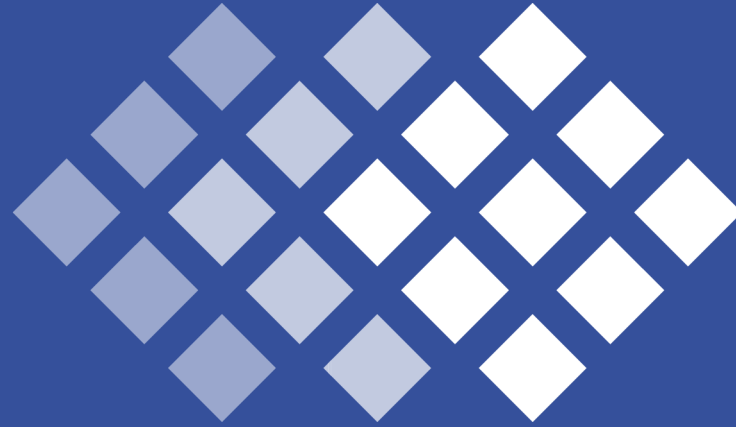


RSC

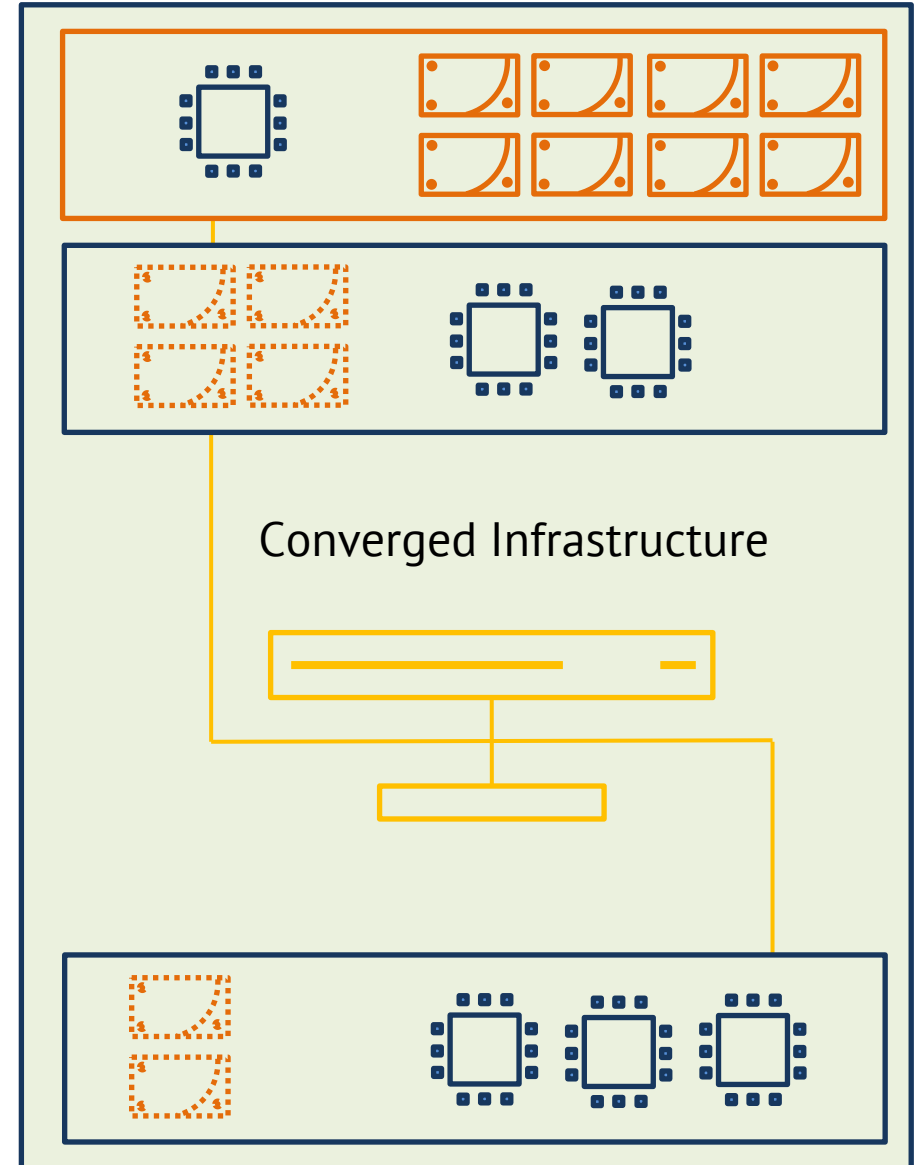
