



BY Developers FOR Developers

Storage Developer Conference
September 22-23, 2020

What's New in SNIA Swordfish™

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Disclaimer

- The information in this presentation represents a snapshot of work in progress within SNIA
- This information is subject to change without notice.
- For additional information, see the SNIA website: www.snia.org/swordfish



Abstract

If you haven't caught the new wave in storage management, it's time to dive in and catch up on the latest developments of the SNIA Swordfish™ specification.

We will cover:

- New functionality included in the latest versions of Swordfish (and functionality added in Redfish to support Swordfish)
- Schema enhancements and simplifications: Moving /Storage to the Service Root
- Adding support to map NVMe and NVMe-oF to Redfish and Swordfish
- To accelerate implementations:
 - New documents added to the Swordfish family to help developers
 - ISO Standardization
 - New mockups on swordfishmockups.com showing more possible deployment permutations
 - Enhancements to the open source tools eco-system
- New supporting programs:
 - The Swordfish Conformance Test Program



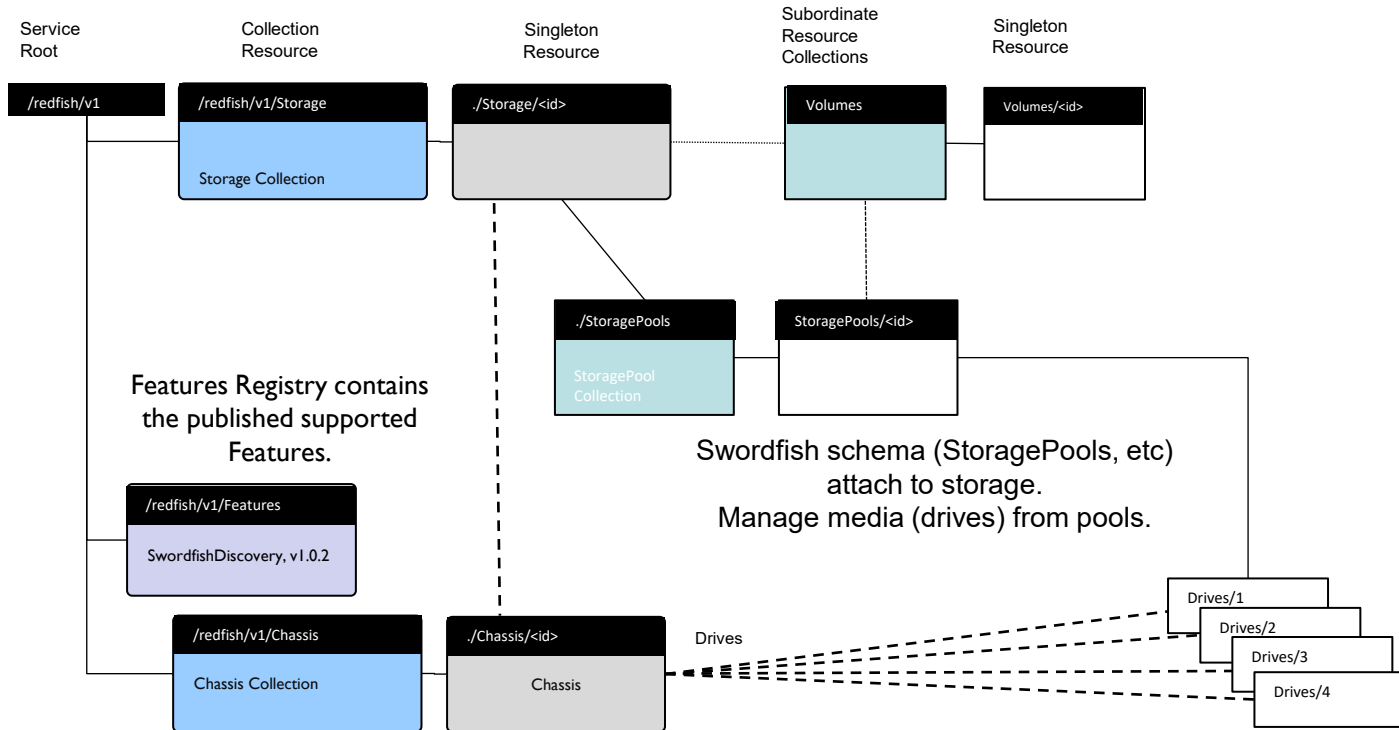
New Swordfish Functionality in 2020

- Add /Storage at the Service Root (required)
 - Support in schema, profiles
- Support for NVMe, NVMe-oF in Redfish and Swordfish
 - Enhancements to Redfish and Swordfish schema
 - Additional mockups in SNIA and DMTF
 - New NVMe-specific documentation: Swordfish NVMe Model Overview and Mapping Guide
 - NVMe use cases added to User's Guide
- Other Updates:
 - Schema changes to support implementation feedback and enhancement requests (Volume, StoragePool, StorageGroups)

