RSC BasIS Platform

Microoagent Platform for Cluster Management

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11 September 2018

Agenda

- BasIS Automation Platform

- BasIS HPC Stack

- Live Demo

About RSC

RSC is a supercomputer company

Top500 Vendors System Share List (2014)	9th place
installations in the Russian Top50	24% (12)
Percentage of liquid-cooled components	100%
Leading compute density	153 nodes per rack
Worldwide record in energy density	400 kW per rack
The most energy efficient system in Russia	PUE 1.027

Key Products

- Liquid-cooled high-performance compute platform

- Compute servers

- High-performance storage system

- **End-to-end datacenter management platform**

RSC BasIS Platform
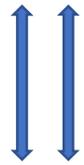
Vertical integration of Hardware, Software and Infrastructure
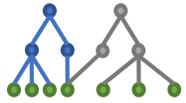
Knowledge about all datacenter objects and their relationships
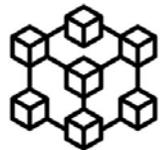
Microagent Mesh for Cluster Automation

Microagent Framework
for Datacenter Automation
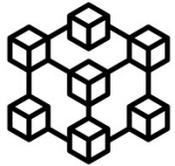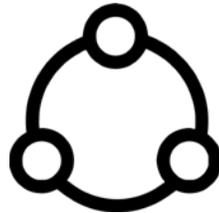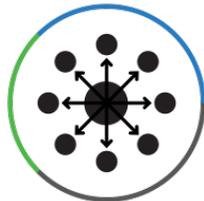
CMDB
Cluster Management Database

All objects and its attributes
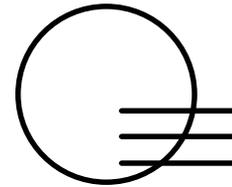
All topologies
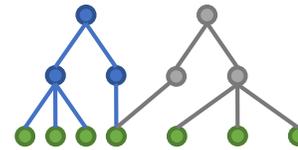
Query Language (QDSL)
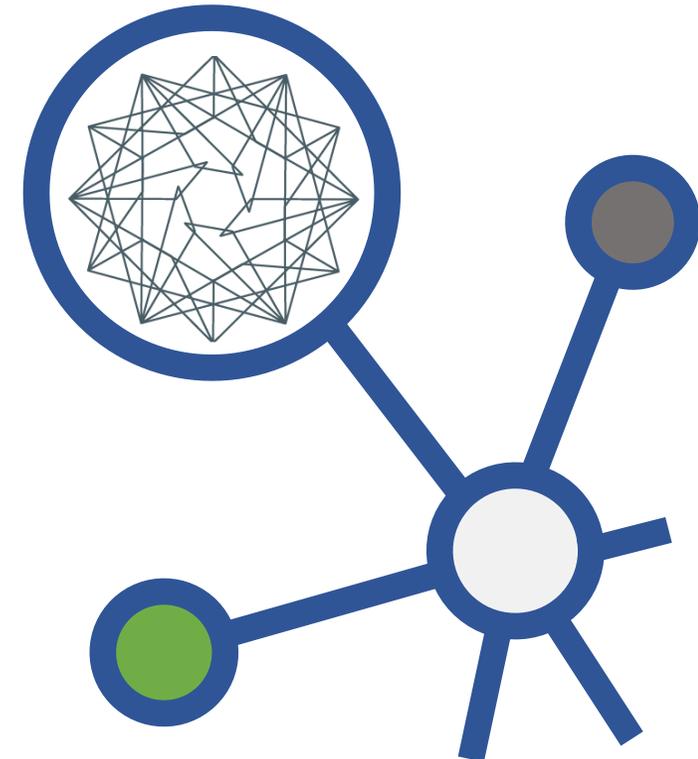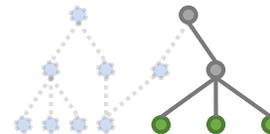
BasIS HPC Stack
Based on BasIS Automation Framework

Advanced node management: discovery, provisioning and control

Powerful Automatic Configuration Engine

Scheduler management and advanced accounting
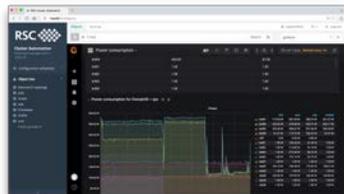
Monitoring