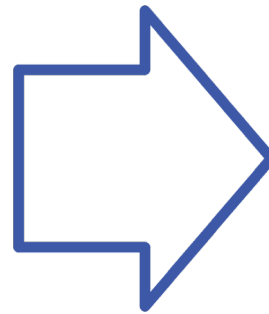
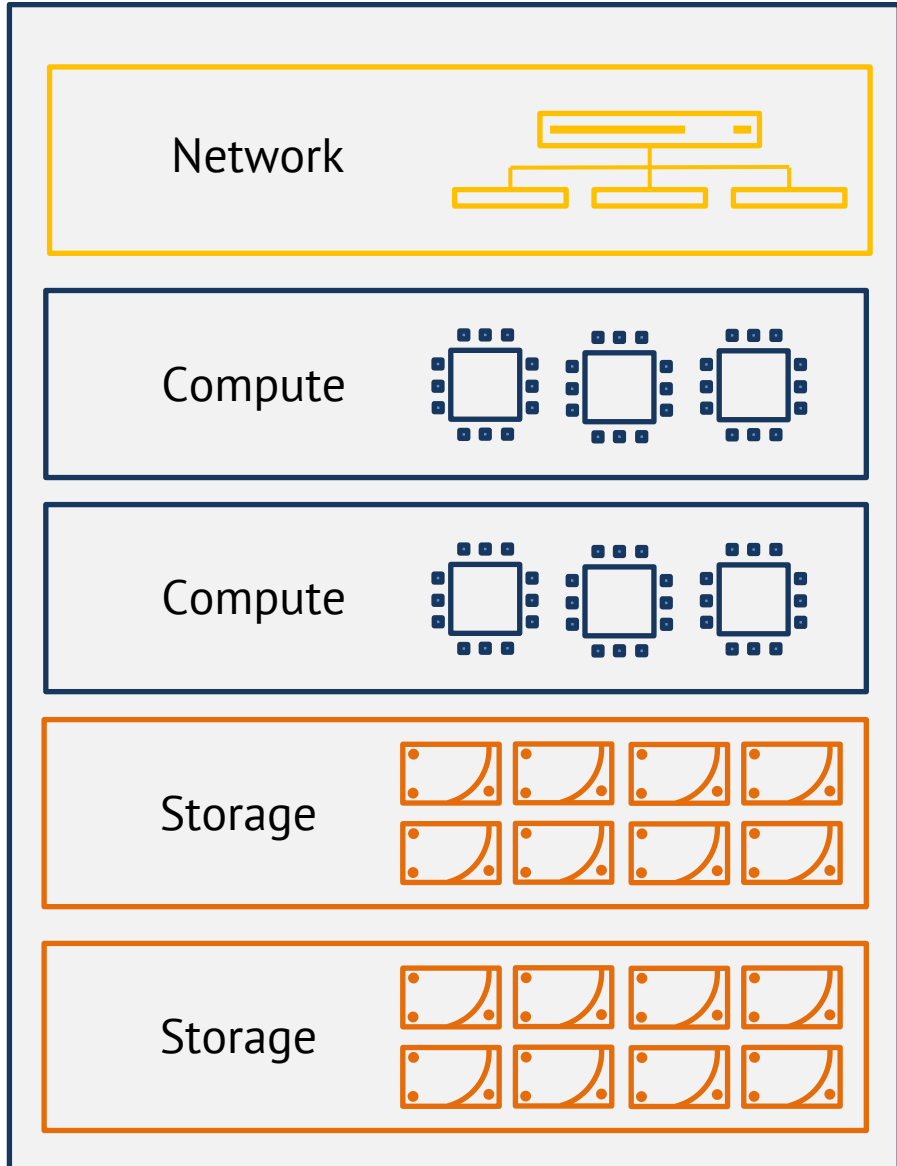
Group



