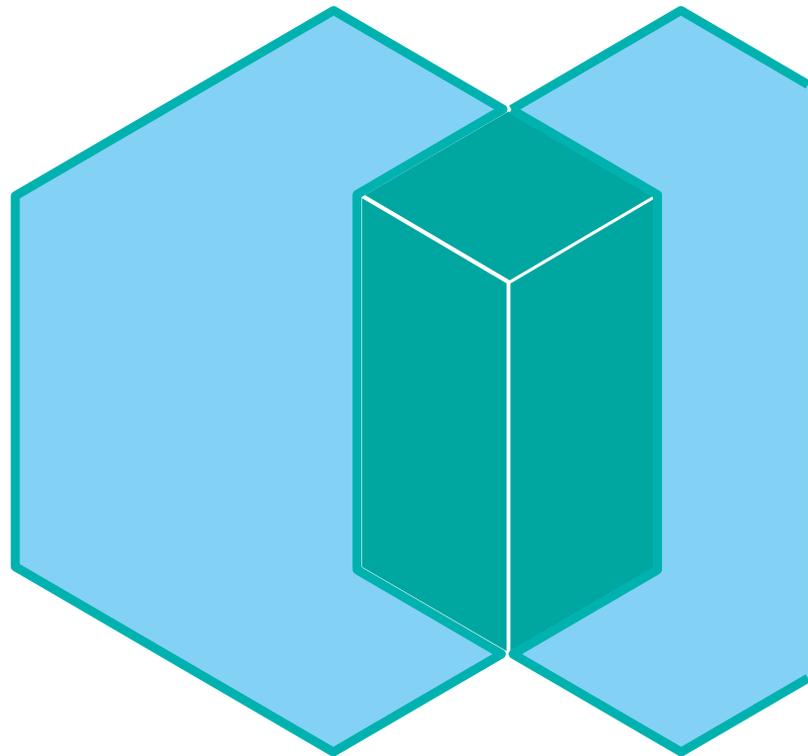




# IBM Spectrum Scale

## – Recent Updates and Outlook –

Spectrum Scale UK User Group Meeting 2016 – London  
May 17, 2016 – Ulf Troppens



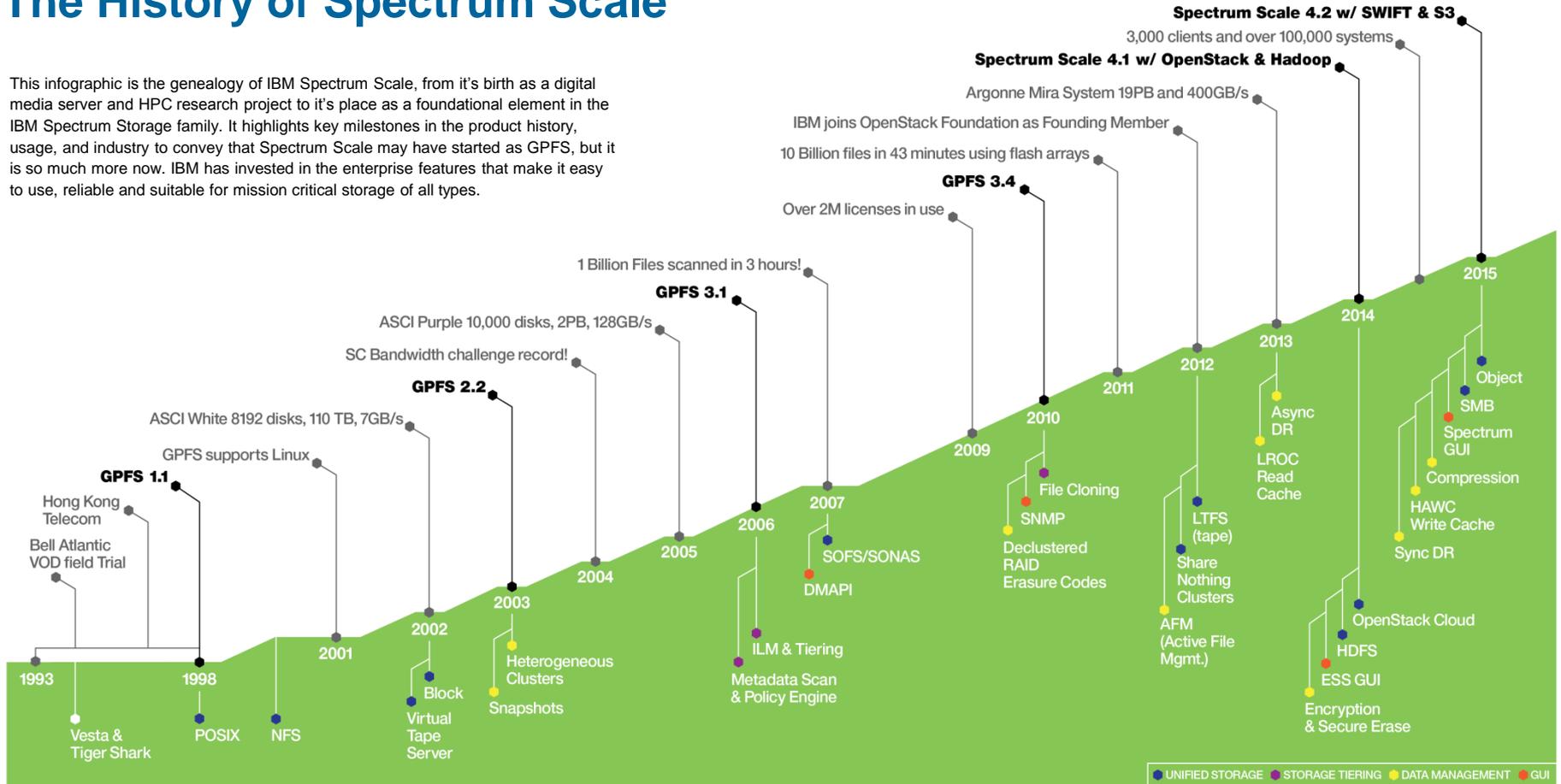
***New in Spectrum Scale 4.2***  
***Priorities 2016***  
***Miscellaneous***

# Outline

*New in Spectrum Scale 4.2*

# The History of Spectrum Scale

This infographic is the genealogy of IBM Spectrum Scale, from its birth as a digital media server and HPC research project to its place as a foundational element in the IBM Spectrum Storage family. It highlights key milestones in the product history, usage, and industry to convey that Spectrum Scale may have started as GPFS, but it is so much more now. IBM has invested in the enterprise features that make it easy to use, reliable and suitable for mission critical storage of all types.



# Store everywhere. Run anywhere.

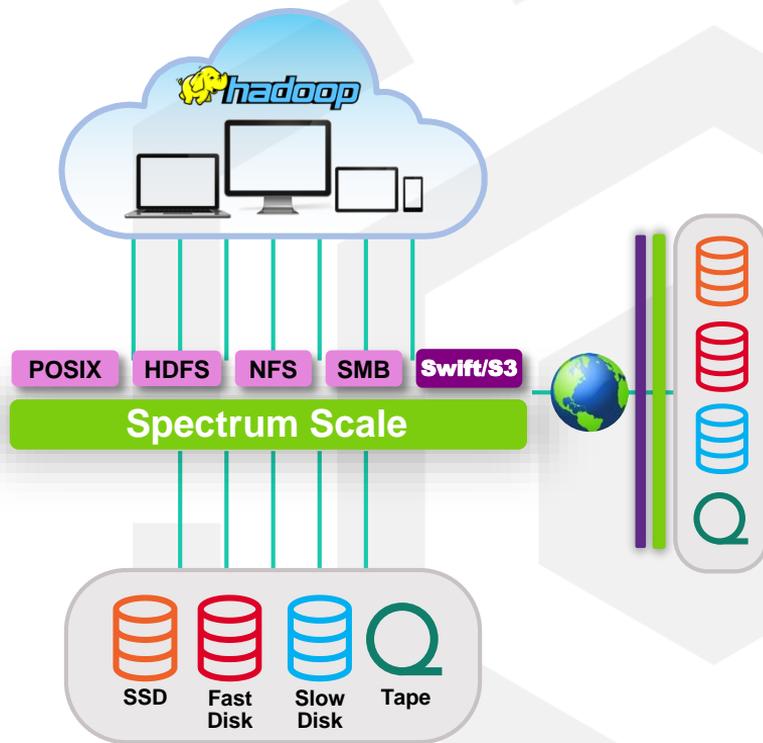
*Remove data-related bottlenecks*

## Challenge

- Managing data growth
  - Lowering data costs
  - Managing data retrieval & app support
  - Protecting business data

