SDC 19

September 23-26, 2019
Santa Clara, CA

Scalable Storage Management with NVMe-oF

Piotr Wysocki, Rafał Bogdanowicz
Intel

Agenda

- Intel® RSD Overview
- NVMoF management in Intel® RSD
- Intel® RSD storage service evolution
- Intel® RSD 2.5 Redfish/Swordfish and SPDK mappings

Code availability

- All discussed code available on GitHub:
  - https://github.com/intel/intelRSD
  - It will be presented on SDC Workshop

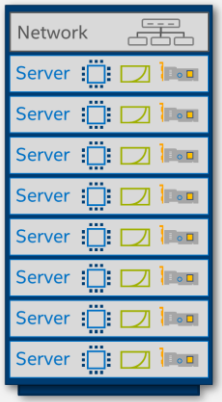
Data Center Agility, Built on Open Standards

TODAY'S DATA CENTER CHALLENGES

45% UTILIZATION OF EQUIPMENT[1]

50% EFFICIENCY IT OPERATIONS[1]

35 PEOPLE HOURS PER RACK UPDATE[2]



Current Infrastructure

- **Fixed ratio** of compute, storage, and accelerator resources
- **Expensive** refresh & scale out
- **Outdated** software interface
- **Cumbersome** hardware provisioning process

Intel® Rack Scale Design

*"an **industry-aligned architecture** for composable, disaggregated infrastructure **built on modern, open standards.**"*

- Disaggregated
- Composable
- Interoperable

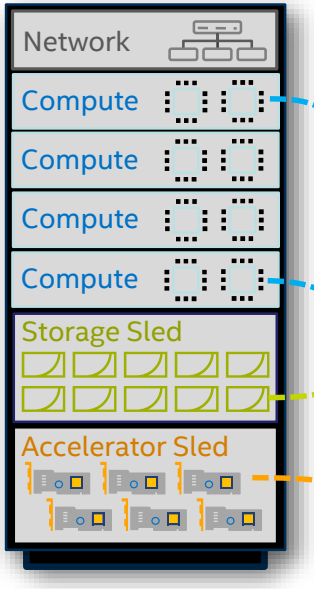
INCREASE AGILITY

DECREASE COSTS

1. Source: Quantifying Datacenter Inefficiency: Making the Case for Composable Infrastructure, IDC, Document #US42318917, 2017.
2. Source: Disaggregated Server Architecture Drives Data Center Efficiency and Innovation, Shesha Krishnapura, Intel Fellow and Intel IT CTO, 2017

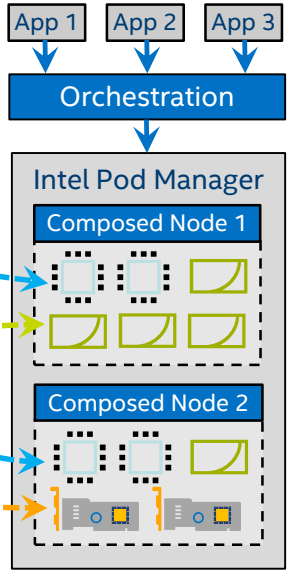
Intel® RSD Key Attributes

Disaggregated



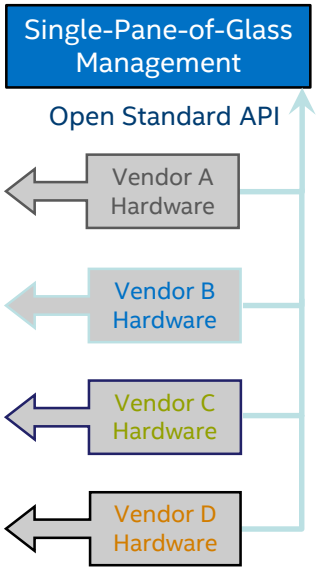
Buy less up front and Save money over time

Composable



Compose hardware resources "on the fly"

Interoperable



Choose the best now without vendor lock-in

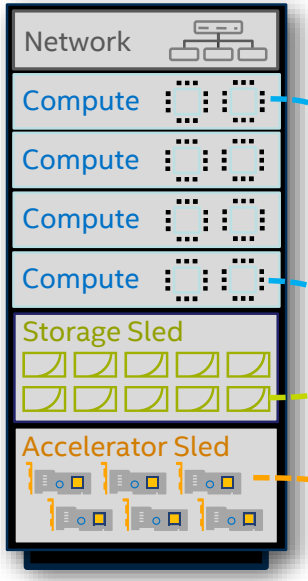
Intel® Rack Scale Design

DELL EMC, ERICSSON, GIGABYTE, HUAWEI, inspur, QCT, Inventec, SUPERMICRO, wiwynn

OEMs with solutions based on RSD

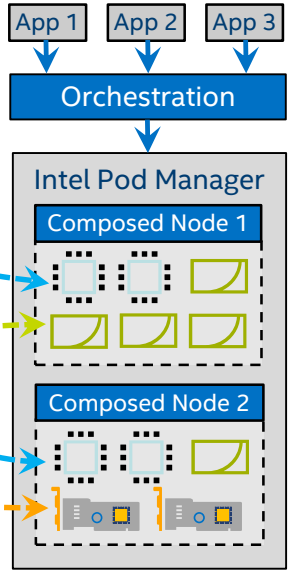
Benefits of Disaggregation and Composability