Advanced tools
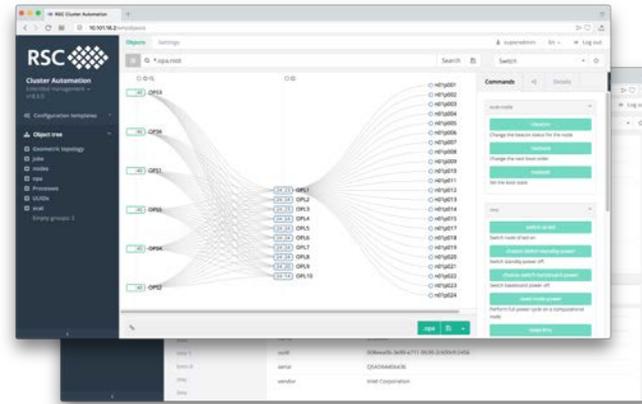
RSC BasIS HPC Stack Demo

Mikhail Malkov

Check our Poster for more details!

In Posters Section

Storage-on-demand

RSC Tornado hyper-converged solution for data processing

Pavel Lavrenko

11 September 2018

Generations of Storage Architecture

Standalone NAS
Based on dedicated storage hardware
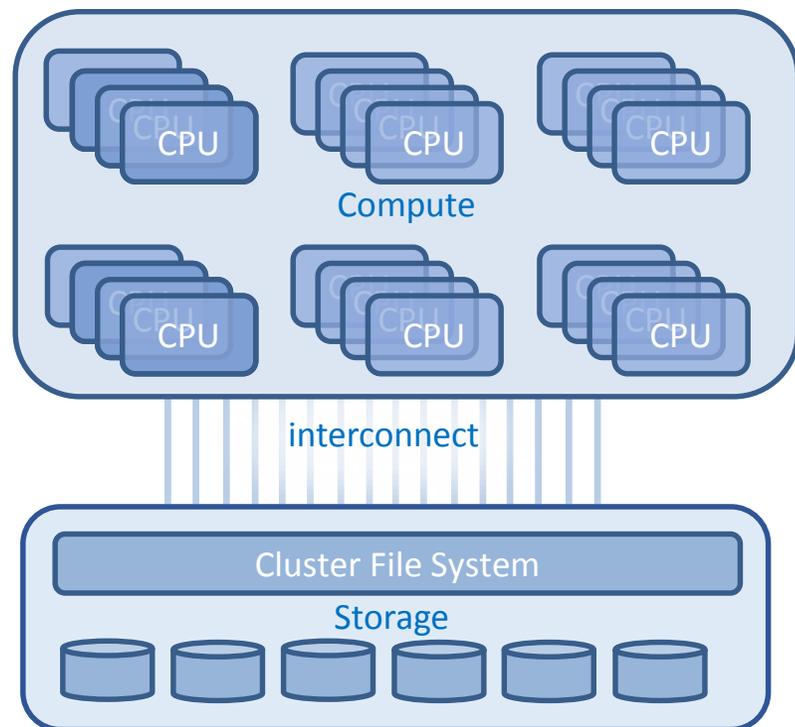
Converged storage
Uniting storage with compute
in dedicated appliances
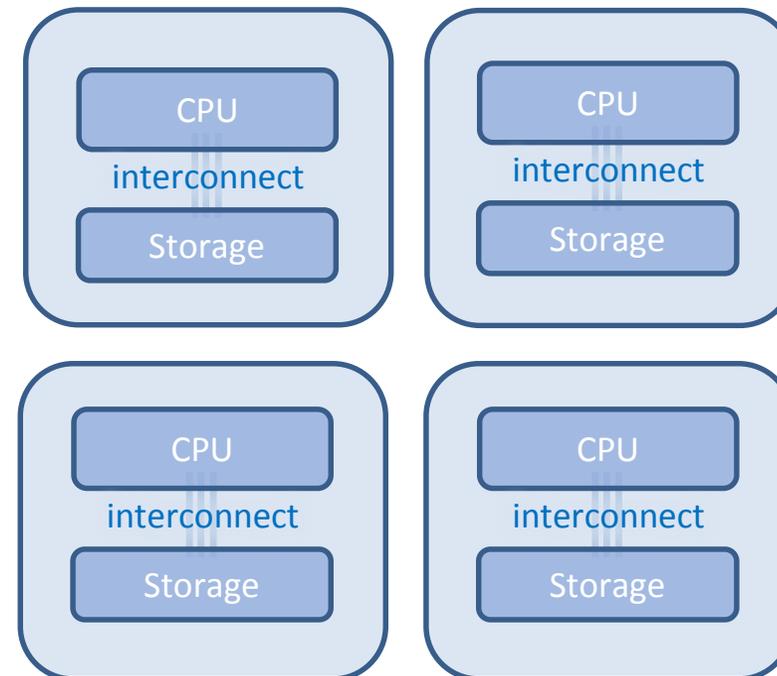
Current Storage Architectures for Clusters