## Unified Scale-out Data Lake

- File In/Out, Object In/Out; Analytics on demand.
- High-performance native protocols
- Single Management Plane
- Cluster replication & global namespace
- Enterprise storage features across file, object & HDFS



# Store everywhere. Run anywhere.

## *Content Repositories*

### **Challenge**

Object storage for static data

- Seamless scaling
- RESTful data access
- Object metadata replaces hierarchy
- Storage efficiency

### **Spectrum Scale Swift & S3**

- High-performance for object
- Native OpenStack Swift support w/ S3
- File or object in; Object or file out
- Enterprise data protection
- Spectrum Scale RAID (ESS)
- Transparent ILM
- Encryption of data at rest and Secure Erase



# Store everywhere. Run anywhere.

*Analytics without complexity*

## Challenge

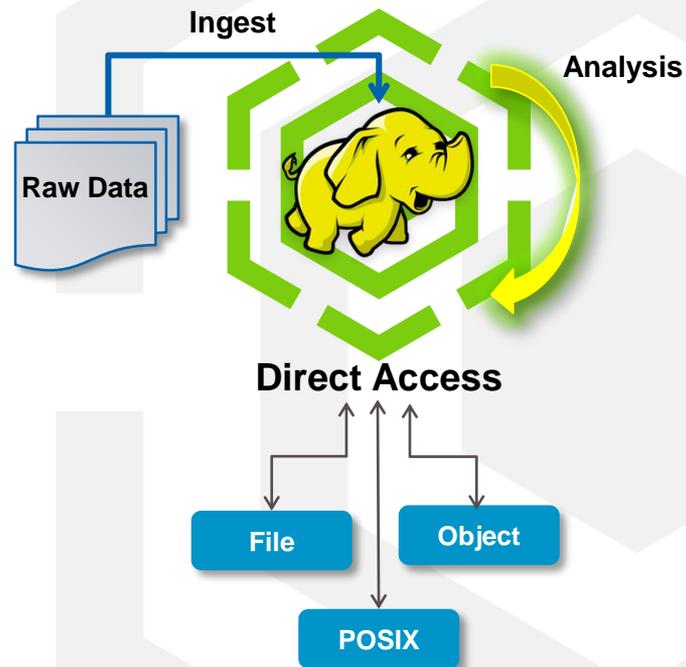
Separate storage systems for ingest, analysis, results

- HDFS requires locality aware storage (namenode)
- Data transfer slows time to results
- Different frameworks & analytics tools use data differently

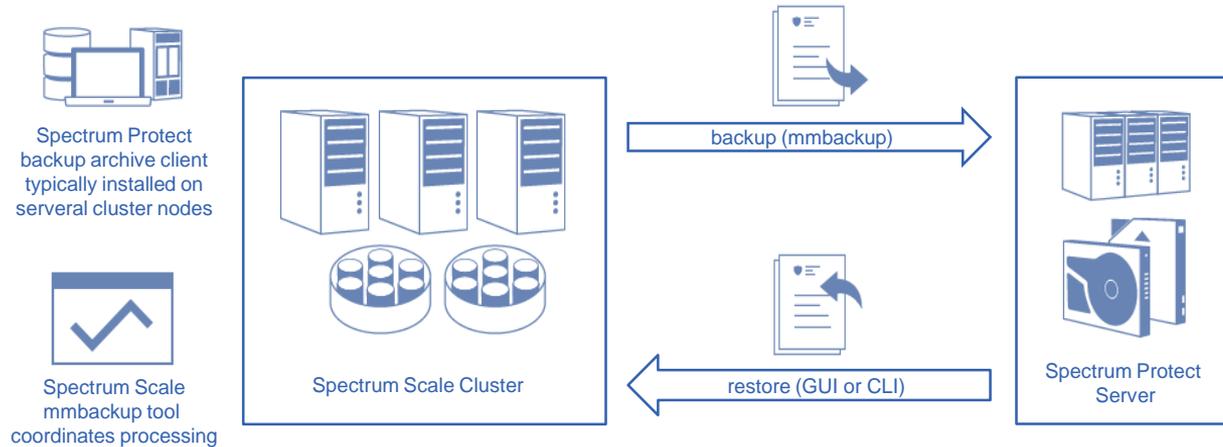
## HDFS Transparency

- Map/Reduce on shared, or shared nothing storage
- No waiting for data transfer between storage systems
- Immediately share results
- Single 'Data Lake' for all applications
- Enterprise data management
- Archive and Analysis in-place

→ Analyze object and file data without copying into HDFS



## Backup Of Large Spectrum Scale File Systems



Function
<ul style="list-style-type: none"> <li>▪ Massive parallel filesystem backup processing</li> <li>▪ Spectrum Scale mmbackup creates local shadow of Spectrum Protect DB and uses policy engine to identify files for backup</li> <li>▪ Spectrum Protect backup archive client is used under the hood to backup files to Spectrum Protect Server</li> <li>▪ Spectrum Protect restore (CLI or GUI) can be used to restore files</li> </ul>

→ Use any backup program to backup file, object and Hadoop data  
 → Use Spectrum Protect to benefit from mmbackup and SOBAR to backup and restore huge amounts of data

## New in Spectrum Scale 4.2

	New Feature	Benefit
<b>Client Experience Focus</b>	<ul style="list-style-type: none"> <li>• Common interface across Spectrum Portfolio</li> <li>• GUI Phase 1</li> </ul>	<p>Easy to learn UI and integration across Spectrum Storage portfolio</p> <p>Simplify common management functions, including</p> <ul style="list-style-type: none"> <li>• Enabling protocols</li> <li>• Policy driven placement and ILM</li> <li>• Monitoring</li> <li>• Troubleshooting</li> </ul>
<b>Object Storage</b>	<ul style="list-style-type: none"> <li>• Unified File and Object</li> <li>• Extended S3 API support</li> </ul>	<p>Single view of data with either file or object read and write</p> <p>Enable applications originally written for AWS</p>
<b>Big Data &amp; Analytics</b>	<ul style="list-style-type: none"> <li>• Native Hadoop Support</li> <li>• Ambari Integration</li> </ul>	<p>Higher performance and broader integration with HDFS applications to go beyond Hadoop and embrace Map/Reduce ecosystem</p>
<b>Storage efficiency</b>	<ul style="list-style-type: none"> <li>• Compression of Cold data for File &amp; Object</li> </ul>	<ul style="list-style-type: none"> <li>• Improve Storage utilization &amp; efficiency for Cold data</li> <li>• Efficiently reduce data size using compression policies</li> </ul>
<b>General</b>	<ul style="list-style-type: none"> <li>• Quality of Service for File</li> <li>• z Linux support</li> <li>• Sudo wrappers</li> </ul>	<p>Expanding functionality in Spectrum Scale data aware policy engine:</p> <ul style="list-style-type: none"> <li>• Performance reservations to meet SLAs – even by time of day</li> <li>• Extending multi-site resiliency features to z-Linux</li> </ul>

# Speed and simplicity: Performance monitoring highlights

System health  
Node performance  
Network traffic  
Historical trends



## Quality of Service

Spectrum Scale has great performance, efficiency, etc, etc, but

...