**Leading Solutions
for HPC and Data Centers**

RSC BasIS Platform: Orchestration for High Performance Composable Storage Architectures

From Rackscale to Composable



Current DAOS status



DAOS is great but still has a lot of complications:

- DAOS requires specially-designed hardware platforms to deploy
- DAOS deployment is tricky
- DAOS doesn't fit HPC Cloud

RSC is focused to address these points

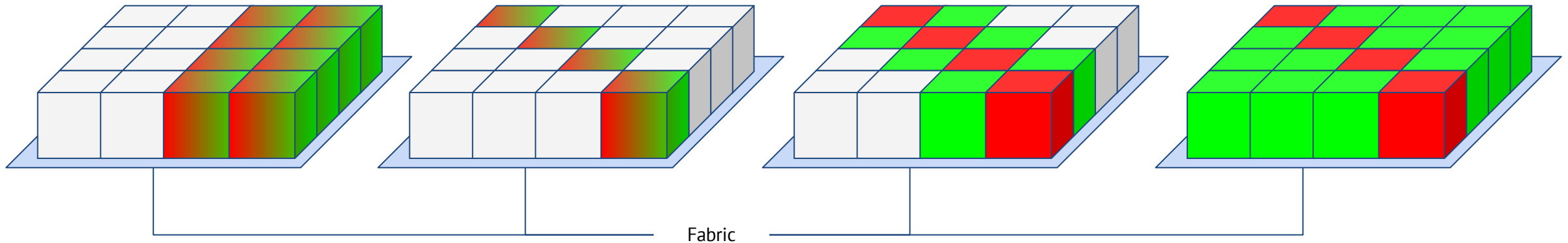
DAOS Storage system models


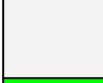


Pooled Storage Model

Hyper-Converged Storage Model

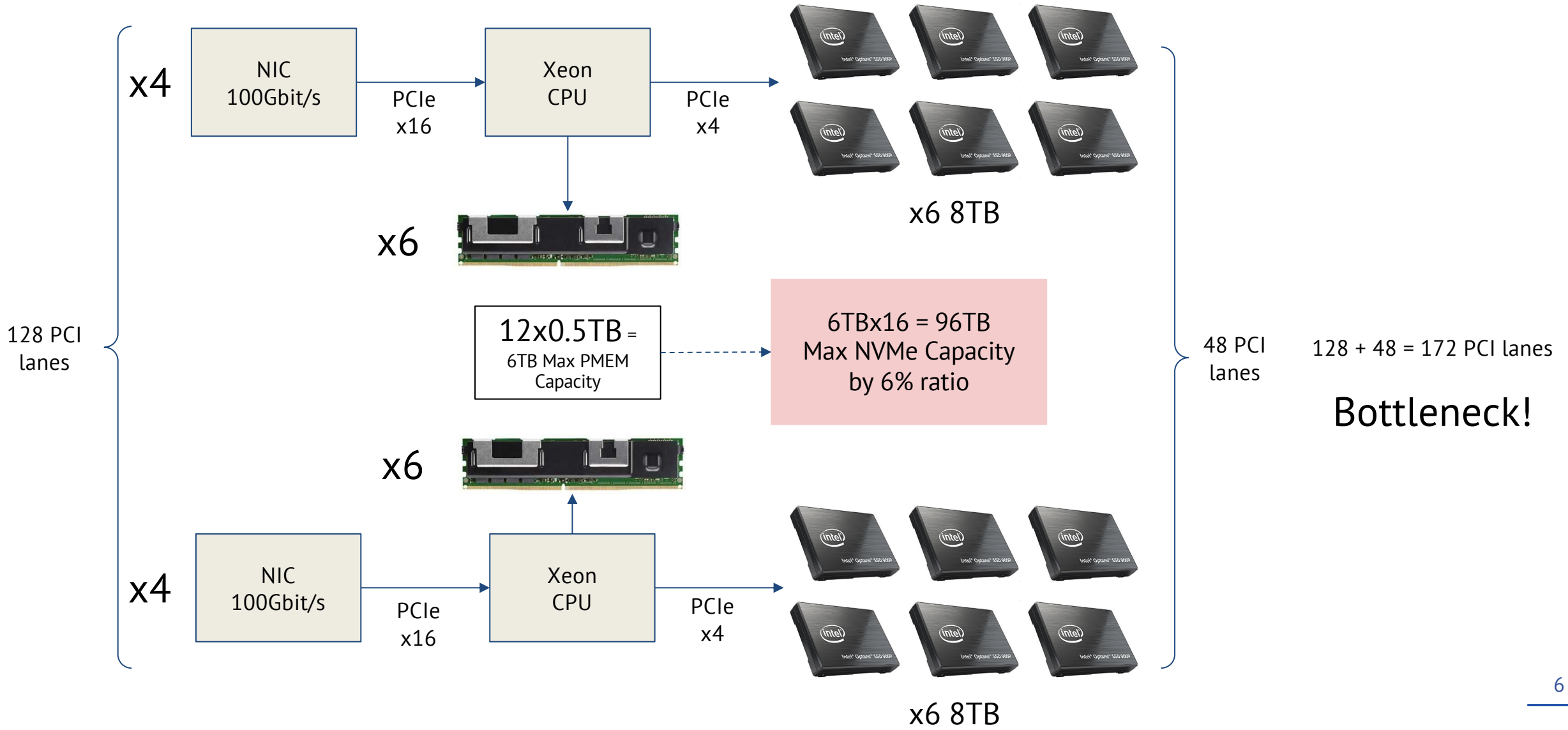
Disaggregated Storage Model
(Dedicated servers)

Disaggregated Hyperconverged Model
(All servers participate in DAOS)

