

Monitoring GPFS Using TPC

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

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13/05/2015



Please note:

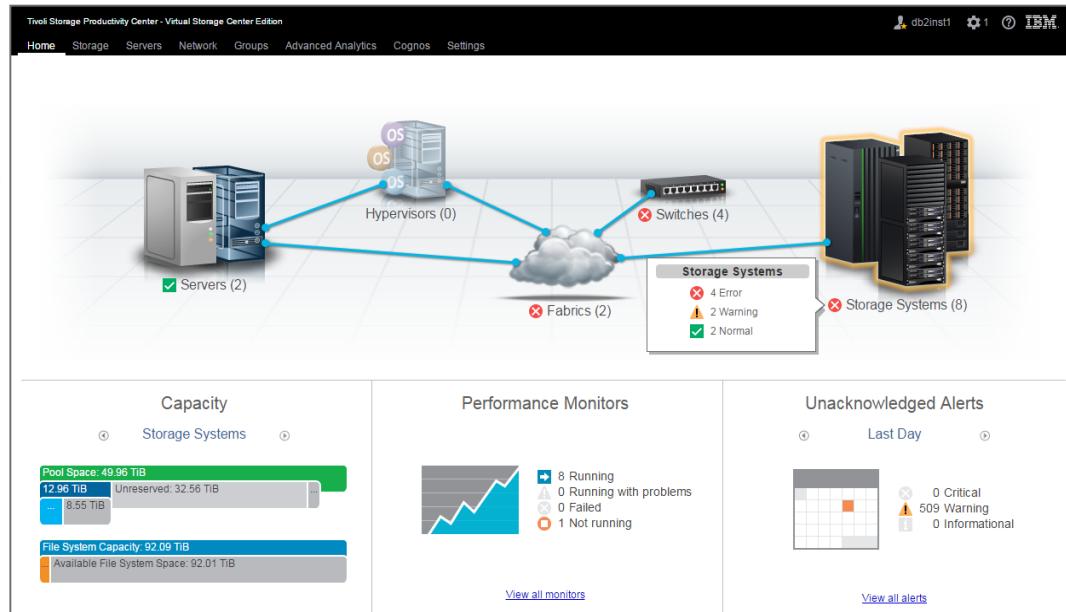
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What is IBM Spectrum Control (a.k.a. IBM Tivoli Storage Productivity Center, or “TPC”)

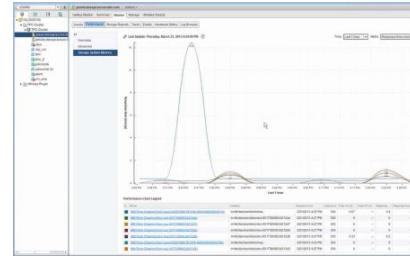
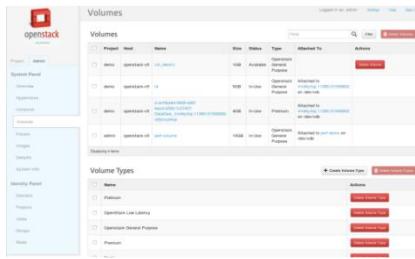
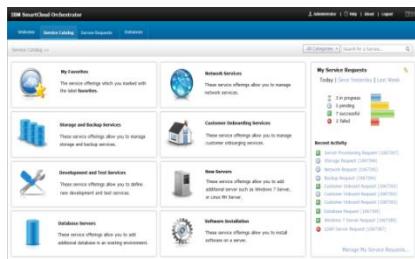
<http://www.ibm.com/software/products/en/tivostorprodcent>

- 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

Spectrum Control

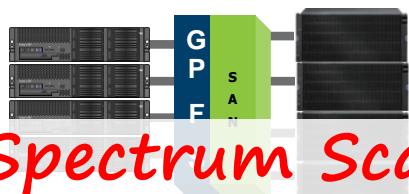
VSC

Spectrum Protect

Backup Integration
and Automation

SDS Control Plane

SDS Data Plane



Spectrum Scale

Elastic Storage/GPFS/GSS/ESS

File Storage



Spectrum Virtualize

IBM and 3rd Party Block Storage



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.



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

Block Storage File Storage Alerts Tasks Performance

Screenshots shown here are from current TPC 5.2.6 beta version

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%		0	May 13, 2015 15:25:34 GMT+02:00
GPFS_v41 (maize9)	Error	Successful	12%		0	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