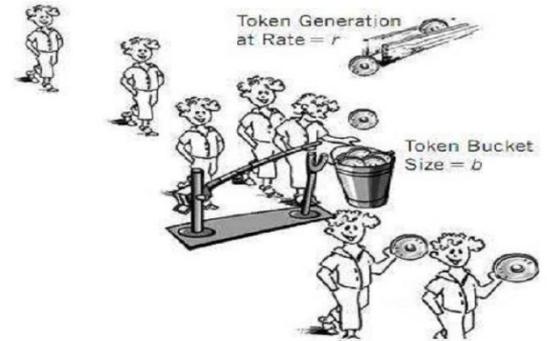
Before QOS – we had no way to control performance of competing tasks/jobs:

- Restripe, backup, policy scan/ILM/HSM, rcopy and other maintenance tasks – *versus*
- Real Work: near-real-time decision support, datacollection and crunching

Spectrum Scale 4.2 introduced QOS for IO operations in 4Q2015

Multiple token buckets, one token bucket for each combination of:

- disk pool,
- QOS class,
- node



## Quality of Service

Valid for all filesystem traffic, but need to configure on the cluster that owns the file system

Currently supported classes: 'maintenance' and 'other'

- May be used to prevent maintenance tasks from "dominating" file system performance
- As of this writing, the following commands are treated as long running Spectrum Scale commands:  
*mmadddisk, mmapplypolicy, mmcheckquota, mmdefragfs, mmdeldisk, mmdelfileset, mmdelsnapshot, mmdf, mmfileid, mmfsck, mmfsctl/tsreclaim, mmlssnapshot, mmrestripefs, mmrpldisk*

It is perfectly okay to issue mmchqos at any time. It will affect IO completion rates but it will not "break anything".

```
mmchqos <fsname> {enable|disable}
```

To cap GPFS maintenance to 300 IOPs:

```
mmchqos <fsname> enable maintenance=300iops,other=unlimited,pool=*
```

To check quotas

```
mmcheckquota [-v] [-N {Node[,Node...] | NodeFile | NodeClass}]
```

```
  [--qos QosClass] {-a | Device [Device ...]}
```

```
mmcheckquota {-u UserQuotaFile | -g GroupQuotaFile | -j FilesetQuotaFile}
```

```
  [--qos QosClass] Device
```

```
mmcheckquota --backup backupDir Device
```

## ***Priorities 2016***

# Disclaimer

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here

# Customer Feedback

"I want meaningful alerts that don't cause alert fatigue. You can't tell the difference between a client leaving a cluster and a quorum node leaving a cluster."

"If we can't monitor something, we can't roll it out."

"What is going on with my GPFS system?"

"Our ops team is looking at dashboards all day. If something doesn't flash in red or come up on their monitoring console, they're not going to see it."

"This is an art that you learn from experience."

"What I really need is to be able to track down the rogue user who is bogging down the entire system."

"One of the things that's really lacking in GPFS is constant monitoring."

"There are tens of thousands of components that could break at any given time."

"When I come in to work each morning, give me a dashboard that surveys the entire Infrastructure landscape and tells me instantly if my day is going to be great or if it is going to pieces."

# 2016 Development Priorities

Every year we define a set of goals

- Based mainly on client feedback and market opportunity
- Target is to achieve them within the year



Sponsor User  
Interviews



Input from PM  
and Field Team



Sponsor User  
Observation



PMR  
Analysis

Focus areas

- Problem determination
- Documentation
- Security
- Defect backlog

Functional enhancements

- Improvements for Big Data
- More flexibility for GNR

# Hills – Problem Determination

1

An IT administrator who monitors Spectrum Scale can be made aware of the health of his Spectrum Scale components in one cluster, from a single place.

2

An IT Administrator, can perform self-service problem determination by utilizing provided guidance or automated solutions to problems, without contacting IBM Support.

3

An IT Administrator, can pre-check/check Spectrum Scale and its operating environment to avoid potential problems after initial installation or when changes are made, from a single tool.

# Simplicity

Subject to change.  
Details are under investigation.

- Spectrum Scale provides a plenty of parameters which allow tuning for a broad range of workloads by an expert user
- Simplicity replaces those parameters by a few aggregated parameters which enable an average skilled user to tune Spectrum Scale for the most common workloads

## Software Configuration and Tuning - Physical

Spectrum Scale Client Nodes		
Parameter Name	Value	Description
deadlockDetectionThreshold	0	Disables automatic deadlock detection.
deadlockOverloadThreshold	0	Disables automatic deadlock detection.
flushedDataTarget	1024	Sets the maximum number of open file objects for which data have already been flushed.
flushedInodeTarget	1024	Sets the maximum number of open file objects for which data and metadata have already been flushed.
idleSocketTimeout	0	Disables timeouts for idle sockets.
ignorePrefetchLUNCount	1	Disables automatic determination of maximum prefetch requests based on visible LUN count. The maximum prefetch requests are instead determined by prefetch buffers and prefetch threads.
inodeXWPrefetchThresholdCount	0	Enables prefetching of inode token in exclusive mode.
logBufferCount	50	Sets the number of log buffers.
logBufferSize	1M	Sets the size of each log buffer.
logPingPongSector	0	Disables the use of 'ping-pong' sectors in logging. The feature is unnecessary when using ESS.
logWrapAmountPct	2	Sets the percentage amount by which the log recovery point is advanced during the flushing of modified log entries.
logWrapThreads	128	Sets the number of threads to use for the flushing of modified log entries.
logWrapThreadsPerInvocation	128	will look in docs for concise description
logWrapThresholdPct	20	Sets the log capacity percentage at which the log flushing algorithms are triggered.
maxActiveIallocSegs	8	Sets the maximum number of active inode allocation segments per node.
maxAllocRegionsPerNode	32	Sets the maximum active allocation regions per node for disk allocation.
maxBackgroundDeletionThreads	128	Sets maximum number of threads to use for file deletions.
maxblocksize	16M	Sets the maximum file system block size.
maxBufferCleaners	1024	Sets the maximum number of threads for cleaning data buffers.
maxFileCleaners	1024	Sets the maximum number of threads for flushing data and metadata.
maxFilesToCache	6291456	Sets the maximum number of files to cache.
maxGeneralThreads	2048	Sets the maximum number of non-critical daemon worker threads.
maxInodeDeallocPrefetch	32	Sets the maximum number of threads that prefetch inode tokens of deleted files.
maxBufferCleaners	1024	Sets the maximum number of threads for cleaning data buffers.
maxBufferDescs	2M	Sets the maximum number of buffer descriptors.
maxFileCleaners	1024	Sets the maximum number of threads for flushing data and metadata.
syncWorker1threads	256	Sets the maximum number of threads to use flush data during explicit sync calls.
worker1Threads	1024	Sets the number of threads used by Spectrum Scale to handle I/O requests.
worker3Threads	64	Sets the number of inode prefetch threads to use.

→ Simplicity is problem prevention

## Sudo wrapper / no root ssh

- Make GUI functional

## File encryption (on rest)

- Consumability improvements in the configuration of SKLM
- Support for the Vormetric key server
- File encryption performance (whitepaper)

## Authentication

- GUI admin user can authenticate via external AD or LDAP server (delivered with 4.2.0-1)
- External Keystone SSL support for object

## Miscellaneous

- Spectrum Scale security best practices (whitepaper)
- Multi-region object deployment with a highly available keystone service (whitepaper)

## *Miscellaneous*

# IBM Spectrum Scale UK User Group Meeting: Grouping of IBM talks

## Access

- Technical Deep Dive - Hadoop Integration, Piyush Chaudhary
- Technical Deep Dive - OpenStack Integration, Gaurang Tapase

## Solutions & Best Practices

- Spectrum Scale ILM & Spectrum Archive (introductory topic), Nils Haustein
- Metadata sizing / tuning (advanced topic), Indulis Bernsteins, Madhav Ponamgi
- AFM Introduction & Use Cases (introductory topic), Madhav Ponamgi
- Encryption & Compression (introductory topic), Olaf Weiser, Yoann Lechevallier
- Spectrum Protect Integration & Best Practices (advanced topic), Nils Haustein
- Spectrum Protect with Spectrum Scale (advanced topic), Nils Haustein
- Sponsor Technical Talk (IBM): Life Sciences, Frank Lee
- I have a Spectrum Scale question, Madhav Ponamgi, Olaf Weiser, Sven Oehme

## Outlook

- 4.2 Roadmap & 2016 Priorities, Ulf Troppens
- Technical Deep Dive - Tiering to the Cloud / MC Store, Robert Basham
- Technical Deep Dive - Problem Determination Enhancements, Mathias Dietz
- Upcoming GUI Enhancements, Markus Rohwedder
- A look into the future by IBM Research, Sven Oehme

# Spectrum Scale and Platform LSF User Meeting at ISC 2016 Frankfurt

Want to hear more about Spectrum Scale and HPC?