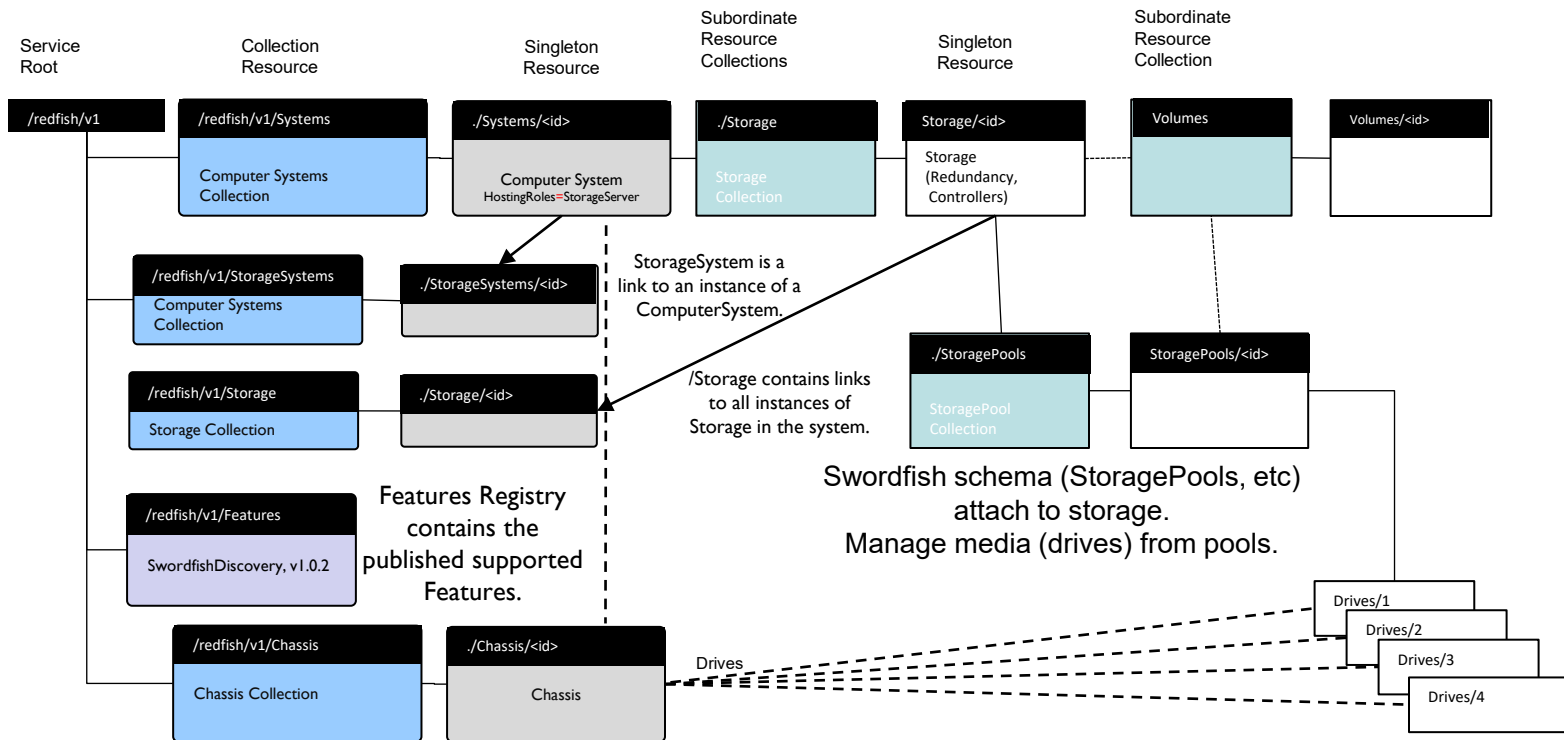
Storage at the Service Root

- Swordfish v1.2.0+: Clients will always be able to find Storage instances in `/redfish/v1/Storage`
- Simplifies search and system traversal
- Next two slides show two different implementation options; client can find both instances in `/redfish/v1/Storage`

Example 1: Standalone Configuration



Example 2: Integrated Configuration



NVMe and NVMe-oF: Mapping into Redfish and Swordfish

- A three-way joint effort between the SNIA, DMTF and NVM Express, hosted by the SNIA SSM TWG
- RF/SF use the available low-level transports to get device / transport specific information into the common models (models are transport agnostic)