- Standalone or Clustered
- Hardware-based or Software-based redundancy
- Block, Object of File

Why are modern solutions not universal?

They are designed to solve particular demand or to be optimized by performance, capacity or the cost of hardware, software or support

All modern solutions are united by same limitations:

- Storage systems for clusters are always separate part of equipment
- A particular storage solution has an architecture, fixed at installation – topology, configuration, access protocols and etc.

Hyperconverged storage
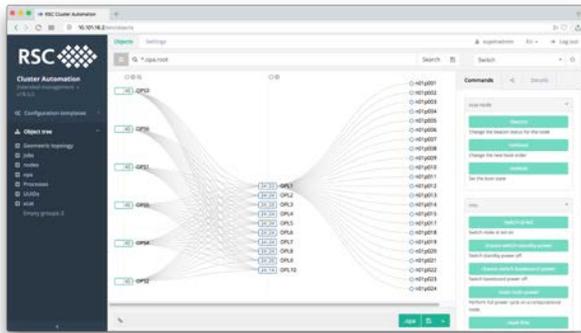
Software Defined Storage
Integrated with full software stack for cluster management

configuration and management
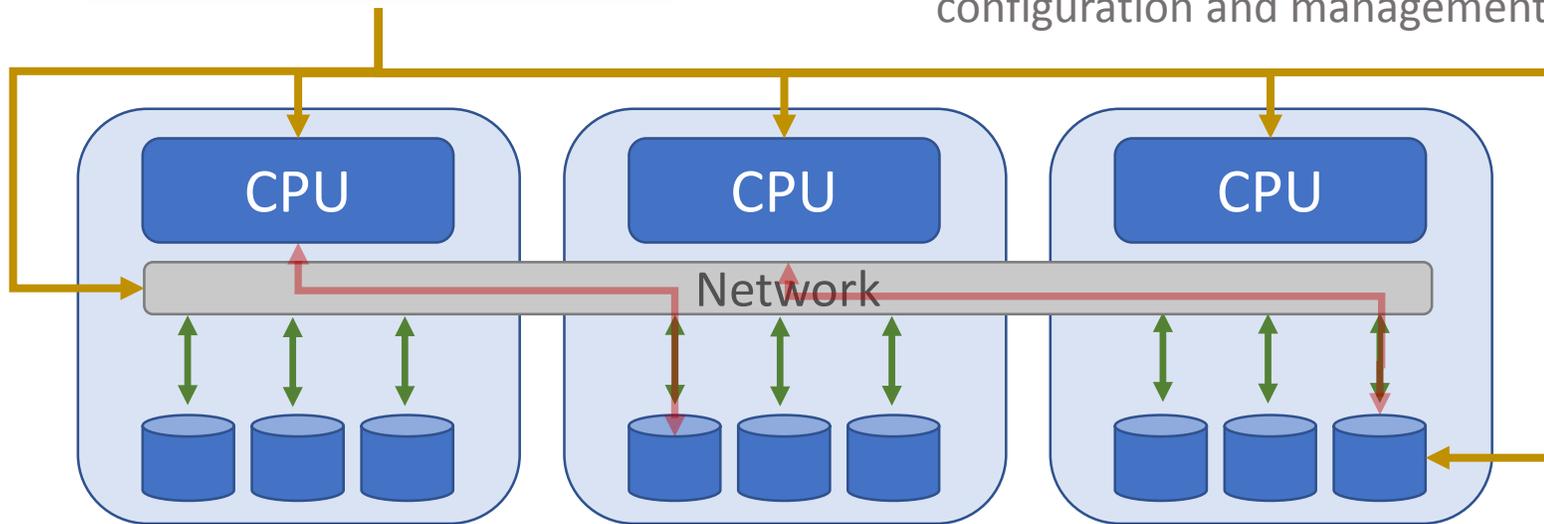
Hyperconverged storage