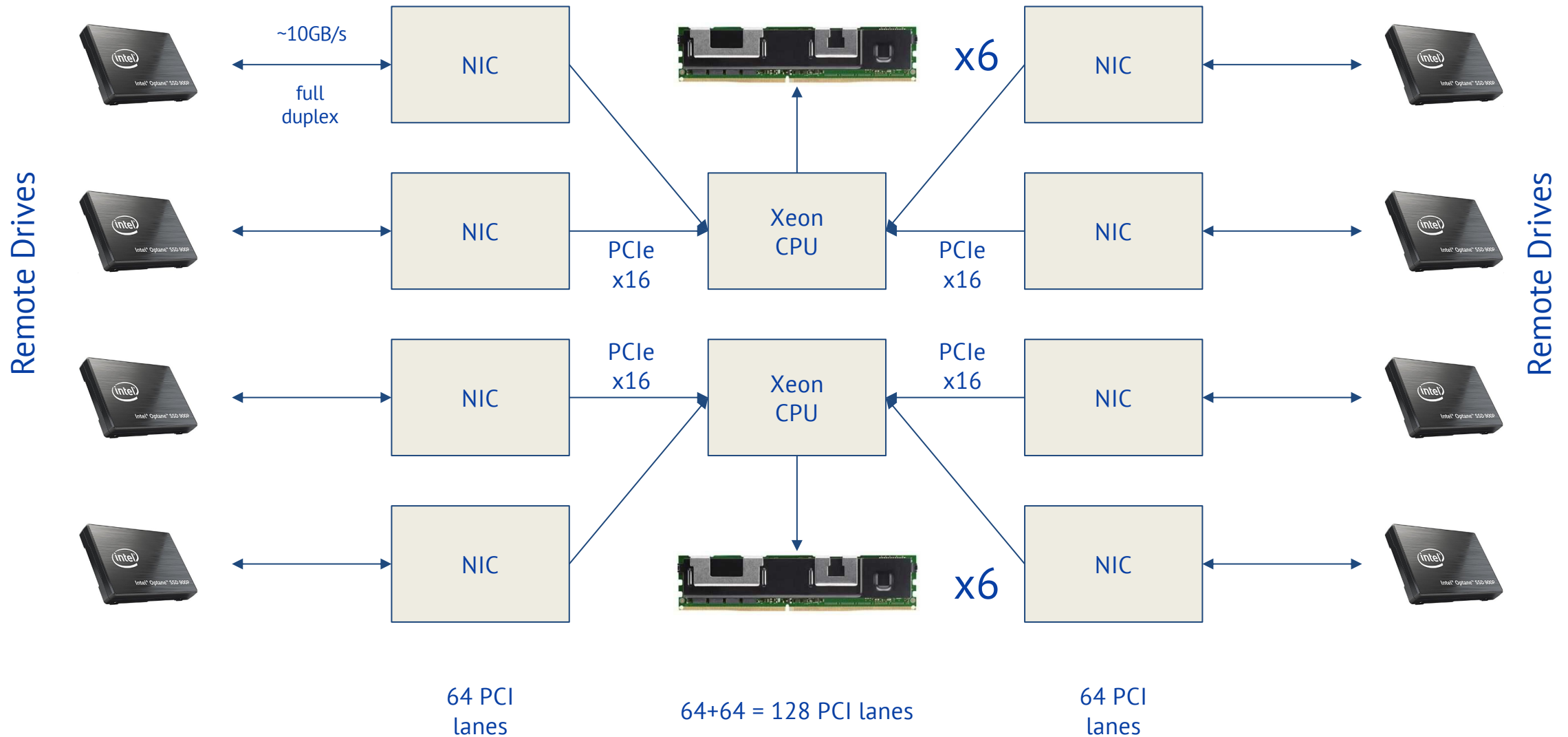


	Nodes With PMEM & NVMe
	Compute Nodes
	Compute with NVMe
	Compute with PMEM

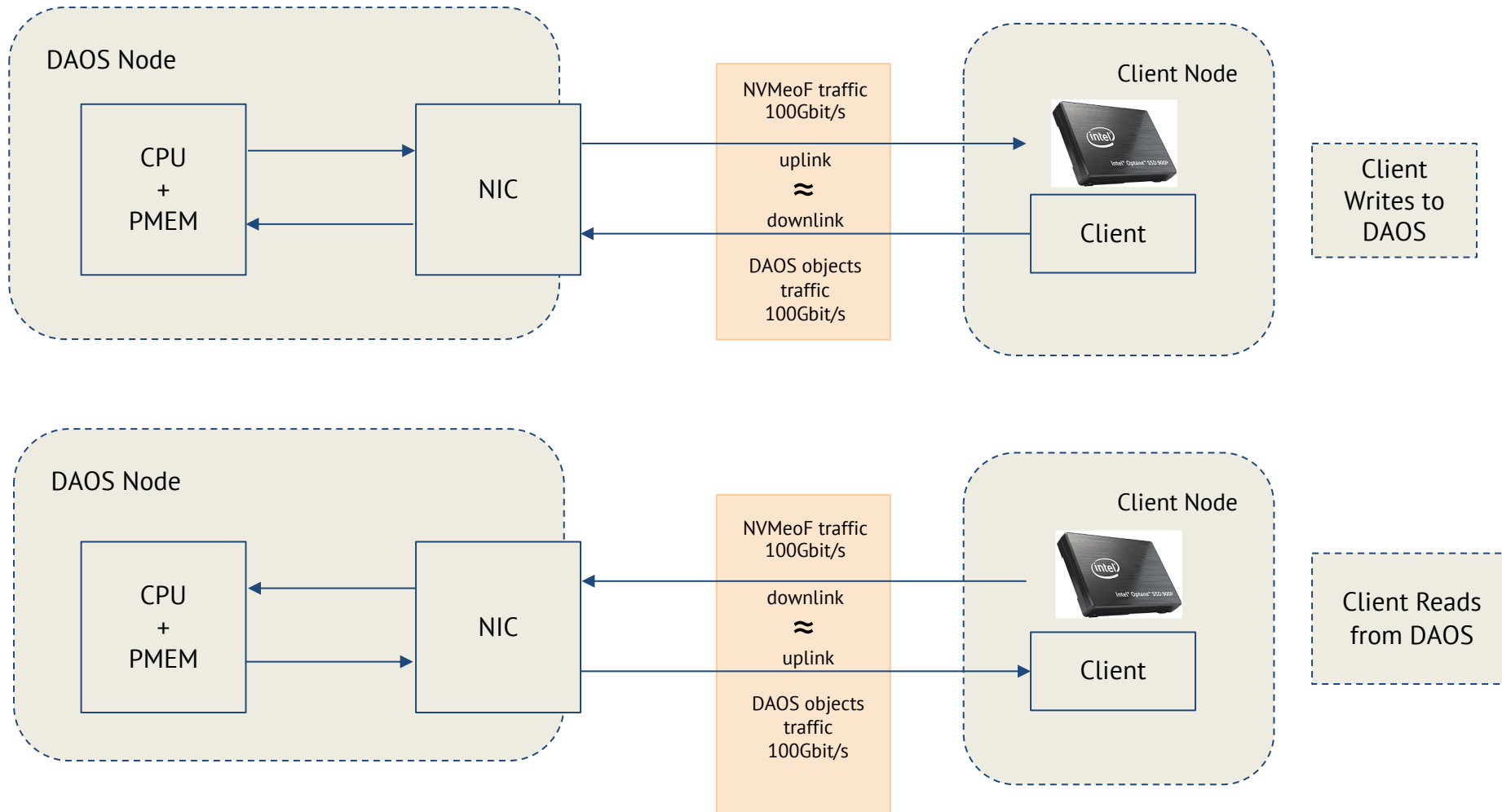
DAOS: Large Capacity Requires Dedicated Storage Servers



Architecture with NVMe-over-Fabrics



Interconnect utilization NVMe-over-Fabrics



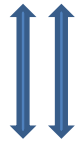
Complete utilization of full duplex network:

DAOS data and NVMeOF always move in the opposite directions

Works well when DAOS cluster uses SSD from client nodes