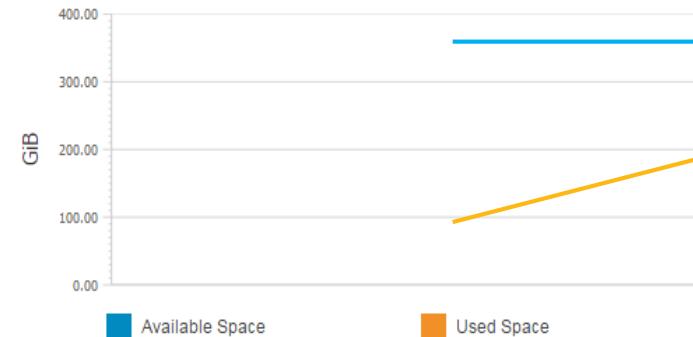
44.47 GiB

Available File System Space: 320.92 GiB

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

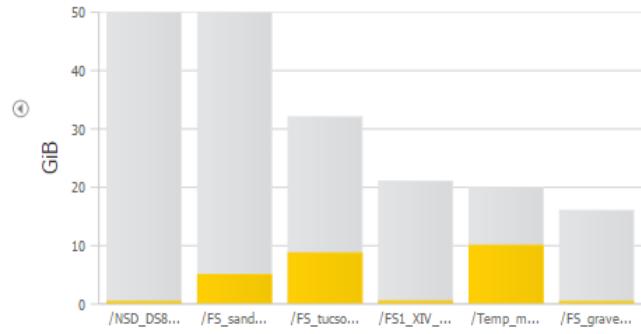
Total File System Space

Last 30 days



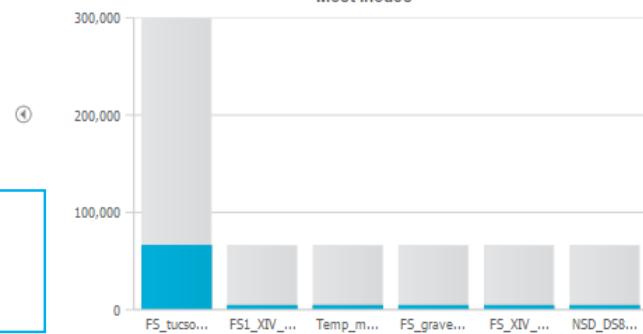
Space by File System

Largest File Systems



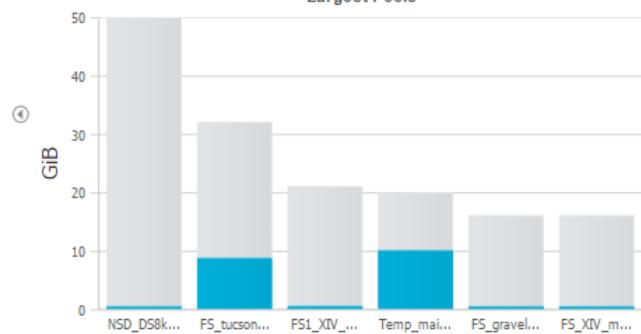
Inodes by Independent Fileset

Most Inodes



Space by Pool

Largest Pools



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

Volume	Volume Status	Back-end Pool	Back-end Storage System	NSD	NSD Status	Type	Pool
cbsnsd1	✓ Online	kaipool2	SVC-2145-Einstein-IBM	cbsnsd1	✓ Normal	Data, Meta...	
GPFS-XIV_1	✓ Normal	TPC_Thin	XIV-2810-7804143-IBM	xiv1	✓ Normal	Data, Meta...	system
GPFS-XIV_2	✓ Normal	TPC_Thin	XIV-2810-7804143-IBM	xiv2NSD	✓ Normal	Data, Meta...	system
tpcqpf1_1	✓ Online	kaipool2	SVC-2145-Einstein-IBM	gpfs1nsd	⚠ Warning	Data, Meta...	system
tpcqpf1_2	✓ Online	tpcqpf1_1	SVC-2145-Einstein-IBM	gpfs2nsd	✓ Normal	Data, Meta...	system
tpcqpf1_3	✓ Online	tpcqpf1_1					otherPool
tpcqpf1_4	✓ Online	kaipool2					...

Actions ▾

View Properties

Volume Performance

Resources

Last: 1 hour 6 hours 12 hours 1 day 1 week 1 month 6 months 1 year

Metrics +

Total I/O Rate - overall

Overall Response Time

Data Resolution

Daily | Hourly | Sample

ops/s

do/su

0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00

01 02 03 04 05 06 07 08 09 10 11 12

00:20 Feb 16, 2015 ▾

12:20 Feb 16, 2015 ▾

Actions ▾ Key Metrics View ▾

Filter...

Name	Storage System	Total I/O ...	Max Total I...	Read I/O Ra...	Max Read I...	Write I/O Ra...	Max W...
tpcqpf1_1	SVC-2145-Einstein-IBM	0.57	0.99	0.56	0.98	0.00	

Remote Cluster Mounts



Cluster3 (flint) ▾

Spectrum Scale

Actions ▾

General

- Overview
- Properties
- Alerts (4)
- Tasks (0)
- Data Collection



Storage Systems

Actions ▾

Name	Status	Probe Status	File System Capacity (%)	Shared File Syste...
GPFS_v41 (maize9)	Error	Successful	12%	12 FS_XIV_flint_17GB
Cluster2 (metalgear)	Error	Running	9%	FS_XIV_flint_17GB
Cluster4.storage.tucson.ibm.com	Normal	Successful	41%	FS_XIV_flint_17GB



File Systems

Actions ▾



Filter...

Creation Name	Path	Owning Storage System	Remote Name	Remote Storage System	Nodes Mounting	Capacity (%)	Used In
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	0%	5%

FS_XIV_flint_17GB_2 Properties



File Systems

Showing 12

General Capacity Nodes Mounting Pools Network Shared Disks Filesets Snapshots

Nodes Mounting

Pools

Network Shared Disks

Filesets

Snapshots

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			✓	
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/172TdqH>
- 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.ibmserviceengage.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:

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Thank you!