 - RF/SF uses the commands that are provided in the NVMe/NVMe-oF/NVMe-MI specs
 - NVMe-MI can be used as the low-level to get the information into the high-level management environment as OOB access mechanism when appropriate
- Scope:
 - NVMe Subsystem, NVMe-oF and NVMe Domain Models

Overview of NVM Mapping: The Overall NVMe Subsystem Model

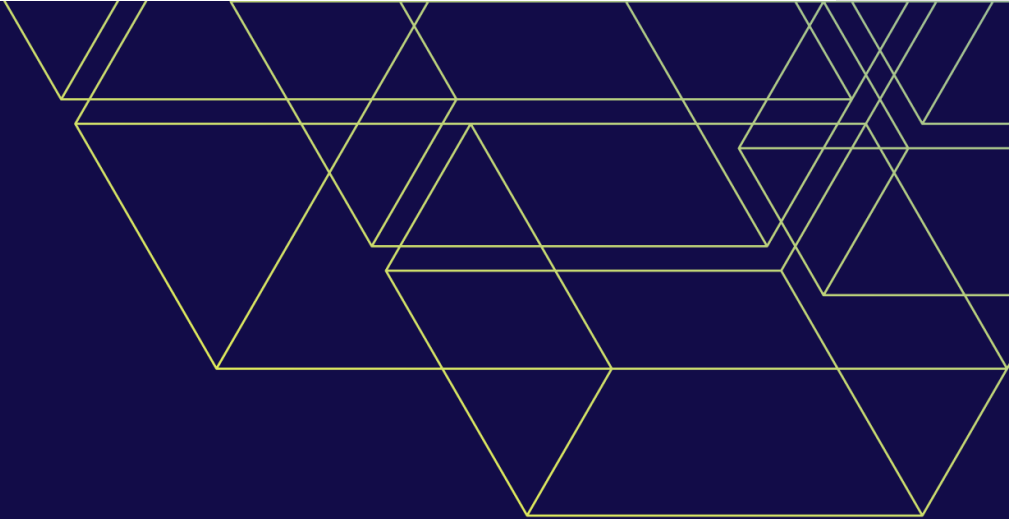
- Model reflects a unified view of all NVMe device types.
- Devices will instantiate an appropriate subset of the model
- The model diagrams do not reflect all available schema elements.
- Model leverages and coarsely maps to existing (Redfish and) Swordfish storage model

See *Swordfish NVMe Model Overview and Mapping Guide* for complete details.