Disaggregated



Buy less up front and Save money over time

Composable



Compose hardware resources "on the fly"

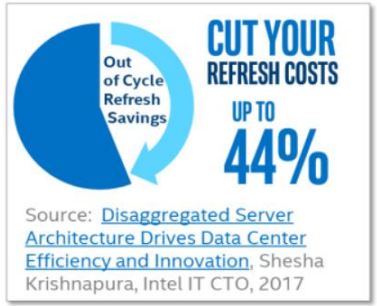
Resource pooling

Maximize utilization of high-value assets and improve agility with dynamic composability

Source: Flash Storage Disaggregation, Stanford University, Klimovic, Kozyrakis, et al, April 2016

Modular Refresh

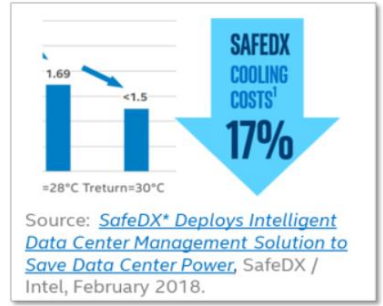
Independently scale and upgrade resources with better lifecycle Management



Source: Disaggregated Server Architecture Drives Data Center Efficiency and Innovation, Shesha Krishnapura, Intel IT CTO, 2017

Operational Costs

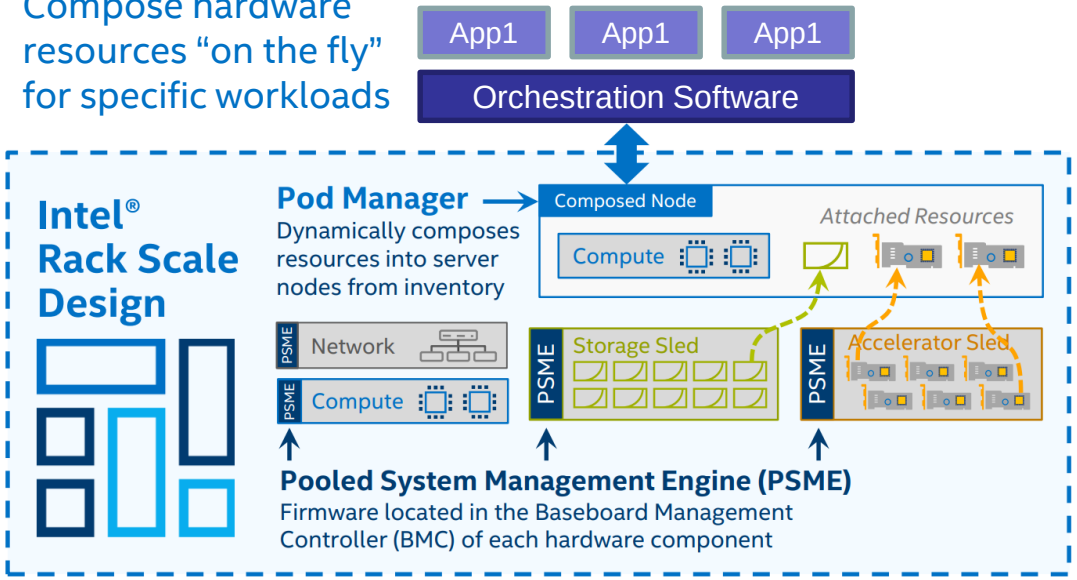
Improve Power Usage Effectiveness (PUE) and streamline operations and HW management



Source: SafeDX* Deploys Intelligent Data Center Management Solution to Save Data Center Power, SafeDX / Intel, February 2018.

Intel® RSD – Composability

Compose hardware resources "on the fly" for specific workloads



Intel® RSD software functions include:

Resoureces Discovery

Automatically discover and store hardware characteristics and location for all your resources

Node Composition

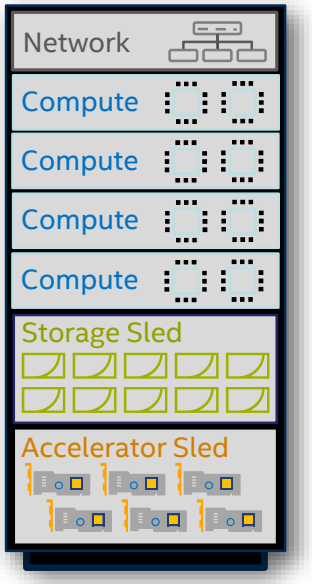
Dynamically compose compute, storage, and other resources to meet workload specific demands

Telemetry Data

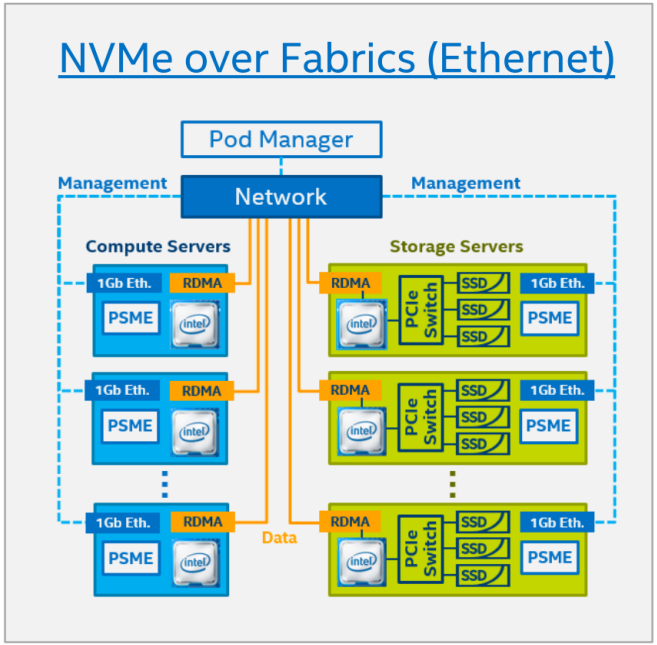
Monitor data center efficiency and detect, diagnose, and help predict resource failures