⇒ Join us at ISC 2016 in Frankfurt

Monday June 20, 2016 - 14:30-18:00 - Conference Room Konstant

14:30-14:40 Welcome (Douglas o'Flaherty, IBM)

14:40-15:00 Ten Reasons to Upgrade from GPFS 3.4 to Spectrum Scale 4.2 (Olaf Weiser, IBM)

15:00-15:30 Shared Storage with in-memory latency: EMC DSSD D5 and IBM Spectrum Scale (Stefan Radtke, EMC)

15:30-16:00 Workload scheduling and data management in a private cloud (Uwe Sommer, Airbus)

16:00-16:30 Spectrum Scale site report (To be confirmed by customer)

16:30-17:00 What's new in Platform LSF 10.1 & storage integration (Bill McMillan, IBM)

17:00-17:30 What's new in Spectrum Scale 4.2.1 (Mathias Dietz, IBM)

17:30-18:00 CORAL enhancements for Spectrum Scale (Sven Oehme, IBM)

For registration see: <http://gpfsug.org/pipermail/gpfsug-discuss/2016-May/001601.html>

# Open Betas and Evaluation Virtual Machine

- DeveloperWorks  
<https://www.ibm.com/developerworks/servicemanagement/tc/gpfs/evaluate.html>
- IBM Spectrum Scale Trial VM
- IBM Spectrum Scale transparent cloud tiering
- IBM Spectrum Scale Object Metadata Search Open Beta
- IBM Spectrum Scale GUI Open Beta

## IBM Spectrum Scale Trial VM

This Trial VM offers fully pre-configured IBM Spectrum Scale instance in a virtual machine based on IBM Spectrum Scale 4.2 GA version. The download bundle includes the virtual image and the requisite guides (Quick Start guide, Explore guide and Advanced guide) allowing you to try the key features in minutes. Use the Quick Start guide for installation instructions. The Explore guide provides step-by-step instructions to try our unified file & Object as well as GUI functionality.

Use [IBM Spectrum Scale Forum](#) or mail to [scale@us.ibm.com](mailto:scale@us.ibm.com) to ask questions and to give your feedback.

Date	Type	Description	Download
14 Jan 2016	Evaluation	VM with pre-configured IBM Spectrum Scale	<a href="#">Download</a>

# IBM Elastic Storage Server (ESS)

*Integrated scale out data management for file and object data*

**Optimal building block** for high-performance, scalable, reliable enterprise storage

- Faster data access with choice to scale-up or out
- Easy to deploy clusters with unified system GUI
- Simplified storage administration with IBM Spectrum Control integration

**One solution** for all your data needs

- Single repository of data with unified file and object support
- Anywhere access with multi-protocol support: NFS 4.0, SMB, OpenStack Swift, Cinder, and Manila
- Ideal for Big Data Analytics with full Hadoop transparency with 4.2

**Ready for business** critical data

- Disaster recovery with synchronous or asynchronous replication
- Ensure reliability and fast rebuild times using Spectrum Scale RAID's dispersed data and erasure code



# Advantages of Spectrum Scale RAID

## Use of standard and inexpensive disk drives

- Erasure Code software implemented in Spectrum Scale

## Faster rebuild times

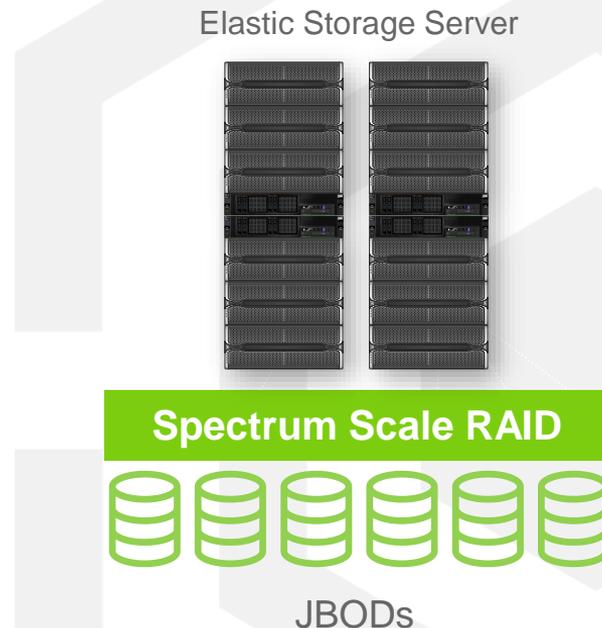
- More disks are involved during rebuild
- Approx. 3.5 times faster than RAID-5

## Minimal impact of rebuild on system performance

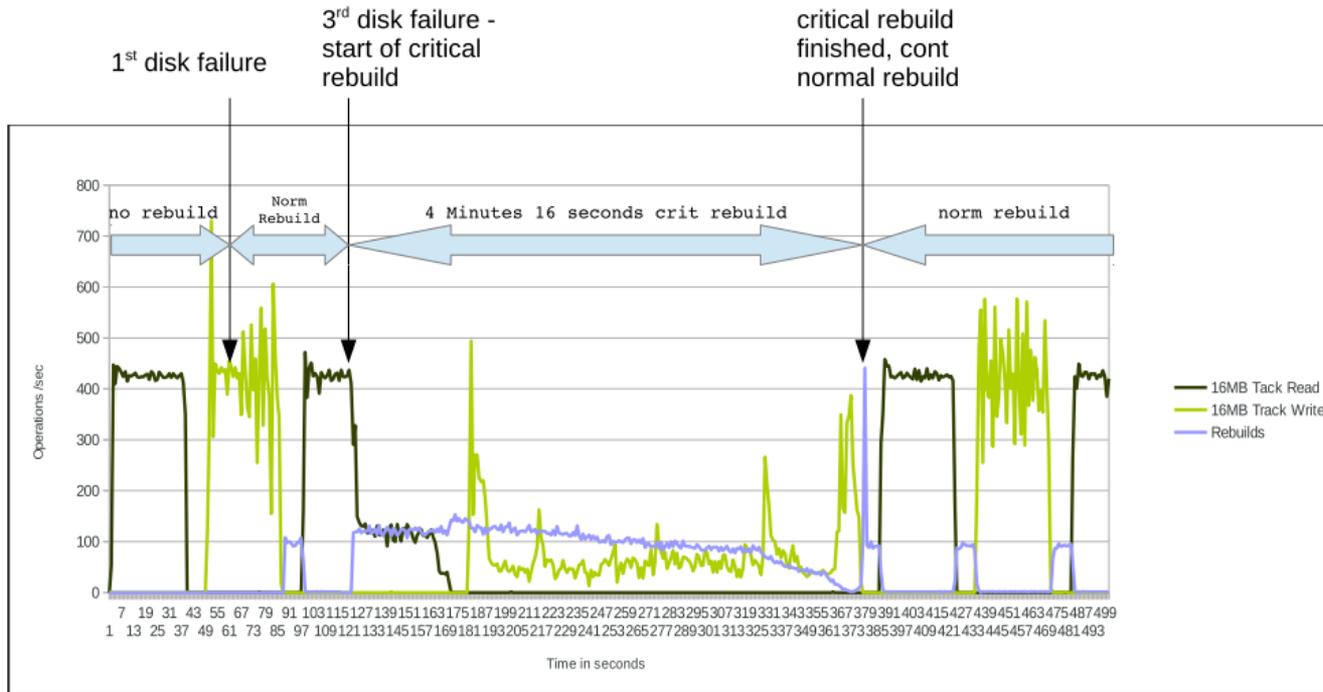
- Rebuild is done by many disks
- Rebuilds can be deferred with sufficient protection

## Better fault tolerance

- End to end checksum
- Much higher mean-time-to-data-loss (MTTDL)
  - 8+2P: ~ 200 Years
  - 8+3P: ~ 200 Million Years



