

# Monitoring GPFS Using TPC

or, “Monitoring IBM Spectrum Scale using IBM Spectrum Control”

Christian Bolik, TPC/Spectrum Control development  
13/05/2015



# Please note:

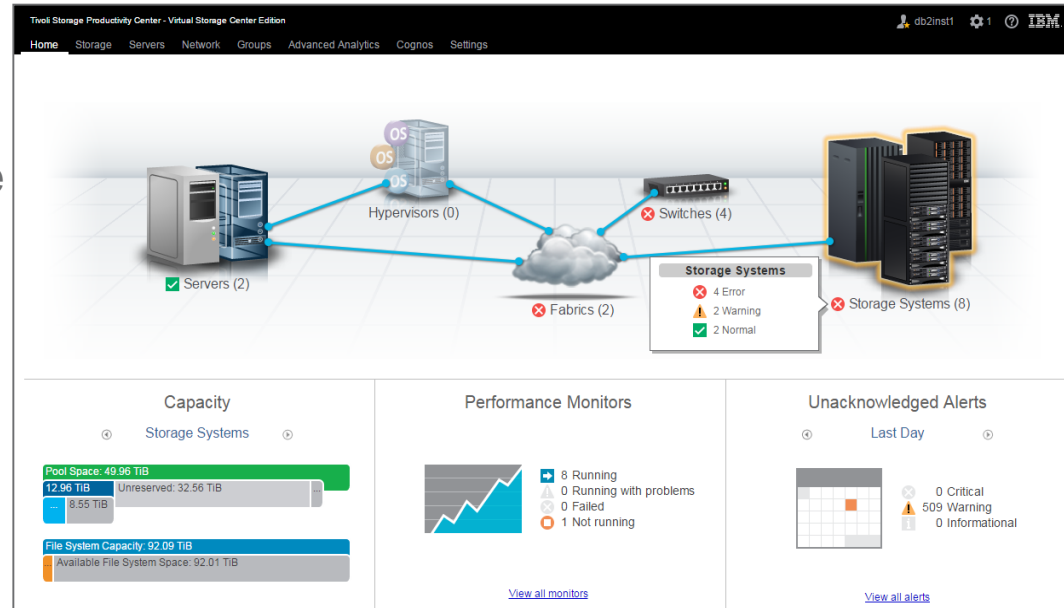
- IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion.
- Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.
- 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.



# What is IBM Spectrum Control (a.k.a. IBM Tivoli Storage Productivity Center, or “TPC”)

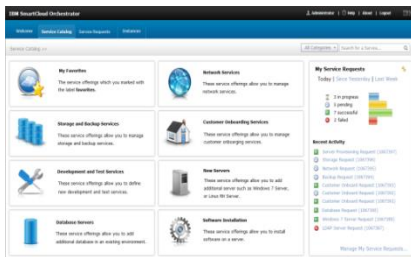
<http://www.ibm.com/software/products/en/tivostorprodcent>

- A key component of IBM Virtual Storage Center (VSC), delivers comprehensive Storage Resource Management
- Simplifies management through a next-generation, web-based user interface
- Provides improved visibility into heterogeneous storage and fabric
- Offers extensive alerting, advanced analytics and reporting through IBM Cognos integration
- Provides best-practice provisioning and capacity planning
- Enables storage optimization and transformation through integration with SVC
- Significant cost savings through reduced management time and improved staff productivity

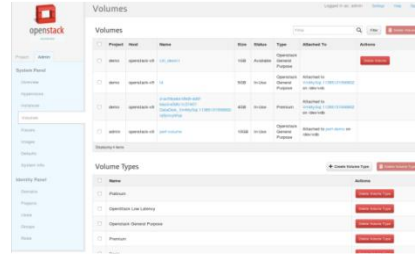


# IBM SDS Vision

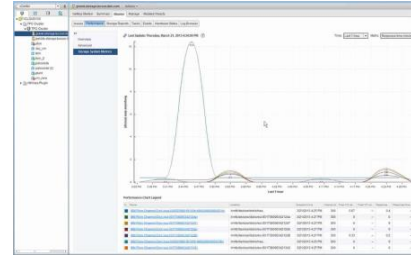
Heterogeneous, integrated storage services over open interfaces



IBM Cloud Orchestrator



OpenStack



VMware



Self-Service Portal

**IBM Storage Integration Server**

- Free storage integration with devices
- VMware, OpenStack, Microsoft drivers
- Storage device Control



**SMAC API**

**Spectrum Control**

TPC

VSC

**Spectrum Protect**

**Backup Integration and Automation**

SDS Control Plane

SDS Data Plane

**Spectrum Scale**

**File Storage**

Elastic Storage/GPFS/GSS/ESS

**Spectrum Virtualize**

**IBM and 3rd Party Block Storage**

SVC

**Object Storage**

Plus: Spectrum Accelerate, Spectrum Archive

# Spectrum Scale Monitoring Requirements

Addressed by Spectrum Control today (as of TPC 5.2.5):