Intel® RSD – Storage Disaggregation

Disaggregation

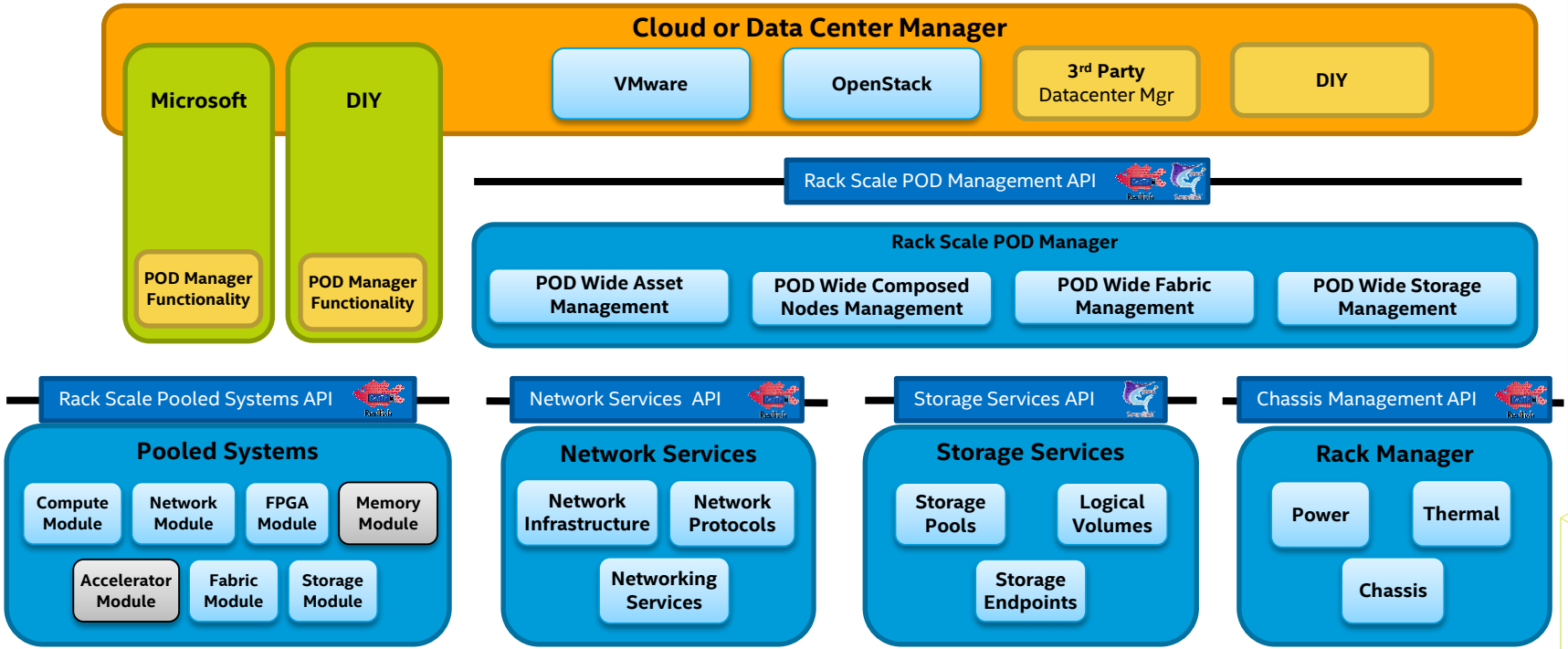


Save money over time with modular refresh

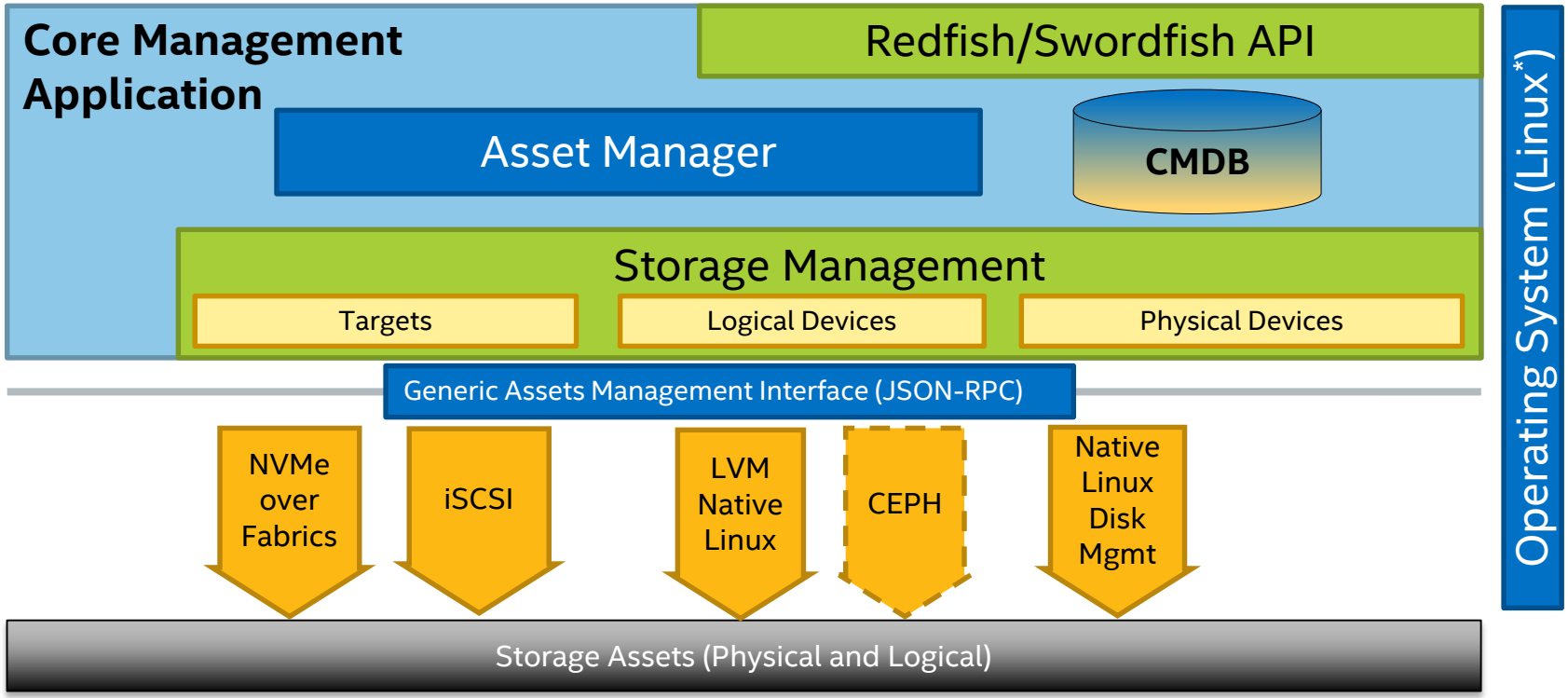


Great scalability

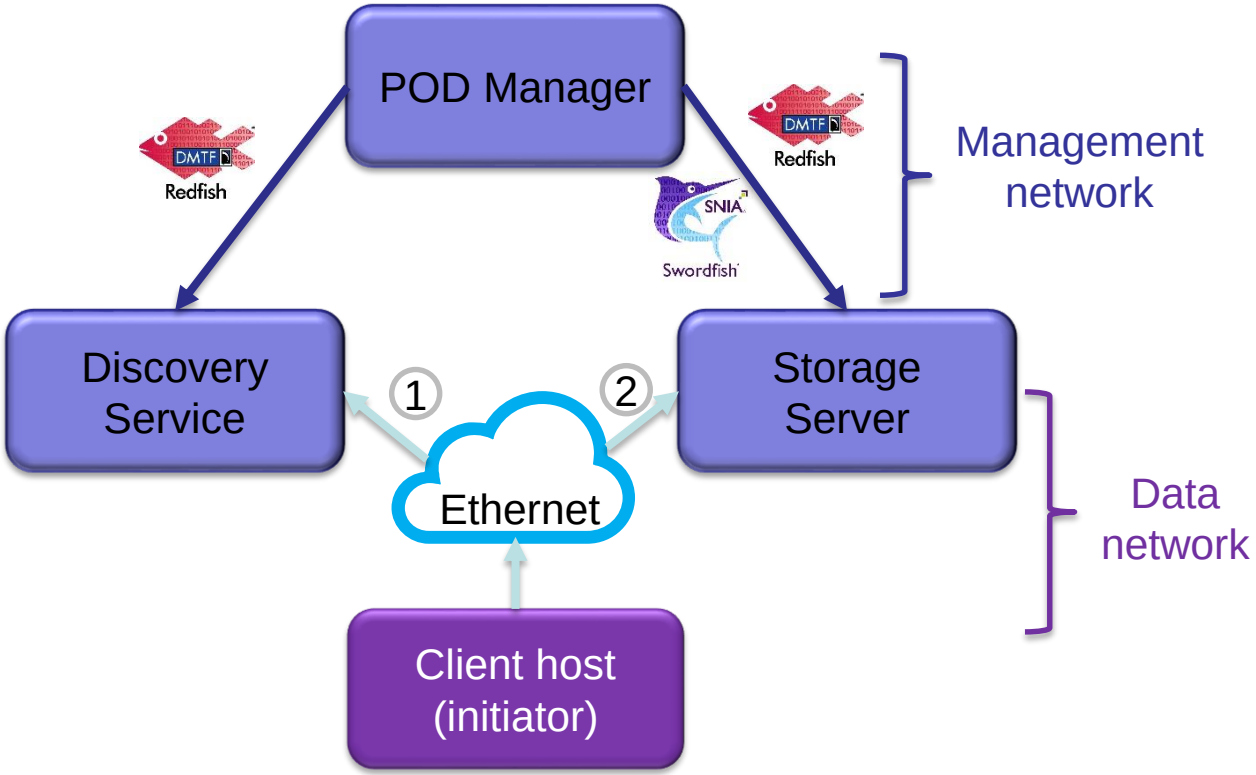