Extra NVMeoF Latency doesn't affect storage performance because of PMEM

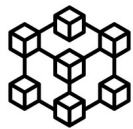
RSC BasIS Orchestration



Vertical integration of Hardware, Software and Infrastructure components



Knowledge about all datacenter objects and their connections



Microagent Mesh for Cluster Automation



App Repository



Agents



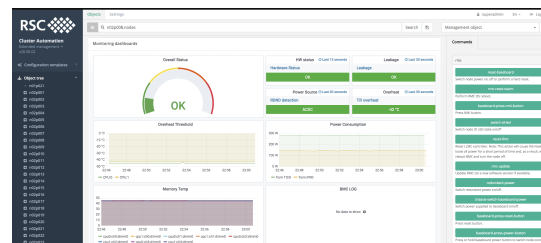
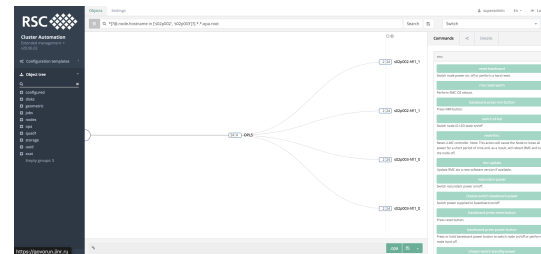
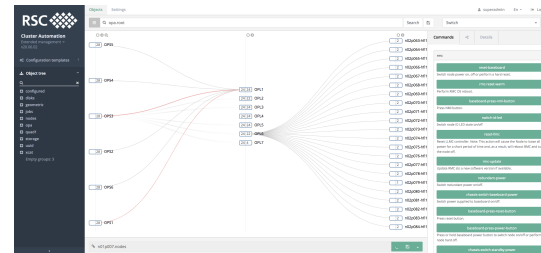
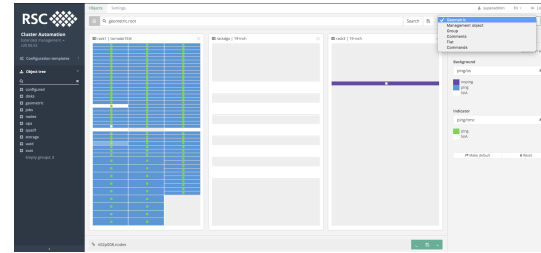
Agent Lifecycle