Is a Storage System on Demand
It can create dedicated filesystem on demand, even for a single job run

Works with any type of Distributed File System
Lustre, BeeFS, EOS, GPFS and etc.

Based on Unified Hardware Components
Each node can act as compute, storage or both. No need for dedicated storage hardware

Has Linear Scalability
Scaling is achieved by adding more nodes to a cluster

Is a Software Defined Storage
It is based on software defined configuration fully optimized for the user needs

Components of RSC's hyperconverged liquid cooling platform

Unified rack
Completely liquid-cooled
Redundant power
Up to 153 modules
Fast 100 GBPs network

Compute & storage nodes
2 CPUs / 384 GB RAM
Up to 12 NVMe drives
Hot-swappable

Standard compute node
Ultra high dencity

Fat compute node
serveral operational modes

Microagent Datacenter Automation Platform
Runs on-demand storage on the fly over the network
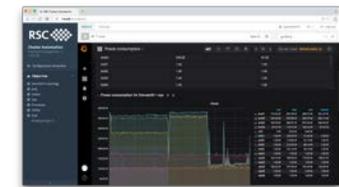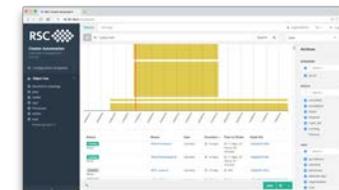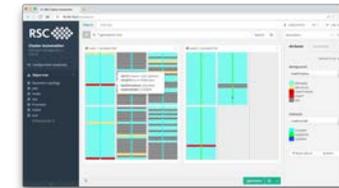
New Compute & Storage Node

2 x Intel Xeon Skylake-SP processors with 28 cores each

768 GiB DDR4 2666

2 x Omni-Path 100 Gb/s or or EDR InfiniBand

12 hot-swap NVMe SSDs

100% 'hot water' liquid cooled solution

Intel® SSD DC P4511 NVMe   Intel® Optane™ SSD DC 4801X (M.2)

Variety of Hyperconverged node types

Nodes with huge memory

Nodes for clustered file system
(Lustre, BeeGFS etc.)

Standard compute nodes
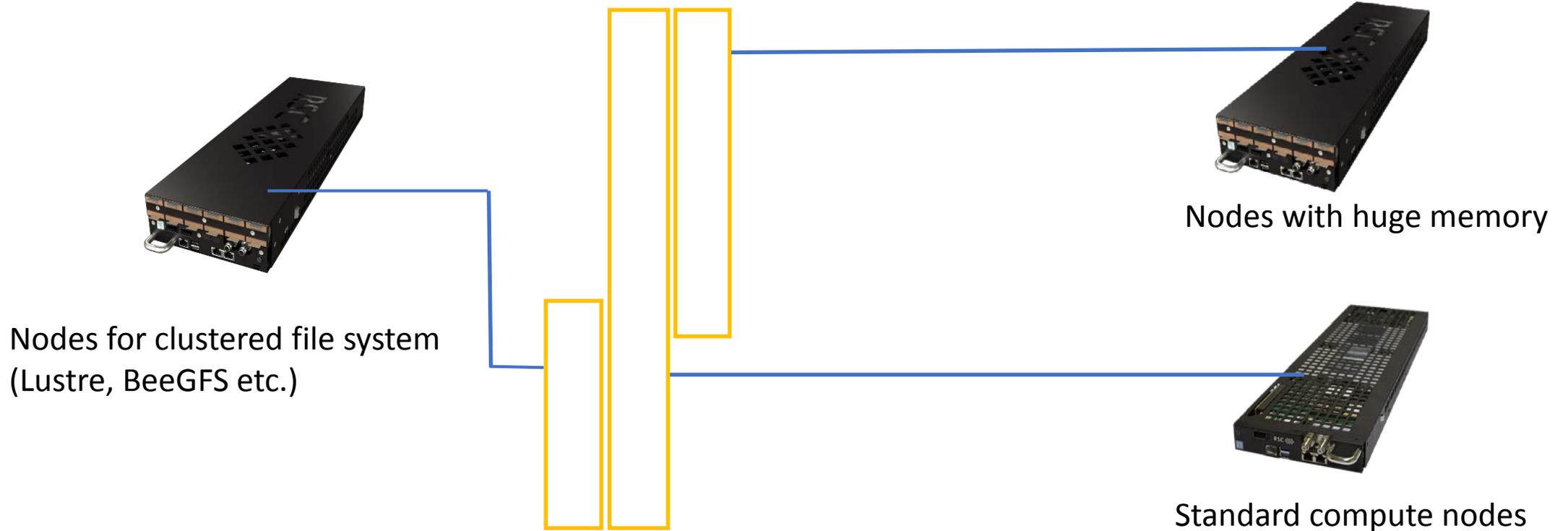
Compute and Store