Intel® Rack Scale Software stack



Intel® Rack Scale Storage Services

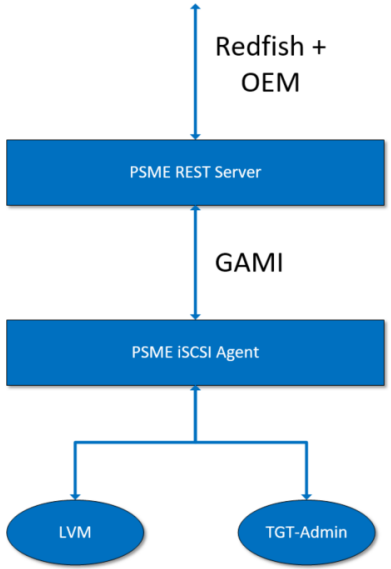


Intel® RSD components in NVMoF

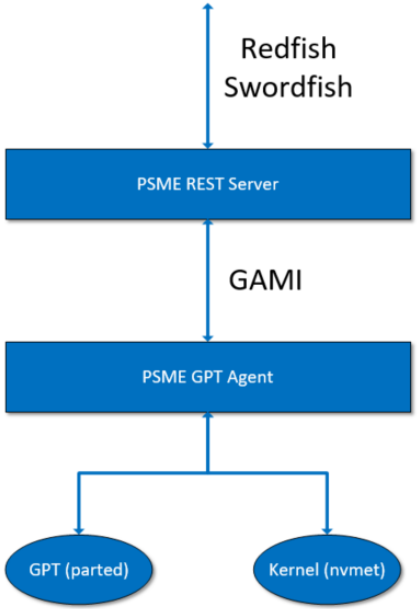


Intel® RSD Storage Service evolution

