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# **Technical storage monitoring in Shell**

Arie Jan Kraai



2

- UNIX and Linux background, user group activities
- Data communication, networks, databases
- Current focus on storage management + support / consultancy
- Process enhancement monitoring



# **Delivering projects**



# Global data storage





# **Clustered storage - clients and tiering**



#### Implementation: protocols and components

- Platform API (PAPI) over HTTPS in Isilon
- Isilon Data Insights Connector on Github
- InfluxDB by default
- Standard data source for Grafana

🚱 - 🔢 islon Data insights Cluster Summary - \star 🗗 🖹 🔹														
Claster, CSE-5200-1 + buildbox + orbablox + ca+x00-2 + durbox + durmbiox + eng-tef-see-sync -														
WELCOME TO THE BILON CLUSTER BUMMARY DAHBOURD														
CSE-X200-1 2*	Total Nodes C	Nodes Down 🕑	Alert Status 💈	Cluster CPU	Cluster Capacity 🕑	NFSv3 Throughput 🕑	NFSv3 Op/s 🕑	NFSv3 Latency 2	SMB2 Throughput	SMB2 Op/s 🕑	SMB2 Latency I			
Detail dashboard WebUI for CSE-X200-1	3	0	Attention	14.80%	97%	34 Bps	1 ops	0.07 ms	N/A	N/A	N/A			
buildblox 🕑	Total Nodes C	Nodes Down @	Alert Status 🕑	Cluster CPU 🕑	Cluster Capacity 🕑	NFSv3 Throughput 🕑	NFSv3 Op/s 🕑	NFSv3 Latency 2	SMB2 Throughput 2	SMB2 Op/s 🕑	SMB2 Latency C			
Detail dashboard WebUI for buildblox	9	0	Healthy	14.40%	30%	891 Bps	48 ops	0.7 ms	N/A	N/A	N/A			
cribebiox 🕼	Total Nodes 🖓	Nodes Down 2	Alert Status 🛛	Cluster CPU 2	Cluster Capacity	NFSv3 Throughput	NFSv3 Op/s 🕑	NFSv3 Latency 2	SMB2 Throughput 2	SMB2 Op/s 2	SMB2 Latency 🕑			
Detail dishboard WebUI for oribibliox	9	0	Attention	8.10%	30%	41.7 MBps	25.7K ops	3 ms	187 kBps	83 ops	1.6 ms			
cse-x200-2 C	Total Nodes 🖙	Nodes Down @	Alert Status (2	Cluster CPU 2	Cluster Capacity 🕑	NFSv3 Throughput 12	NFSv3 Op/s 2	NFSv3 Latency 2	SMB2 Throughput	SMB2 Op/s 🕑	SMB2 Latency C			
Detail dashboard WebUI for cse-x200-2	3	0	Healthy	81.6%	7%	119.2 MBps	110.5K ops	21 ms	N/A	N/A	N/A			
durblox C	Total Nodes C	Nodes Down C	Alert Status 🕑	Cluster CPU	Cluster Capacity 🕑	NFSv3 Throughput 12	NFSv3 Op/s 🕑	NFSv3 Latency C	SMB2 Throughput	SMB2 Op/s 🕑	SMB2 Latency C*			
Detail dashboard WebUI for durblox	16	o	Healthy	24.3%	69%	2.076 MBps	3.00K ops	2 ms	57.1 kBps	713 ops	0.7 ms			
durymbiox 🕫	Total Nodes 🕑	Nodes Down 🕑	Alert Statue 🧭	Cluster CPU	Cluster Capacity	NFSv3 Throughput 2*	NFSv3 Op/s 🕑	NFSv3 Latency 2	SMB2 Throughput C	SMB2 Op/s 🕑	SMB2 Latency C			
Detail dashboard WebUI for durvmblox	15	o	Attention	18.00%	69%	125.2 MBps	33.8K ops	4 ms	N/A	N/A	N/A			
eng-inf-sea-vmcluster	Total Nodes 🗷	Nodes Down 🛛	Alert Status 🧷	Cluster CPU 12	Cluster Capacity 🕑	NFSv3 Throughput 2 146.7	NF5v3 0p/s 2	NFSv3 Latency 2	SMB2 Throughput 🕑	SMB2 Op/s 🛛	SMB2 Latency 🕑			