# GNR Technology: Rebuild Test 8+3p on a EL6 with 2TB NL-SAS

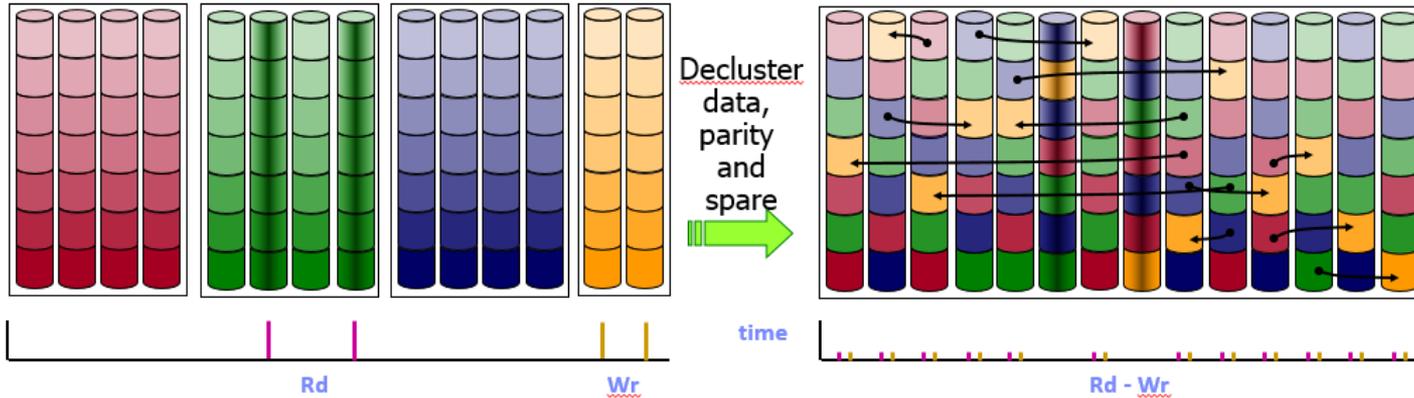


As one can see during the critical rebuild impact on workload was high, but as soon as we were back to double parity (+2P) the impact to the customers workload was <5%

# GNR Technology: Distribute rebuild workload on many drives

14 physical disks / 3 traditional RAID6 arrays / 2 spares

14 physical disks / 1 declustered RAID6 array / 2 spares



Rebuild activity confined to just a few disks – slow rebuild, disrupts user programs

Rebuild activity spread across many disks, less disruption to user programs

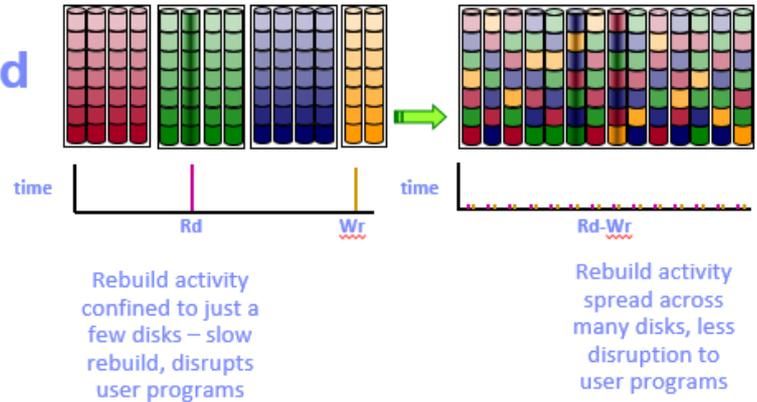
# GNR Technology: Critical Rebuild vs. Rebuild

## ■ De-clustered RAID: Prioritize Rebuild

- Choose 8+2P or 8+3P
- Failure: One parity left (most common)
  - Rebuild slowly with minimal impact to client workload
- No parity left: (very rare)
  - Only fraction of stripes have three failures ~ 1%
  - Get back to non-critical (redundant) state in minutes vs. rebuilding all stripes (hours / days) for conventional RAID

## ■ Optional 2, 3 or 4 way replication

- Often used for metadata



# Overview of all File Storage Systems



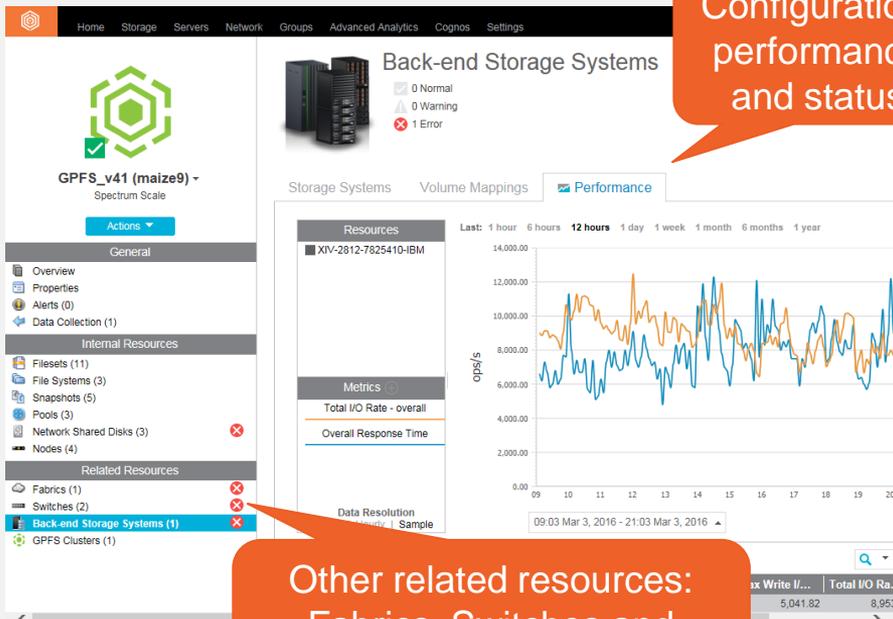
## File Storage Systems

- ✔ 6 Normal
- ⚠ 0 Warning
- ✖ 3 Error

Storage Systems ✖ Alerts Tasks Performance

Name	Condition	Location	Probe Status	Performanc...	File System Capacity (%)	Snapshot Space (GiB)	Disks	Type	IP Address	Version
 GPFS_v41 (maize9)	<span style="color: red;">✖</span> Error		<span style="color: green;">✔</span> Successful	<span style="color: orange;">⏸</span> Disabled	<div style="width: 44%;"><div style="background-color: blue; height: 100%;"></div></div> 44%	1.93	3	Spectrum Scale	9.11.92.75	4.1.0.0
 GPFS_v411 (cupcake5)	<span style="color: red;">✖</span> Error		<span style="color: green;">✔</span> Successful	<span style="color: orange;">⏸</span> Disabled	<div style="width: 3%;"><div style="background-color: blue; height: 100%;"></div></div> 3%	0.00	1	Spectrum Scale	9.11.92.251	4.1.1.0
 Storwize V7000-2076-IFS-ballis...	<span style="color: red;">✖</span> Error		<span style="color: green;">✔</span> Successful	<span style="color: blue;">▶</span> Running	<div style="width: 14%;"><div style="background-color: blue; height: 100%;"></div></div> 14%	0.00	38	V7000 Unified - 2073	9.11.92.162	1.5.1.2-1
 Cluster2 (rye5)	<span style="color: green;">✔</span> Normal		<span style="color: green;">✔</span> Successful	<span style="color: orange;">⏸</span> Disabled	<div style="width: 29%;"><div style="background-color: blue; height: 100%;"></div></div> 29%	0.00	5	Spectrum Scale	9.11.91.232	4.1.0.0
 GPFS_v42 (pear)	<span style="color: green;">✔</span> Normal		<span style="color: green;">✔</span> Successful	<span style="color: blue;">▶</span> Running	<div style="width: 33%;"><div style="background-color: blue; height: 100%;"></div></div> 33%	1.07	3	Spectrum Scale	9.11.123.80	4.2.0.0
 Object (hops2)	<span style="color: green;">✔</span> Normal		<span style="color: red;">✖</span> Failed	<span style="color: blue;">▶</span> Running	<div style="width: 29%;"><div style="background-color: blue; height: 100%;"></div></div> 29%	3.46	7	Spectrum Scale	9.11.92.101	4.1.1.0
 Object2 (rice3)	<span style="color: green;">✔</span> Normal	Tucson	<span style="color: green;">✔</span> Successful	<span style="color: blue;">▶</span> Running	<div style="width: 19%;"><div style="background-color: blue; height: 100%;"></div></div> 19%	0.00	1	Spectrum Scale	9.11.91.97	4.1.1.0
 tpcsonas3a.storage.tucson.ibm...	<span style="color: green;">✔</span> Normal		<span style="color: green;">✔</span> Successful		<div style="width: 0%;"><div style="background-color: blue; height: 100%;"></div></div> 0%	0.00	6	SONAS	9.11.92.174	1.5.1.0-10
 zinc	<span style="color: green;">✔</span> Normal	Tucson	<span style="color: blue;">▶</span> Running	<span style="color: orange;">⏸</span> Disabled	<div style="width: 35%;"><div style="background-color: blue; height: 100%;"></div></div> 35%	0.00	5	N3700	9.11.98.62	Data ONTA...