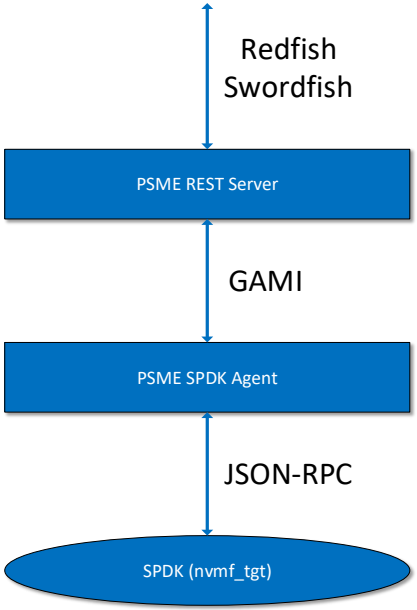
Intel® RSD 1.2+
iSCSI Storage Service



Intel® RSD 2.3+
Partitions over NVMe



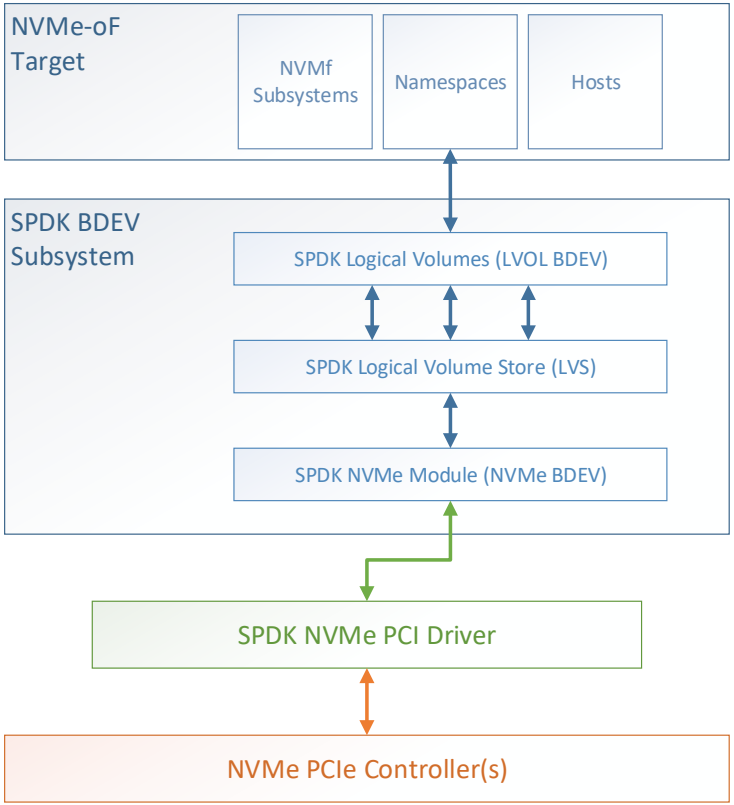
Intel® RSD 2.4+
Storage Performance Development Kit