- Which of my clusters are running out of free space?
- Which of my clusters or nodes have a health problem?
- Which file systems and pools are running out of capacity?
- Which file systems are mounted on which nodes?
- How much space is occupied by snapshots? Are there any potentially obsolete ones?
- Which quotas are close to being exceeded or have already been exceeded?
- Which filesets are close to running out of free inodes?
- Which NSDs are at risk of becoming unavailable, or are unavailable?
- Are the volumes backing my NSDs performing OK?
- Are all nodes fulfilling critical roles in the cluster up and running?
- Notify me when nodes go offline or file systems fill up beyond a threshold.

For a video demonstration of the above, visit <http://bit.ly/1EBiLvr>



# Spectrum Scale Monitoring Requirements

Planned content in TPC 5.2.6, expected in June 2015:

- Remote cluster mounts: Which file systems are mounted from or by other clusters?
- Ability to monitor GPFS clusters without requiring specification of root credentials.

Enhancements considered for future releases:

- Performance monitoring of most relevant metrics (node and file system I/O stats etc.)
- Visibility into Spectrum Scale Object, GNR, and AFM configurations
- Provisioning of filesets, shares, NSDs (volumes can be provisioned to cluster nodes today)
- Policy visibility and management, and associated analytics



# Spectrum Scale in the File Storage Overview

Tivoli Storage Productivity Center - Virtual Storage Center Edition

Home **Storage** Servers Network Groups Advanced Analytics Cognos Settings



## Storage Systems

✓ 1 Normal

⚠ 0 Warning

✗ 4 Error

*Screenshots shown here are from current TPC 5.2.6 beta version*

Block Storage **File Storage** ⚠ Alerts Tasks 📈 Performance

+ Add Storage System ⋮ Actions

Name	Status	Probe Status	File System Capacity (%)	Type	Version	Last Successful Probe
Cluster2 (metalgear)	✗ Error	➡ Running	9%	Spectrum Scale	4.1.0.0	May 12, 2015 15:26:48 GMT+02:00
Cluster3 (flint)	✗ Error	✓ Successful	17%	Spectrum Scale	4.1.0.10	May 13, 2015 15:36:43 GMT+02:00
Cluster4.storage.tucson.ibm.com	✓ Normal	✓ Successful	41%			May 13, 2015 15:25:34 GMT+02:00
GPFS_v41 (maize9)	✗ Error	✓ Successful	12%			May 13, 2015 08:07:53 GMT+02:00

Used Space: 44.47 GiB (12%)  
■ Snapshot: 4.49 GiB (1%)  
■ Other: 39.98 GiB (11%)  
■ Total Capacity: 365.40 GiB (100%)

- TPC treats one Spectrum Scale system as a „file storage system“, like SONAS and Storwize V7000 Unified
- As for any table in the TPC Web GUI, columns to show, their ordering etc. is customizable
- Provides at-a-glance overview of clusters running out of free space, being in bad shape, or consuming excessive amount of space for snapshots



# Spectrum Scale Detail View



GPFS\_v41 (maize9) ▾

Spectrum Scale

Actions ▾

General

Overview

Properties

Alerts (5) ⚠

Tasks (0)

Data Collection (1)

Internal Resources

Filesets (35)

Quotas (32)

File Systems (18)

Snapshots (10)

Pools (6)

Network Shared Disks (10) ❌

Nodes (6) ❌

Related Resources

Back-end Storage Systems (1) ❌

GPFS Clusters (1) ❌

Quick overview of cluster resources and their status

## Overview

File System Capacity: 365.4 GiB

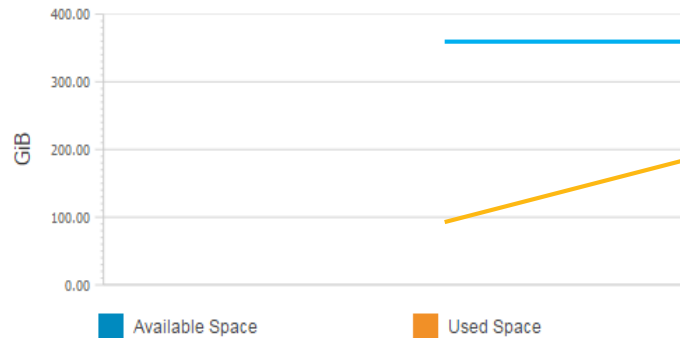
44.47 GiB

Available File System Space: 320.92 GiB

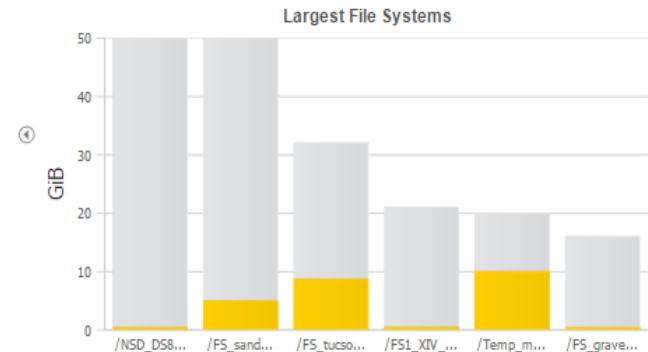
Rapid identification of file systems, filesets and pools closest to running out of space or inodes