Messaging system



SDK



Knowledge of objects

- Auto-discovery
- Inventory and classification
- Knowledge of topologies
- Dynamic selection based on Query language

Continuous configuration

- Repository of configuration
- Maintaining consistency

Group Commands Execution

- Human operator – Platform
- Agent to agent

Monitoring

- Dynamical status representation
- GUI for drill-down analysis
- Problem-oriented dashboards



Cluster Automation

Extended management v20.10-rc

Configuration templates

Object tree

Search

configured

disks

geometric

jobs

nodes

opa

processes

quad1

storage

uuid

xcat

Empty groups: 2

Objects

Settings

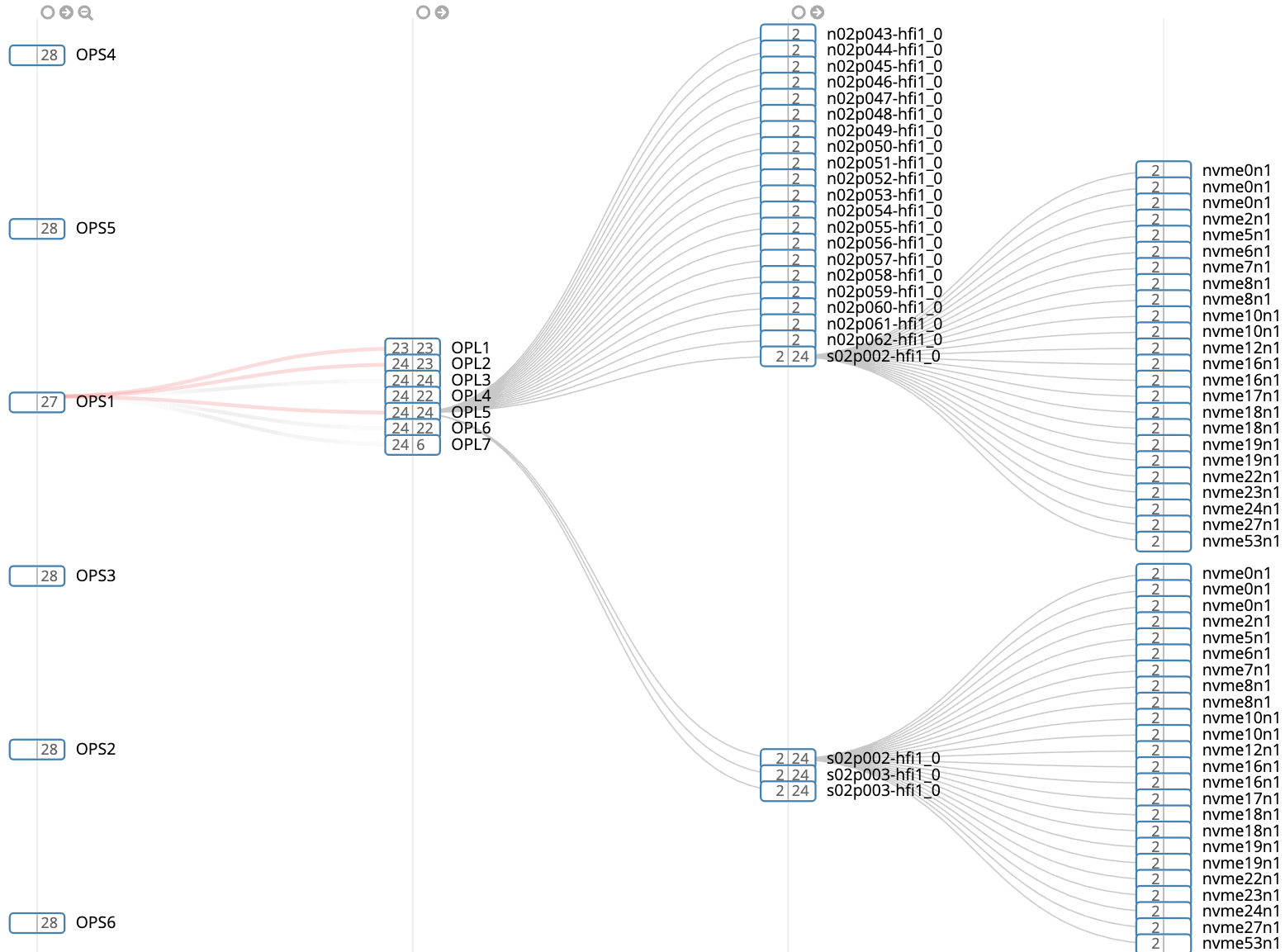
superadmin En Log out

opa.root

Search



Switch



Commands Details

rmc

- reset-baseboard**
Switch node power on, off or perform a hard reset.
- rmc-reset-warm**
Perform RMC OS reboot.
- baseboard-press-nmi-button**
Press NMI button.
- switch-id-led**
Switch node ID LED state on/off
- reset-llmc**
Reset LLMC controller. Note: This action will cause the Node to loose all power for a short period of time and, as a result, will reboot BMC and turn the node off.