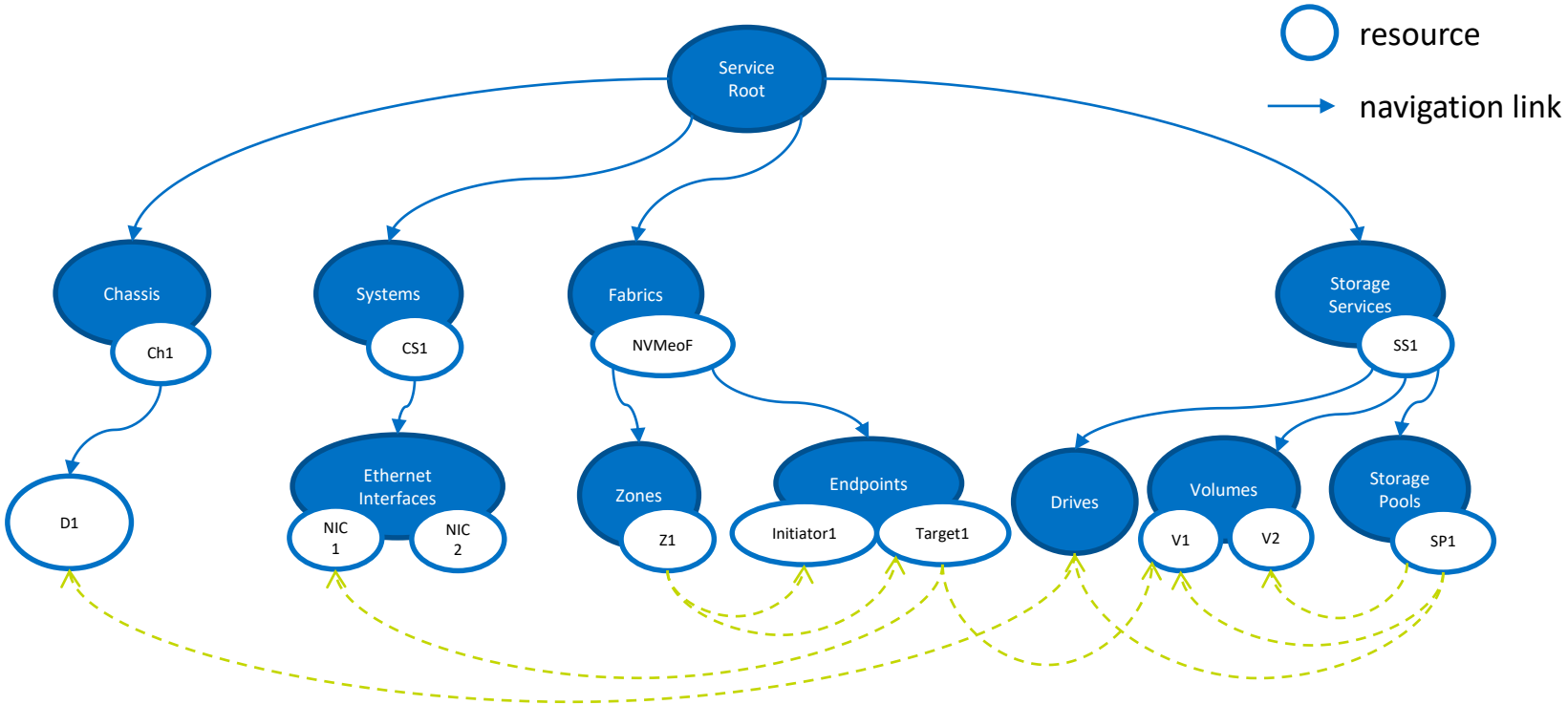
Why SPDK?

The Storage Performance Development Kit – a set of libraries providing:

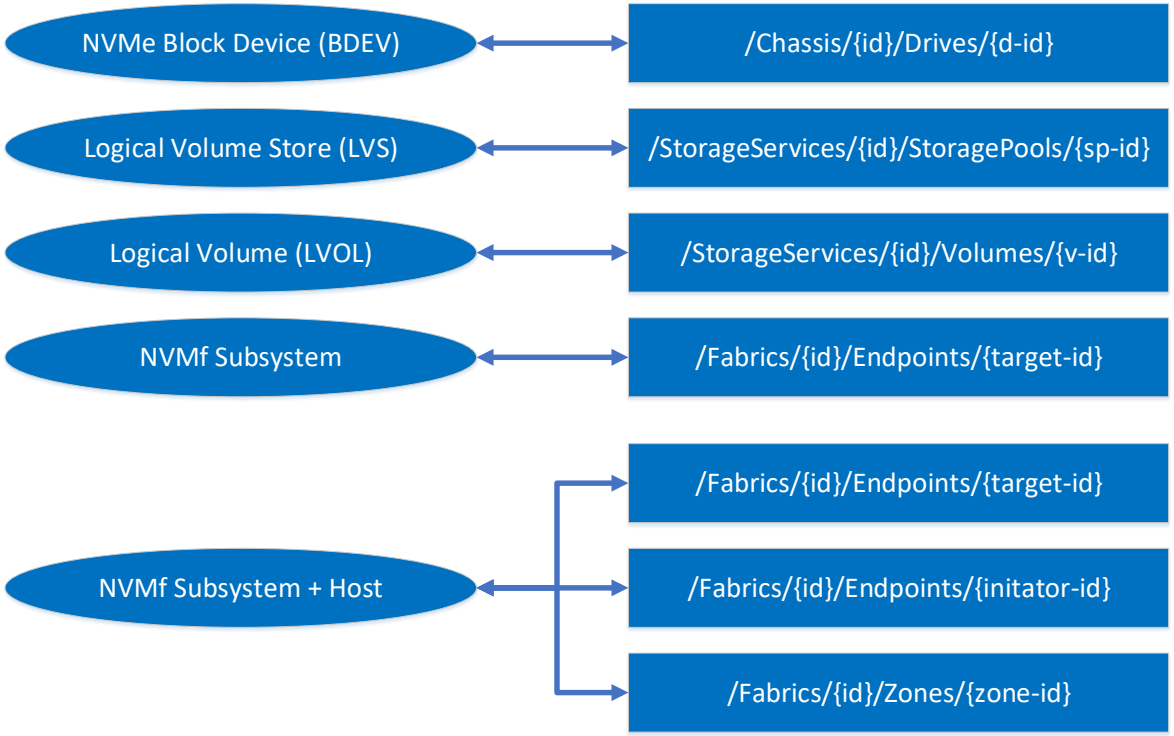
- High performance
- Scalability
- Low latency
- Efficient use of CPU and memory resources
- Modularity