Software Defined Storage

Parallel File System

Clustered Block Storage

SSD from Compute nodes

RSC
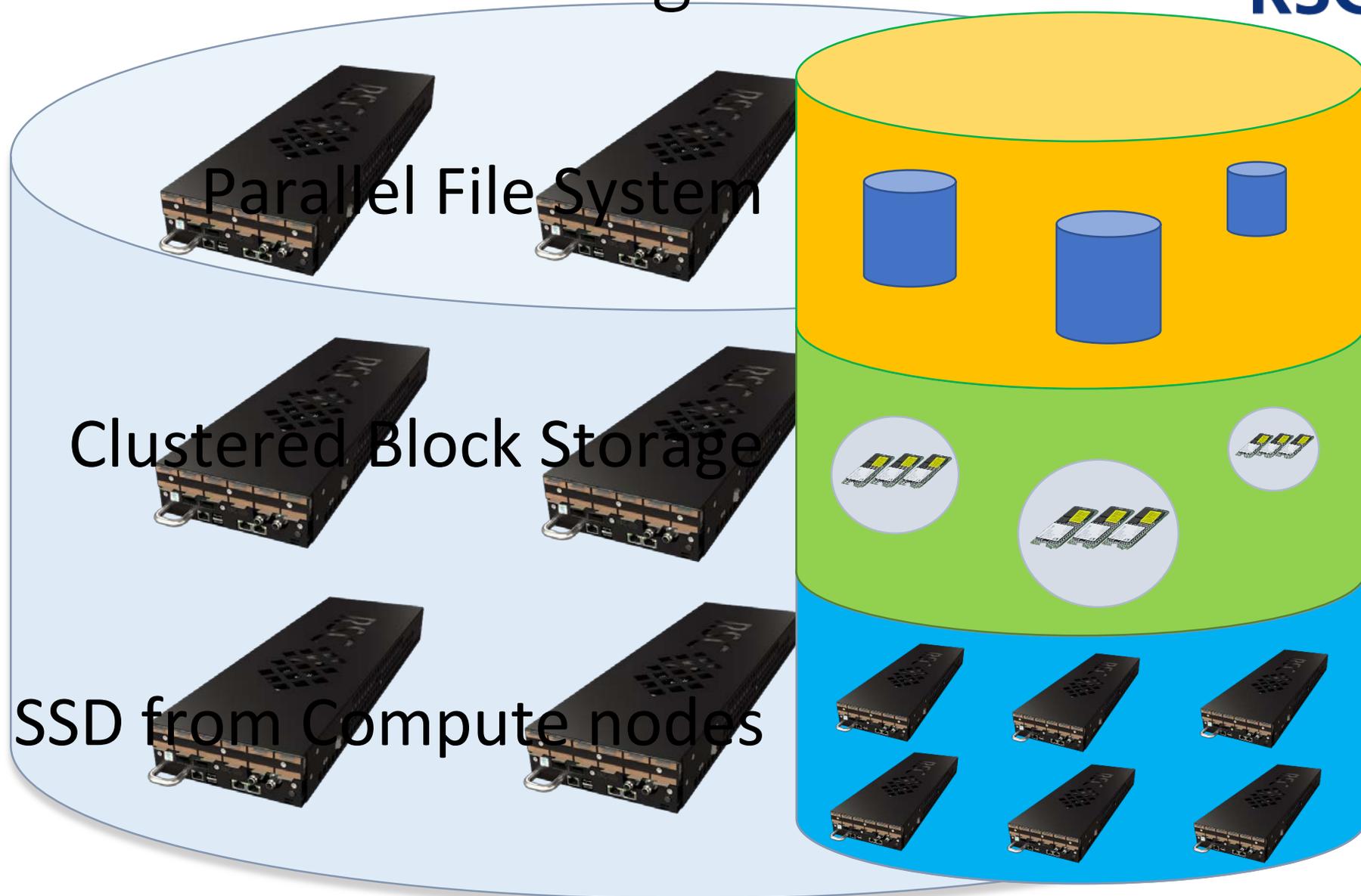
Features

- Object or filesystem operational mode

- Different file systems to provision

- Storage or memory operational mode

- Adjustable level of redundancy

- Configurable lifetime

- Adjustable storage capacity

Job ID: 390071
Job name: d15_prev
User: veselova
Node list: n01p[426-427]
Nodecount: 2
Time to finish: 8 days, 19 hours, 32 minutes
End date: 2018-07-02 13:58:05
Status: running

Job 342

Job 2123

JOB 4391

14/06/2018 15/06/2018 16/06/2018 17/06/2018 18/06/2018 19/06/2018 20/06/2018 21/06/2018 22/06/2018 23/06/2018 24/06/2018 25/06/2018 26/06/2018 27/06/2018 28/06/2018 29/06/2018 30/06/2018 01/07/2018 02/07/2018 03/07/2018 04/07/2018 05/07/2018 06/07/2018 07/07