# SAN-attached storage troubleshooting



Configuration, performance and status

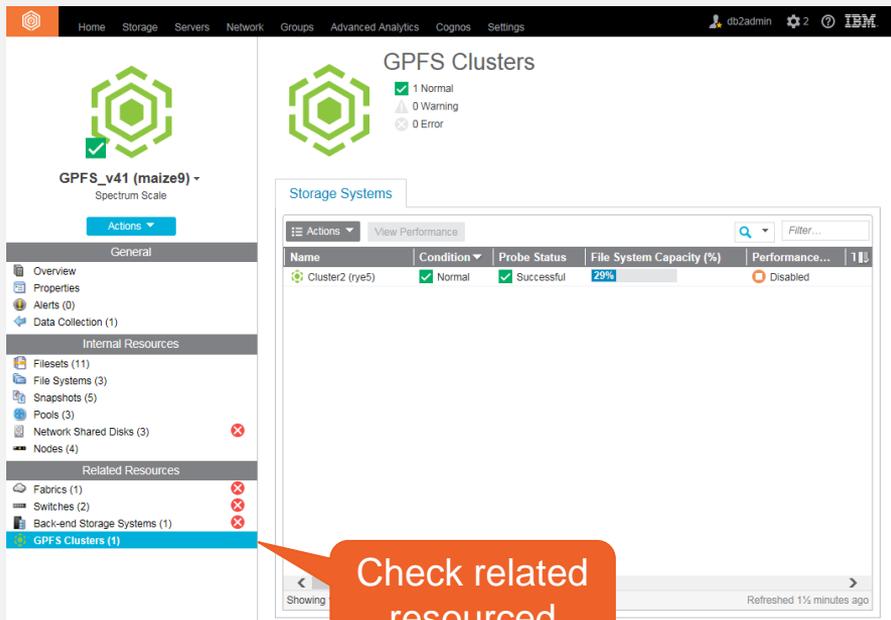
Other related resources: Fabrics, Switches and Storage Systems

Clusters may use NSDs built off of SAN attached storage such as FlashSystems or other block storage systems. Latency within the Spectrum Scale file system may be due to issues within the storage or the fabric connections.

**Today** - Troubleshooting an issue may involve hunting through the Spectrum Scale GUI, Brocade Network Advisor (or Cisco Fabric Manager), and storage system element managers.

**With Spectrum Control** - A storage team can start from a node or file system and trace performance through the fabric to the SAN attached storage.

# Multi-cluster environments



GPFS Clusters

1 Normal  
0 Warning  
0 Error

Storage Systems

Name	Condition	Probe Status	File System Capacity (%)	Performance...
Cluster2 (rye5)	Normal	Successful	29%	Disabled

GPFS Clusters (1)

Check related resourced

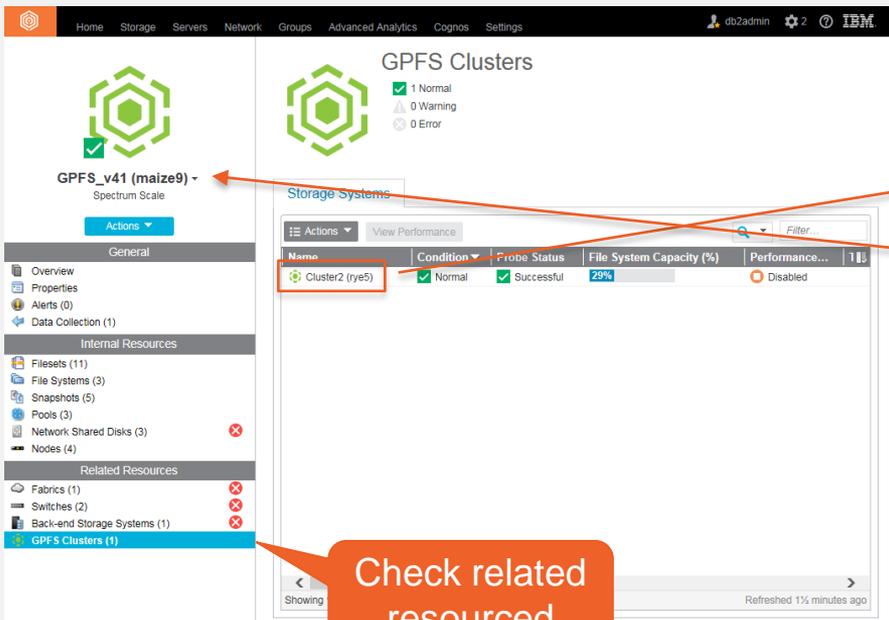
Many Spectrum Scale customers that we talked to have more than a single cluster, typically some of which are client only and storage only. You would have a better idea of how normal this is.

**Today** - If a storage team wants a complete view of their Spectrum Scale environment, they have a few choices:

- Jump between multiple Spectrum Scale GUIs
- Write their own home grown tools
- Purchase a product that can monitor multiple clusters.

**With Spectrum Control** - Storage teams can see their entire Spectrum Scale environment at a glance, easily comparing capacity and workloads across multiple clusters.

# Multi-cluster environments II



GPFS Clusters

- 1 Normal
- 0 Warning
- 0 Error

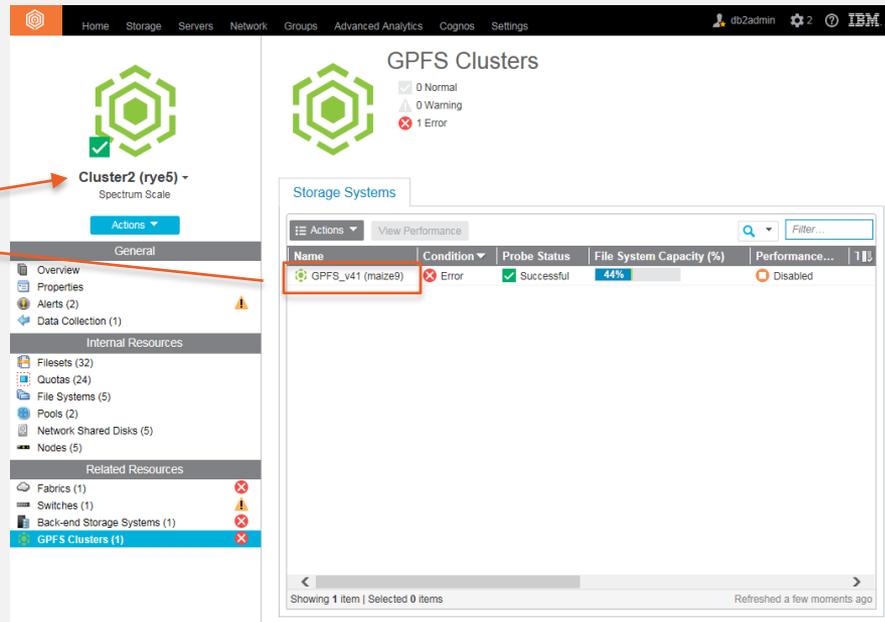
**GPFS\_v41 (maize9)**  
Spectrum Scale

Storage Systems

Name	Condition	Probe Status	File System Capacity (%)	Performance...
Cluster2 (rye5)	Normal	Successful	29%	Disabled