- rmc-update**
Update RMC sto a new software version if available.
- redundant-power**
Switch redundant power on/off.
- chassis-switch-baseboard-power**
Switch power supplied to baseboard on/off.
- baseboard-press-reset-button**
Press reset button.
- baseboard-press-power-button**
Press or hold baseboard power button to switch node on/off or perform node hard off.
- chassis-switch-standby-power**
Switch standby power on/off.
- rmc-reset-cold**
Perform full power cycle on a RMC.

BasIS Storage Orchestrator



RSC Cluster Automation
Extended management v20.06.02-lb-render

Configuration templates

Object tree

- dcpm
- disks
- hpc
- nodes
- processes
- storage
 - control
 - disk-pool
 - node-pool
 - sod-storage
 - storage_one
 - uuid

Empty groups: 6

Objects Settings

storage_one.storage

Search Management object

superadmin En Log out

editor management

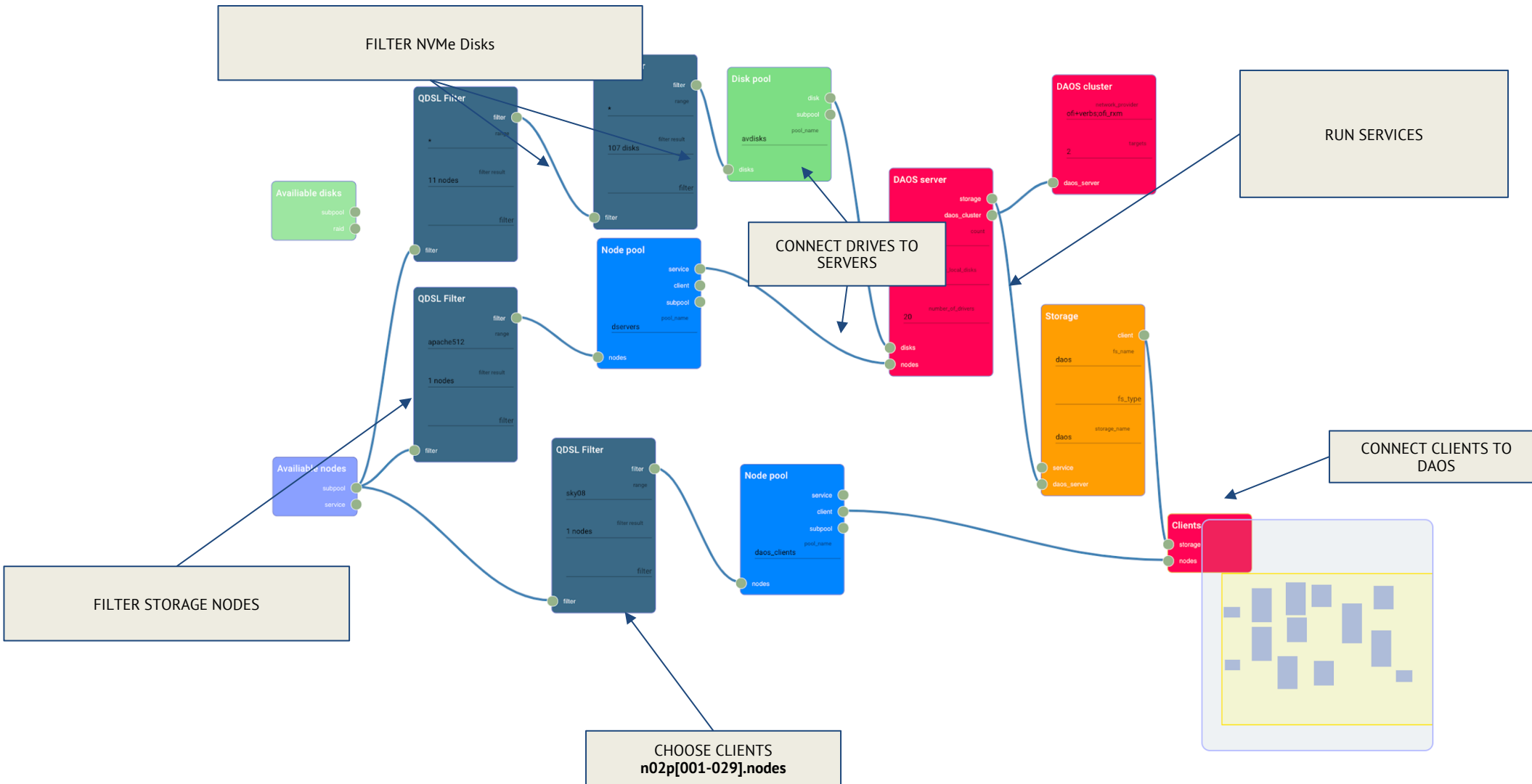
STORAGE STORAGE > QDSL FILTER 104 STORAGE > QDSL FILTER 108 STORAGE > QDSL FILTER 212 STORAGE > QDSL FILTER 214