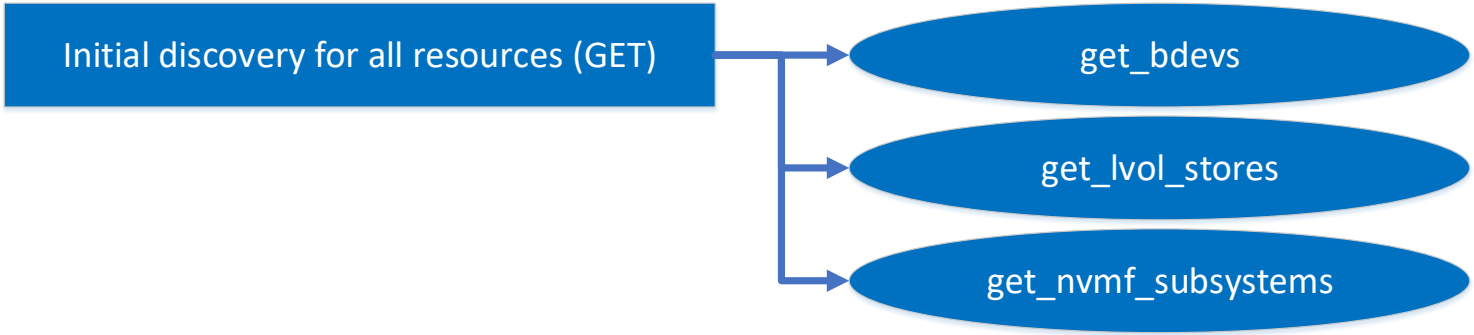
Storage Service and Common Fabric Model (Redfish + Swordfish)



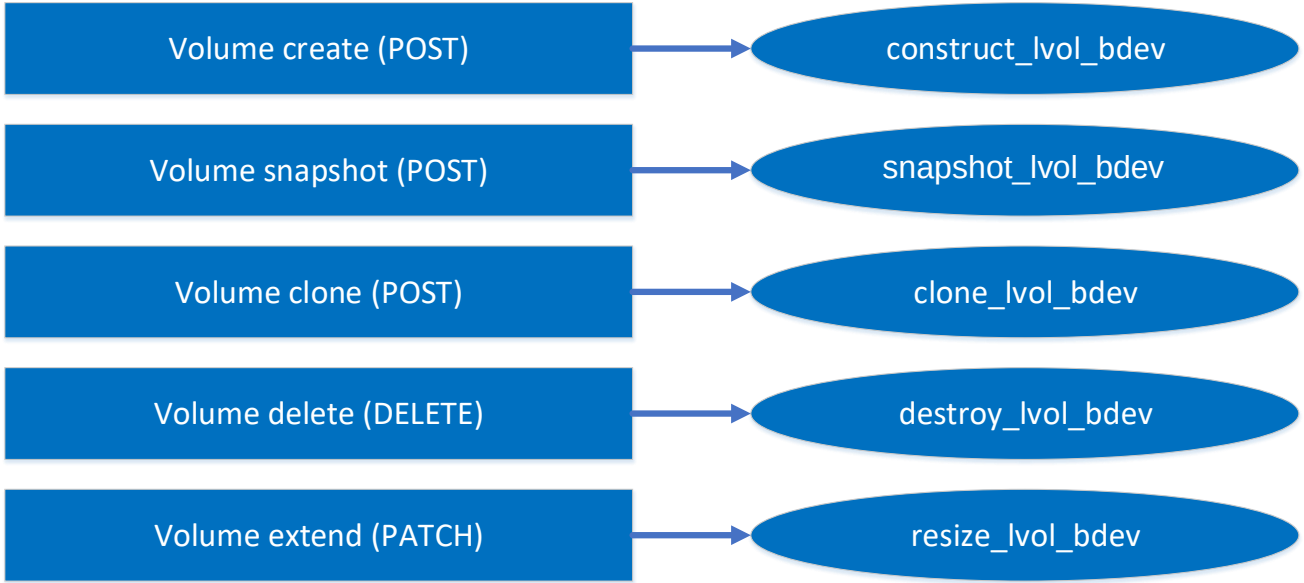
Intel® RSD 2.5 NVM over Fabrics SPDK to Redfish/Swordfish mapping