### Total File System Space

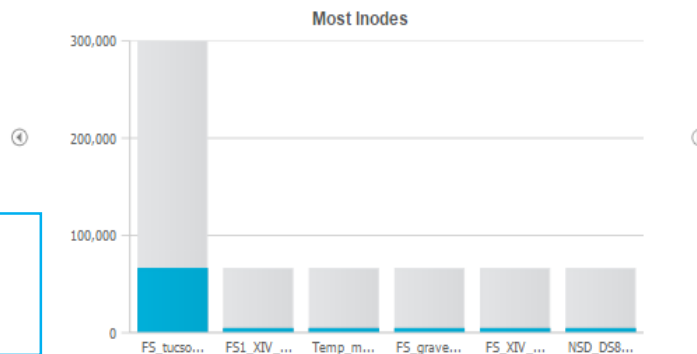
Last 30 days



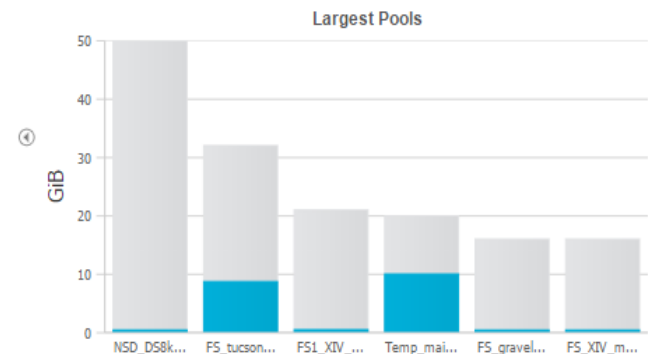
### Space by File System



### Inodes by Independent Fileset



### Space by Pool





# Related Storage Systems: Volume Mappings to NSDs



## Back-end Storage Systems

- ✓ 1 Normal
- ⚠ 0 Warning
- ✗ 1 Error

For NSDs using storage from an external storage system, get visibility into the volume's (and thus, the NSD's) performance.

Storage Systems

Volume Mappings

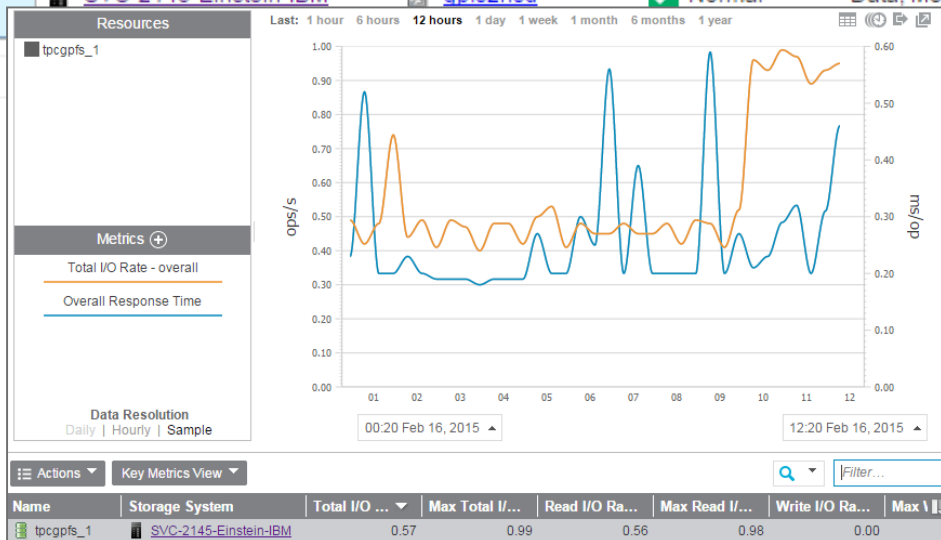
Performance

Actions

Filter...