# The need for containers

- Avoid OS cluttering
- Docker is available in standard Linux platform
- Leverage existing InfluxDB and Grafana Docker images
- Only one image left to built
- Orchestration not required
- Portability



#### Data collection topology



# **Querying topology**



Isilon Monitoring Viewing Production data

11

# Dashboards: global overview

ß	# nodes	Status	CPU busy	Capacity	NFS conn / node	NFS act avg / node	SMB2 conn /node	SMB2 act / node	NFS Mbps in+out	SMB2 Mbps in+out
	7	ОК	5.6%	(31)	55	19	35	1.0	119	0.2
~										
R	# nodes	Status	CPU busy	Capacity	NFS conn / node	NFS act avg / node	SMB2 conn /node	SMB2 act / node	NFS Mbps in+out	SMB2 Mbps in+out
	9	ATT	8.4%	<b>6</b> 53	55	7	4	0.0	50	0.0
~										
C.	# nodes	Status	CPU busy	Capacity	NFS conn / node	NFS act avg / node	SMB2 conn /node	SMB2 act / node	NFS Mbps in+out	SMB2 Mbps in+out
	14	<u> </u>	9.6%	<b>6</b> 58	51	17	8	0.3	223	0.8
~										
C.	# nodes	Status	CPU busy	Capacity	NFS conn / node	NFS act avg / node	SMB2 conn /node	SMB2 act / node	NFS Mbps in+out	SMB2 Mbps in+out
	7	ОК	(2.6%)	<b>5</b> 8	26	3	29	0.8	37	0.4

#### **Dashboards: cluster details**



#### Dashboards: one cluster per row









ris-tcs-w1







Shell Technical Landscape Services

### **Dashboards: client connection tables**

average active NFS clients per node per hour								average active NFS clients per node per hour													
Time 👻								Time -		10				14							
2018-02-20 13:00:00								2018-02-20 13:00:00													
2018-02-20 12:00:00								2018-02-20 12:00:00													
2018-02-20 11:00:00								2018-02-20 11:00:00													
2018-02-20 10:00:00								2018-02-20 10:00:00													
2018-02-20 09:00:00								2018-02-20 09:00:00													
2018-02-20 08:00:00								2018-02-20 08:00:00													
2018-02-20 07:00:00								2018-02-20 07:00:00													
> Total NFS connections																					
aver	age active SN	1B2 clients p	er node per h	nour				average active SMB2 clients per node per hour													
Time 🕶								Time +		10				14		5					
2018-02-20 13:00:00								2018-02-20 13:00:00													
2018-02-20 12:00:00								2018-02-20 12:00:00													
2018-02-20 11:00:00								2018-02-20 11:00:00													
2018-02-20 10:00:00								2018-02-20 10:00:00													
2018-02-20 09:00:00								2018-02-20 09:00:00													
2018-02-20 08:00:00								2018-02-20 08:00:00													
2018-02-20 07:00:00								2018-02-20 07:00:00													
> Total SMB2 connections																					

# Special dashboards: storage capacity



# Use cases: client CIFS connections







# Use cases: internal copy operations





Shell Technical Landscape Services

#### Use cases: compute cluster misconfiguration



Shell Technical Landscape Services



#### Use cases: Linux autofs issue









# Use cases: Linux autofs issue - solved



# Works of art - slick graphs





# Learnings

- Technical knowledge on cluster operations
- Service management
- Global metrics comparison
- Capacity planning / forecasting
- Moving average interpretation skills

## **Current developments**

- Stabilize data collection processes
- Implement alerting
- Detailed metrics
- Graph types: pie charts, heat maps
- Training
- Disposable dashboards (Grafana 5)
- Ongoing: pattern recognition
- Linux operating system monitoring
- Other data sources

#### Legacy quota graph



25

# Grafana quota graph



26



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