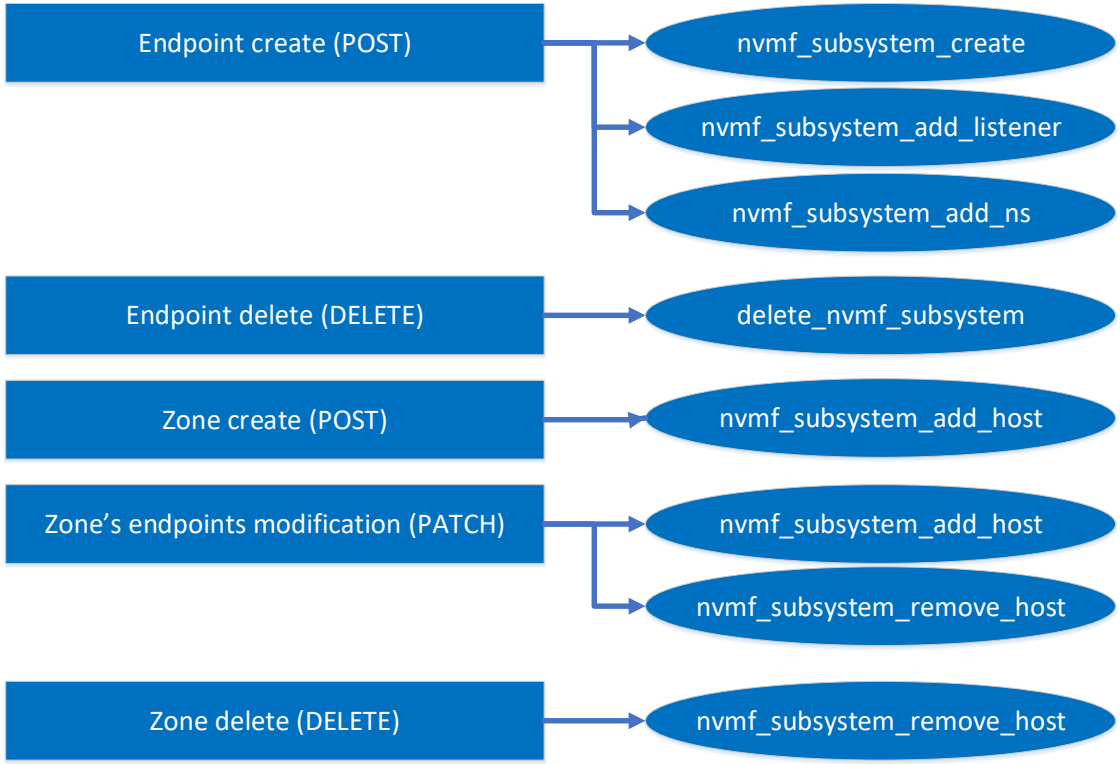
Intel® RSD 2.5 NVM over Fabrics Redfish/Swordfish actions to SPDK mapping

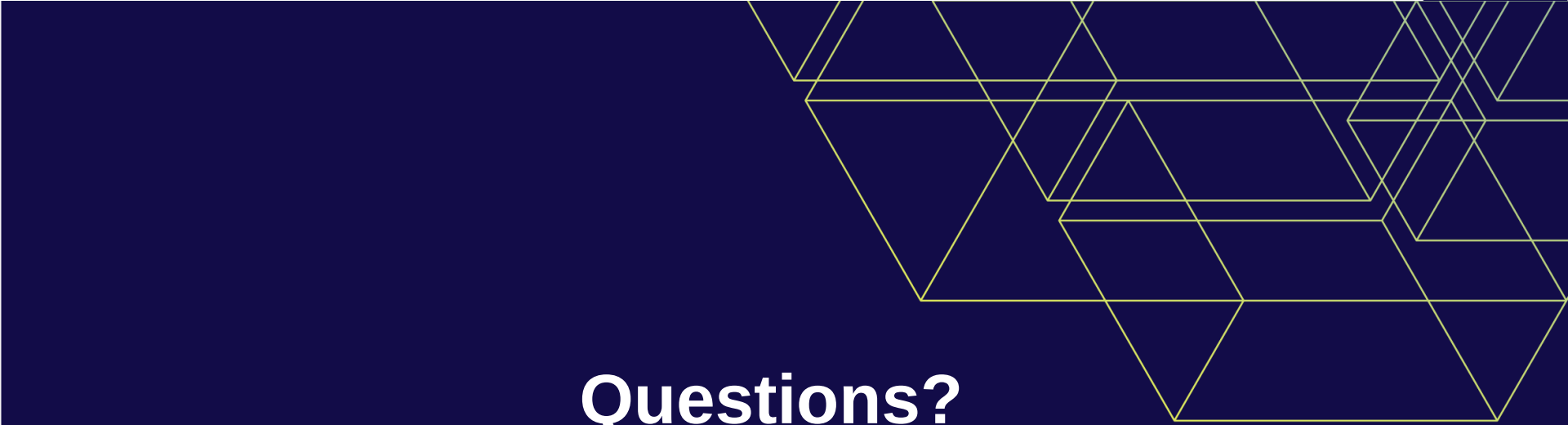


Intel® RSD 2.5 NVM over Fabrics Redfish/Swordfish actions to SPDK mapping



Intel® RSD 2.5 NVM over Fabrics Redfish/Swordfish actions to SPDK mapping





Questions?

Thank you