Showing 1 item | Selected 0 items | Refreshed 1 1/2 minutes ago

**Check related resourced**



GPFS Clusters

- 0 Normal
- 0 Warning
- 1 Error

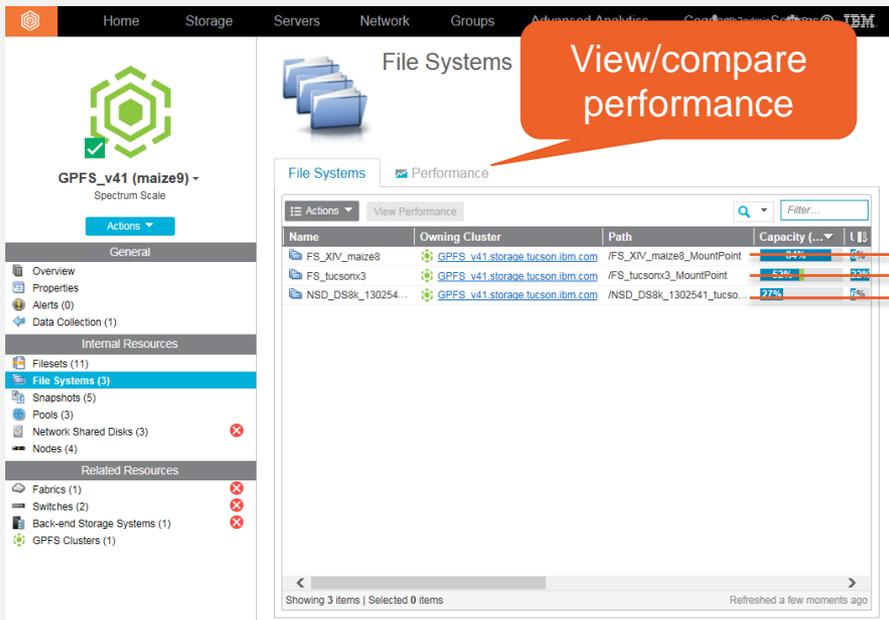
**Cluster2 (rye6)**  
Spectrum Scale

Storage Systems

Name	Condition	Probe Status	File System Capacity (%)	Performance...
GPFS_v41 (maize9)	Error	Successful	44%	Disabled

Showing 1 item | Selected 0 items | Refreshed a few moments ago

# Multi-cluster environments: Cross-Cluster mounts



**View/compare performance**

Name	Owning Cluster	Path	Capacity (%)
FS_XIV_maize8	GPFS_v41.storage.tucson.ibm.com	/FS_XIV_maize8_MountPoint	0%
FS_tucson3	GPFS_v41.storage.tucson.ibm.com	/FS_tucson3_MountPoint	60%
NSD_DS8k_130254...	GPFS_v41.storage.tucson.ibm.com	/NSD_DS8k_1302541_tucso...	27%



**Click to see nodes having a file systems mounted**

**List file systems together with the Owning Cluster**

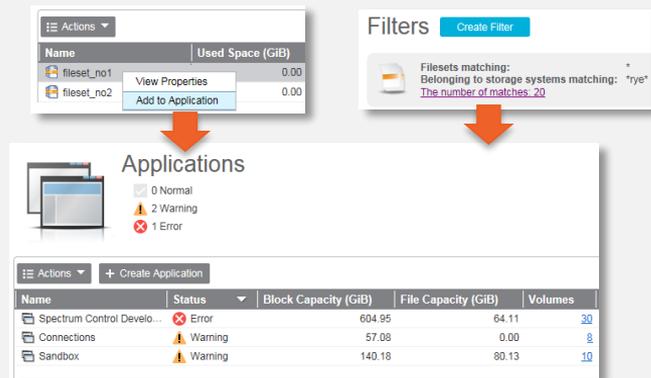
Name	Owning Cluster	Capacity (%)	Nodes Mounting
New_FS_XIV_maize8	GPFS_v41.storage.tucson.ibm.com	84%	1
New_FS_tucson3	GPFS_v41.storage.tucson.ibm.com	52%	2
New_NSd_DS8k_1...	GPFS_v41.storage.tucson.ibm.com	27%	1
FS_XIV_maize14	Cluster2.storage.tucson.ibm.com	7%	1
FS_XIV_fint_34GB	Cluster2.storage.tucson.ibm.com	1%	1

# Application oriented monitoring

An even in a storage environment an application consists of many components, in this context these are filesets.

**Today** - Troubleshooting and reporting is difficult because the components like file sets, shares, network and backend storage resources are not available in a single dashboard

**With Spectrum Control** - A Spectrum Scale admin defines which resources belong to an application. From a list of applications (or departments) the admin can open a panel that shows all the information in a single place.

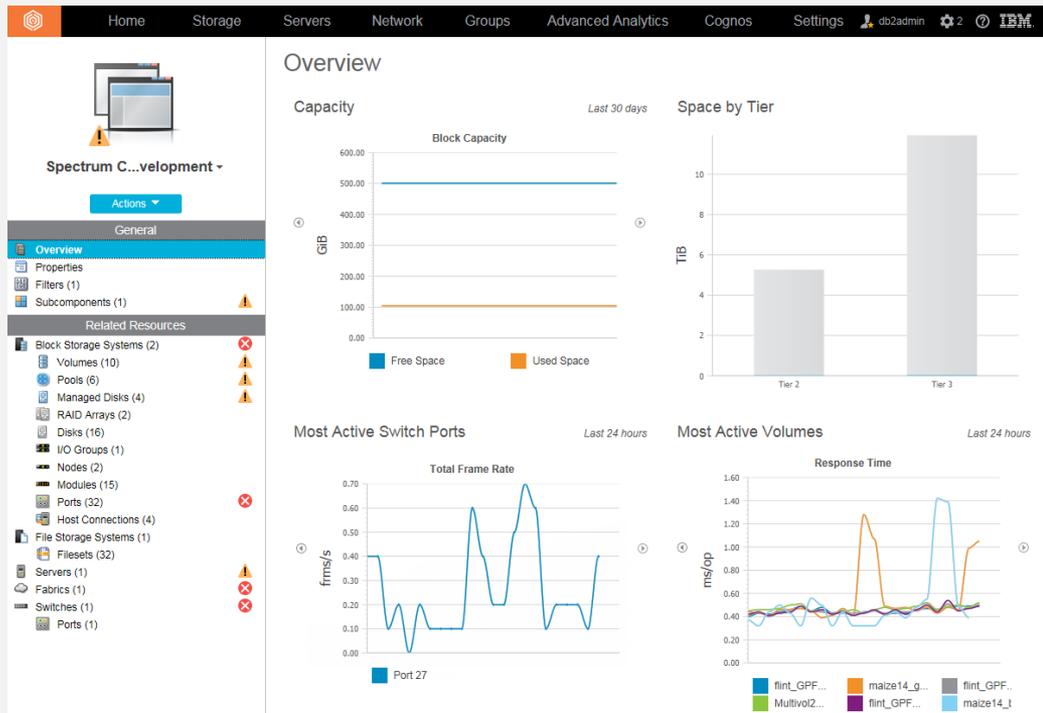


The screenshot shows the 'Filesets' and 'Filters' sections. The 'Filesets' table lists filesets and their used space. The 'Filters' section shows a filter for storage systems matching '\*rye' with 20 matches.

Name	Used Space (GiB)
fileset_no1	0.00
fileset_no2	0.00

Name	Status	Block Capacity (GiB)	File Capacity (GiB)	Volumes
Spectrum Control Develo...	Error	604.95	64.11	20
Connections	Warning	57.08	0.00	8
Sandbox	Warning	140.18	80.13	10



The screenshot shows the 'Overview' dashboard for an application. It includes a navigation menu on the left and several monitoring charts on the right.

**Capacity** (Last 30 days): A line chart showing Block Capacity with Free Space (blue) and Used Space (orange) over time.

**Space by Tier**: A bar chart showing space usage in TiB for Tier 2 and Tier 3.

**Related Resources**: A list of resources associated with the application, including Block Storage Systems (2), Volumes (10), Pools (6), Managed Disks (4), RAID Arrays (2), Disks (16), I/O Groups (1), Nodes (2), Modules (15), Ports (32), Host Connections (4), File Storage Systems (1), Filesets (32), Servers (1), Fabrics (1), and Switches (1).

**Most Active Switch Ports** (Last 24 hours): A line chart showing Total Frame Rate (frames/s) for Port 27.

**Most Active Volumes** (Last 24 hours): A line chart showing Response Time (ms/op) for various volumes like flint\_GPF..., maize14\_g..., flint\_GPF..., Multivol2..., flint\_GPF..., and maize14\_1.