The diagram illustrates the storage orchestration architecture. It features several interconnected components:

- QDSL Filter** (blue boxes): Acts as a central control point, receiving input from 'Available disks' and 'Available nodes' and distributing it to various storage services.
- Disk pool** (green boxes): Manages disk resources, including subpools and RAID configurations.
- RAID** (green box): Configures RAID levels and targets for data storage.
- Node pool** (blue boxes): Manages node resources, including services and clients.
- DAOS server** (red box): Provides storage services to the DAOS cluster.
- DAOS cluster** (red box): The core data storage and management component.
- Storage** (orange box): Manages storage configurations, including disk types and storage pools.
- Clients** (red box): Represents the end users or applications accessing the storage.

The flow of data and control is indicated by blue lines connecting these components, showing a hierarchical and interconnected structure.

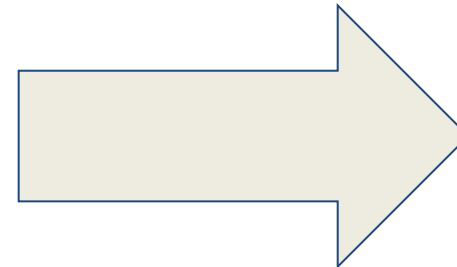
BasIS: DAOS with NVMeOF Pipeline



Flexible PMEM-only server roles

DAOS Server

Storage Server
with PMEM & NVMe



- Less complex
- Cheaper
- More roles

PMEM-only Server

DAOS Server
with NVMeOF Drives

AI

In-Memory DBs

Grid Systems

IOR results with DFS API

Configurations	BW write MB/s	BW read MB/s
2 IO instances and 4 local NVMe drives	2132	2008
2 IO instances and 4 NVMeOF drives	2253	2178
4 IO instances and 8 local NVMe drives	4679	3935
4 IO instances and 8 NVMeOF drives	4248	4268

NVMe drives - Intel P4510 2TB - W: 2 GB/s and R: 3.2 GB/s by specs

DAOS: kdev (AIO Linux driver) was used for NVMeOF drives, 2 targets per disk, max pool size, service replica = 1, ofi+sockets provider through Intel Omni-path

MPI: np=104 from 3 clients

Conclusions



What have we archived with RSC BasIS Storage Orchestration:

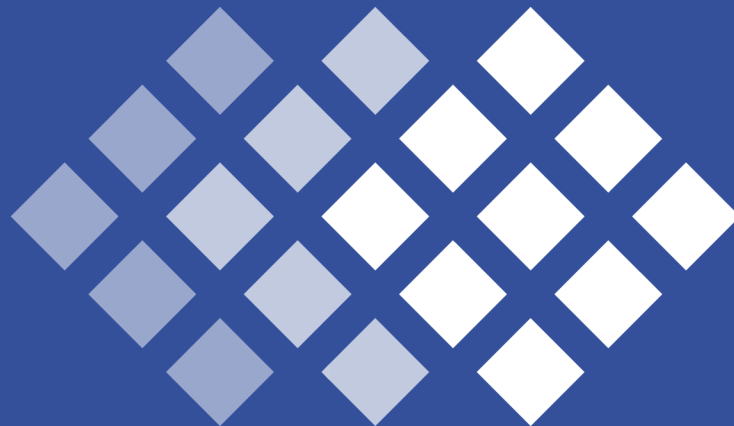
- ~~DAOS requires specially designed hardware platforms to deploy~~
 - You can have DAOS cheap - just buy PMEM and compose DAOS over a fabric
 - Existing servers can share their NVMe drives
- ~~DAOS deployment is tricky~~
 - Software orchestration significantly simplifies DAOS deployment
- ~~DAOS doesn't fit HPC Cloud~~
 - Composable Disaggregated approach gives flexible ways to use PMEM nodes
 - DAOS can be dynamically assembled when needed

RSC Announces DAOS Support in its storage orchestration platform

<https://www.hpcwire.com/off-the-wire/rsc-announces-intel-ice-lake-sp-and-daos-support-introduces-tornado-afs-storage/>

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