Volume	Volume Status	Back-end Pool	Back-end Storage System	NSD	NSD Status	Type	Pool
<a href="#">cbsnsd1</a>	✓ Online	<a href="#">kaipool2</a>	<a href="#">SVC-2145-Einstein-IBM</a>	<a href="#">cbsnsd1</a>	✓ Normal	Data, Meta...	
<a href="#">GPFS-XIV_1</a>	✓ Normal	<a href="#">TPC_Thin</a>	<a href="#">XIV-2810-7804143-IBM</a>	<a href="#">xiv1</a>	✓ Normal	Data, Meta...	<a href="#">system</a>
<a href="#">GPFS-XIV_2</a>	✓ Normal	<a href="#">TPC_Thin</a>	<a href="#">XIV-2810-7804143-IBM</a>	<a href="#">xiv2NSD</a>	✓ Normal	Data, Meta...	<a href="#">system</a>
<a href="#">tpcpfs_1</a>	✓ Online	<a href="#">kaipool2</a>	<a href="#">SVC-2145-Einstein-IBM</a>	<a href="#">gpfs1nsd</a>	⚠ Warning	Data, Meta...	<a href="#">system</a>
<a href="#">tpcpfs_2</a>	✓ Online	<a href="#">kaipool2</a>	<a href="#">SVC-2145-Einstein-IBM</a>	<a href="#">gpfs2nsd</a>	✓ Normal	Data, Meta...	<a href="#">system</a>
<a href="#">tpcpfs_3</a>	✓ Online	<a href="#">kaipool2</a>					<a href="#">otherPool</a>
<a href="#">tpcpfs_4</a>	✓ Online	<a href="#">kaipool2</a>					<a href="#">system</a>

View Properties  
Volume Performance



# Remote Cluster Mounts



Cluster3 (flint) ▾

Spectrum Scale

Actions ▾

General



GPFS Clusters

- ✓ 1 Normal
- ⚠ 0 Warning
- ✗ 2 Error

Storage Systems

Actions ▾

Name	Status	Probe Status	File System Capacity (%)	Shared File System...
GPFS_v41 (maize9)	✗ Error	✓ Successful	12%	12
Cluster2 (metalgear)	✗ Error	➡ Running	9%	FS XIV flint 17GB
Cluster4.storage.tucson.ibm.com	✓ Normal	✓ Successful	41%	FS XIV flint 17GB

File Systems

Actions ▾

Creation Name	Path	Owning Storage System	Remote Name	Remote Storage System	Nodes Mounting	Capacity (...)	Used Inc
FS XIV flint 17GB...	/FS_XIV_flint_17GB...	Cluster3 (flint)	New_FS_XIV_flint...	GPFS_v41 (maize9)	3	54%	100%
Temp_maize9_gpfs...	/Temp_maize9_gpfs...	GPFS_v41 (maize9)	New_Temp_maize9...	Cluster3 (flint)	2	50%	10%
FS XIV flint 17GB	/FS_XIV_flint_17GB...	Cluster3 (flint)	Remote_FS_XIV_fli...	GPFS_v41 (maize9)	2	41%	52%
FS XIV flint 17GB_2	/FS_XIV_flint_17GB...	Cluster3 (flint)	New_FS_XIV_flint...	GPFS_v41 (maize9)	7	3%	6%

FS\_XIV\_flint\_17GB\_2 Properties



File Systems

Showing 12

General Capacity Nodes Mounting Pools Network Shared Disks Filesets Snapshots

Actions ▾

Name	Storage System	Status	Manager	Quorum	NSD Server	NSDs !
sandman.storage.tucson...	GPFS_v41 (maize9)	✗ Error	✓	✓	✓	NSD
flint.storage.tucson.ibm.c...	Cluster3 (flint)	✓ Normal	✓	✓	✓	
gravel1.storage.tucson.i...	GPFS_v41 (maize9)	✓ Normal			✓	NS
maize8.storage.tucson.i...	GPFS_v41 (maize9)	✓ Normal			✓	
maize9.storage.tucson.i...	GPFS_v41 (maize9)	✓ Normal	✓		✓	
tpc-d56-int.storage.tucso...	Cluster3 (flint)	✓ Normal	✓	✓		

# Where to go for more information

- IBM Spectrum Storage homepage:  
<http://www.ibm.com/systems/storage/spectrum/>
- IBM's storage management blog: <http://ibm.co/172TdgH>
- Spectrum Control (i.e. TPC/VSC) runs a **beta program**, it can be joined here:  
<https://www.ibm.com/software/support/trial/cst/forms/nomination.wss?id=5405>
- A subset of Spectrum Control is being made available as a cloud-based service under the name of **IBM Spectrum Control Storage Insights** (announced on 11/05/15), learn more and sign up for the beta here:  
<https://www.ibm.serviceengage.com/preview/storage-insights/learn>
  - Storage Insights includes the complete current support for Spectrum Scale present in Spectrum Control

For anything else, questions, feedback etc. please drop me an email at:

[bolik@de.ibm.com](mailto:bolik@de.ibm.com)

***Thank you!***