Lustre Storage-on-Demand io500 benchmark results

RSC

56 GB/s easy_read ior test

36 GB/s easy_write ior test
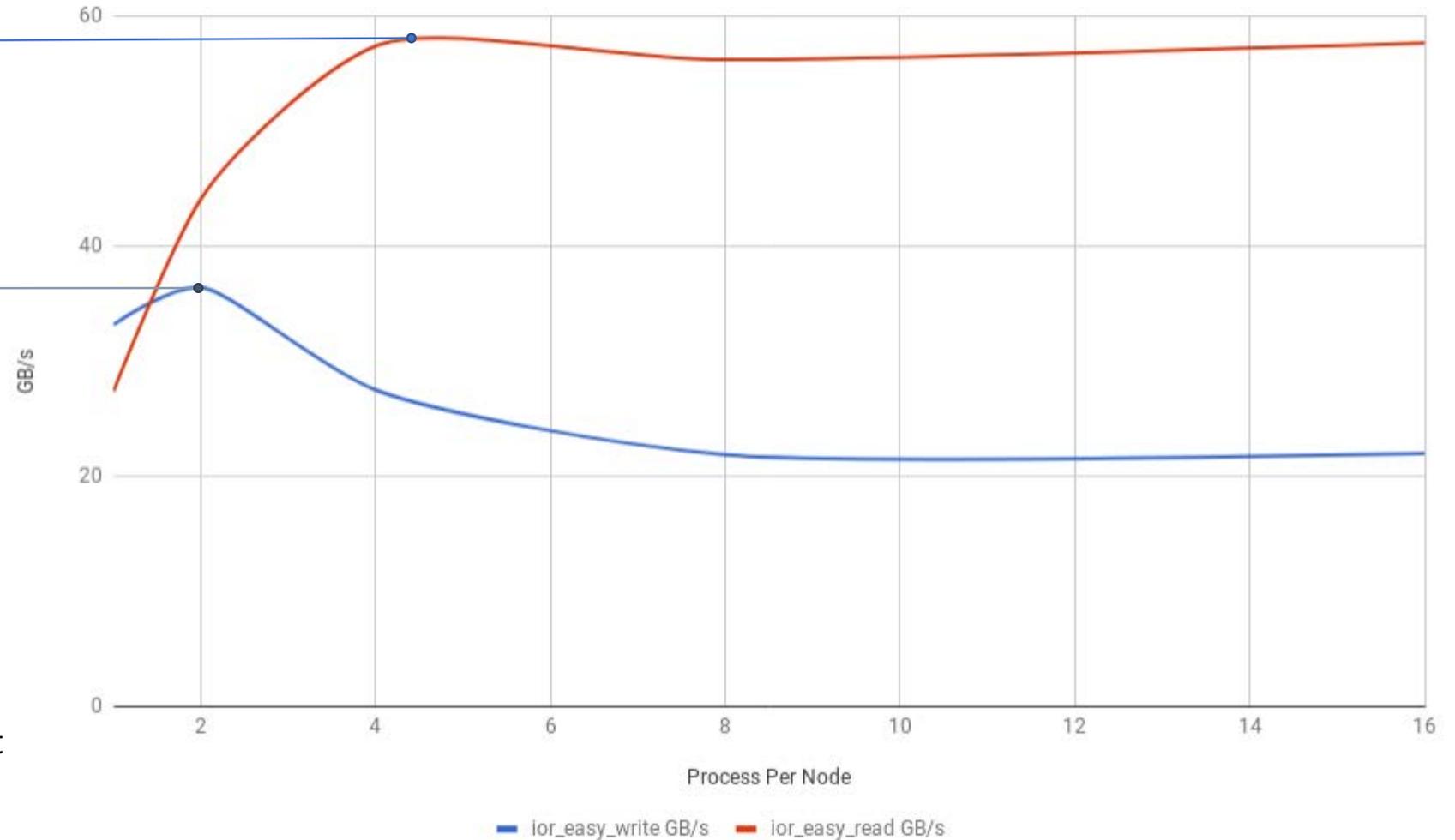
Configuration:
1 x MDS
12 x OSS (6 x 1TB NVMe SSD)
24 Lustre Clients
100GBps Intel Omni-Path interconnect

Y-axis: GB/s (0, 20, 40, 60)
X-axis: Process Per Node (2, 4, 6, 8, 10, 12, 14, 16)

— ior_easy_write GB/s   — ior_easy_read GB/s

9th in io500 benchmark

RSC ◆◆◆

IO⁵⁰⁰

IO-500

This is the official *ranked* list from 🌐 ISC-HPC 2018. The list shows the best result for every given combination of system/institution/filesystem (i.e. multiple submissions from the same system are not shown; only the most recent is shown). The full list is available here.

#	information						io500		
	system	institution	filesystem	storage vendor	client nodes	data	score	bw	md
								GiB/s	kIOP/s