# Snapshot backup of Applications

Spectrum Control Advanced edition includes Spectrum Protect Snapshot (aka FlashCopy Manager)

**Today** – Automation of snapshot bases backups with offload to tape has to be individually developed and maintained

**With Spectrum Control** - A Spectrum Protect Snapshot can be used to integrate application consistent backups, offloading the backup to tape, and maintain a backup history that's available in Spectrum Control.

Notes:

- Minimum Spectrum Protect Version 4.1.1.2 (1Q15)
- Minimum Spectrum Protect Version 4.1.4 (1Q16) with offload backup to Spectrum Protect (aka TSM) [link](#)
- Minimum Spectrum Scale Version: 4.1.0.5



## Snapshots

Name	Creation Time	File System	Fileset	Size (GiB)	Actions
 Filesystem[GPFS2]-SNAP[2]@GMT-2015-...	Nov 2, 2015, 22:41:19	 gpfs2		1.07	
 Filesystem[GPFS2]-SNAP[1]@GMT-2015-...	Nov 2, 2015, 21:46:52	 gpfs2		0.00	
 Snapshot1@GMT-2015.10.30-15.25.51	Oct 30, 2015, 19:26:00	 gpfs1	 gpfs1 Fileset1	0.00	

Showing 3 items | Selected 0 items
Refreshed a few moments ago

## Meet the Devs – German Spectrum Scale Expert Workshop 2016



All charts are in English and available here:  
<http://www.spectrumscale.org/german-expert-workshop-2016/>



### Business challenge

Research center Deutsches Elektronen-Synchrotron (DESY) found that increasingly resource-intensive experiments was affecting storage system performance, limiting research. How could the organization handle over five gigabytes of data streaming into its computing center every second?

### Transformation

With a flexible, high-performance storage solution from IBM, DESY can meet growing demand cost-effectively. Scientists can now start analyzing the data in just a few minutes, instead of days, accelerating ground-breaking research.

### Business benefits:

#### Ensures

DESY can easily maintain a multi-PB library of research data to meet growing demand and remain an attractive research destination

#### Rapid

access to millions of data points accelerates research and helps lead to breakthroughs

#### Increases

administration efficiency with automated data management, improving DESY's service offering

# DESY

## Making the next breakthrough in scientific research possible with the latest in storage innovation

DESY, Deutsches Elektronen-Synchrotron, is a national research center in Germany that operates particle accelerators and photon science facilities used to investigate the structure of matter. DESY is housed in Hamburg and Zeuthen, Germany, and attracts over 3,000 scientists from over 40 countries annually.

### Solution components

- IBM® Spectrum Scale™
- IBM Spectrum Scale RAID
- IBM Elastic Storage™ Server GS1
- IBM Elastic Storage Server GL4 and GL6
- IBM Power® S822L
- IBM Systems Lab Services

### Share this



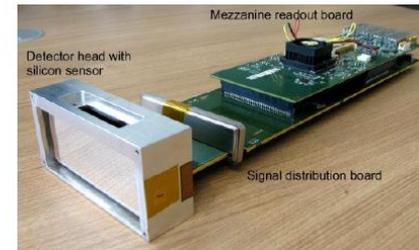
# Current and Future Detector Rates

## > Detectors exceeded capabilities of prev. system:

- Pilatus 300k: 1,2 MB Files @ 200 Hz
- Pilatus 6M: 25 MB files @ 25 Hz  
7 MB files @ 100 Hz
- PCO Edge: 8 MB files @ 100Hz
- PerkinElmer: 16 MB + 700 Byte files @ 15 Hz
- Lambda: 60 Gb/s @ 2000 Hz (Future)
- Eiger: 30 Gb/s @ 2000 Hz (Future)

## > GPFS is now used to handle those rates

- SMB/NFS sufficient for current detectors
- Future detectors need new methods



# Resources

Detailed whitepaper published by DESY at CHEP2015

<http://iopscience.iop.org/article/10.1088/1742-6596/664/4/042053>

DESY presentation at IBM Edge 2015:

<http://www.slideshare.net/UlfTroppens/desy-ibm-edge2015-technical-computing-for-photon-science-20150520v2>

DESY presentation at HEPiX Spring 2016 conference with updates:

[https://indico.cern.ch/event/466991/contributions/1143592/attachments/1260614/1862916/Dietrich\\_ASAP3\\_Status\\_Update\\_and\\_XFEL\\_Activities.pdf](https://indico.cern.ch/event/466991/contributions/1143592/attachments/1260614/1862916/Dietrich_ASAP3_Status_Update_and_XFEL_Activities.pdf)

IBM reference material about DESY PETRA III:

Web: <http://ibm.co/1qCIAuL>

PDF: <http://ibm.co/26csg4s>

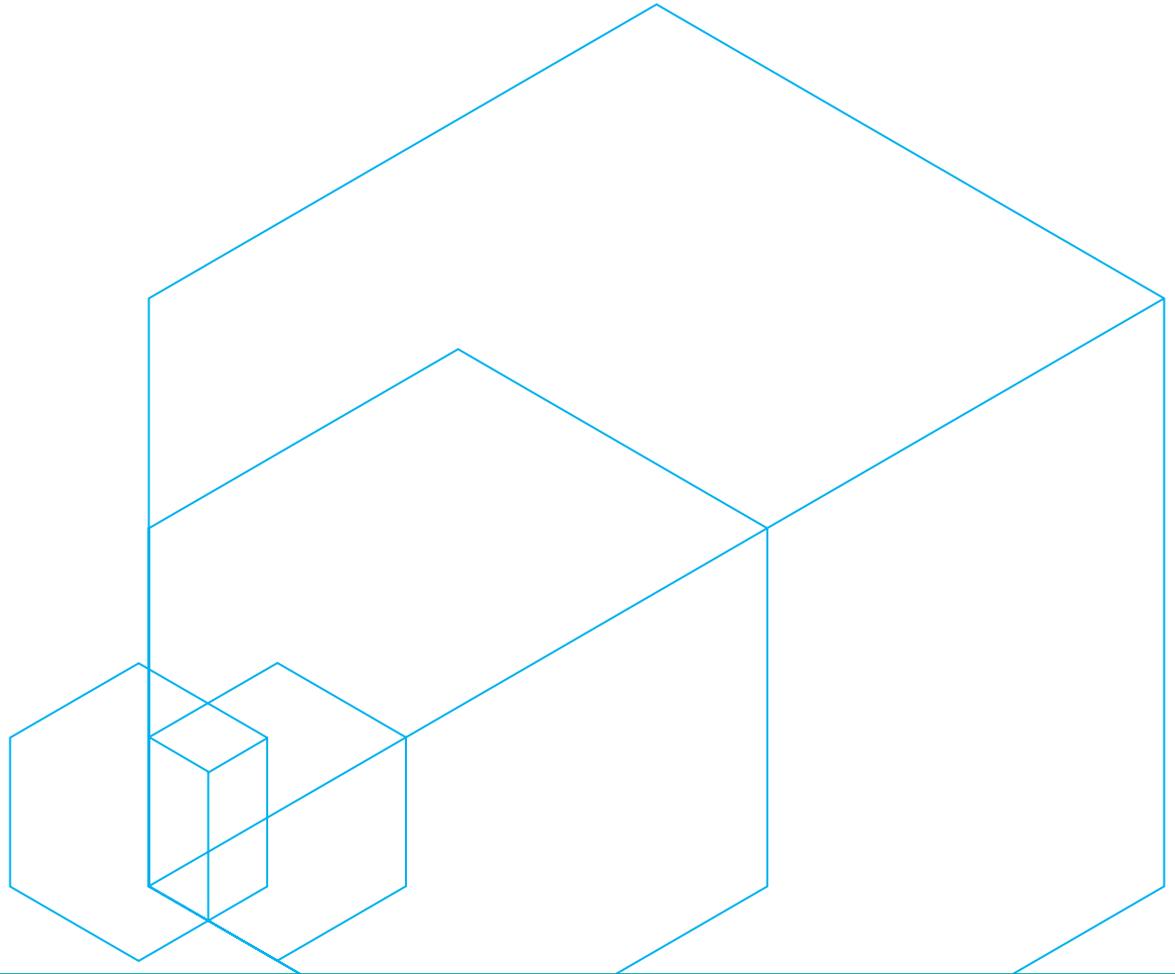
PPT: <http://ibm.co/1Wcr3pl>

Video: <https://ibm.biz/Bd4nBN>

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