1	Oakforest-PACS	JCAHPC	IME	DDN	2048	zip	137.78	560.10	33.89
2	ShaheenII	KAUST	DataWarp	Cray	1024	zip	77.37	496.81	12.05
3	ShaheenII	KAUST	Lustre	Cray	1000		41.00*	54.17	31.03*
4	JURON	JSC	BeeGFS	ThinkparQ	8		35.77*	14.24	89.81*
5	Mistral	DKRZ	Lustre2	Seagate	100		32.15	22.77	45.39
6	Sonasad	IBM	Spectrum Scale	IBM	10	zip	24.24	4.57	128.61
7	Seislab	Fraunhofer	BeeGFS	ThinkparQ	24		16.96	5.13	56.14
8	Mistral	DKRZ	Lustre1	Seagate	100	zip	15.47	12.68	18.88
9	Govorun	Joint Institute for Nuclear Research	Lustre	RSC	24	zip	12.08	3.34	43.65
10	EMSL Cascade	PNNL	Lustre		126		11.12	4.88	25.33
11	Serrano	SNL	Spectrum Scale	IBM	16		4.25*	0.65	27.98*
12	Jasmin/Lotus	STFC	NFS	Purestorage	64	zip	2.33	0.26	20.93

https://www.vi4io.org/io500/start

RSC Storage-on-Demand provides outstanding performance at 1/20th of traditional parallel file system cost

Check our Poster for more details!