Major NVM Objects Mapped to RF/SF

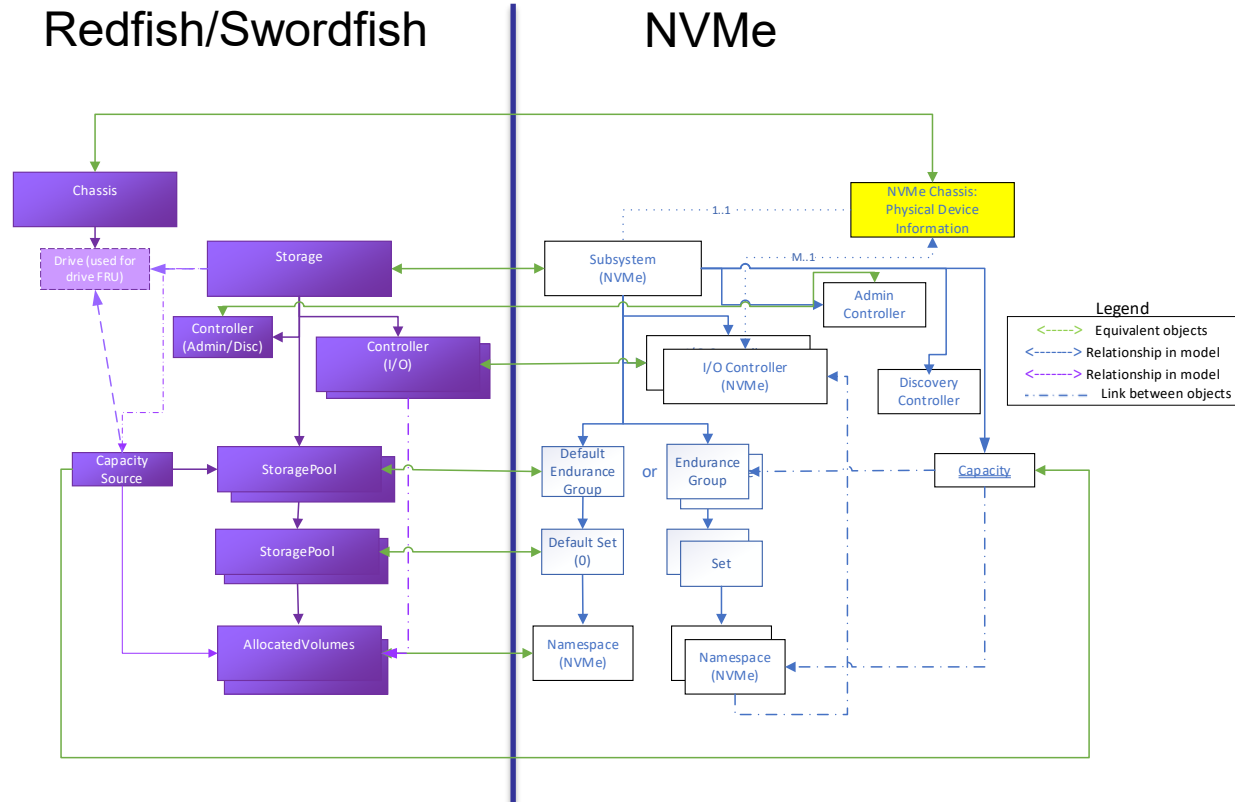
- Mapping focuses on major NVM objects:
 - NVM Subsystem
 - NVM Controller (IO, Admin and Discovery)
 - Namespace
 - Endurance Group
 - NVM Set
 - NVM Domain

Concepts mapped to existing Storage model, adding additional properties and enhancements where needed.



NVMe Subsystem: Model

NVMe Subsystem Model





Sample instantiations

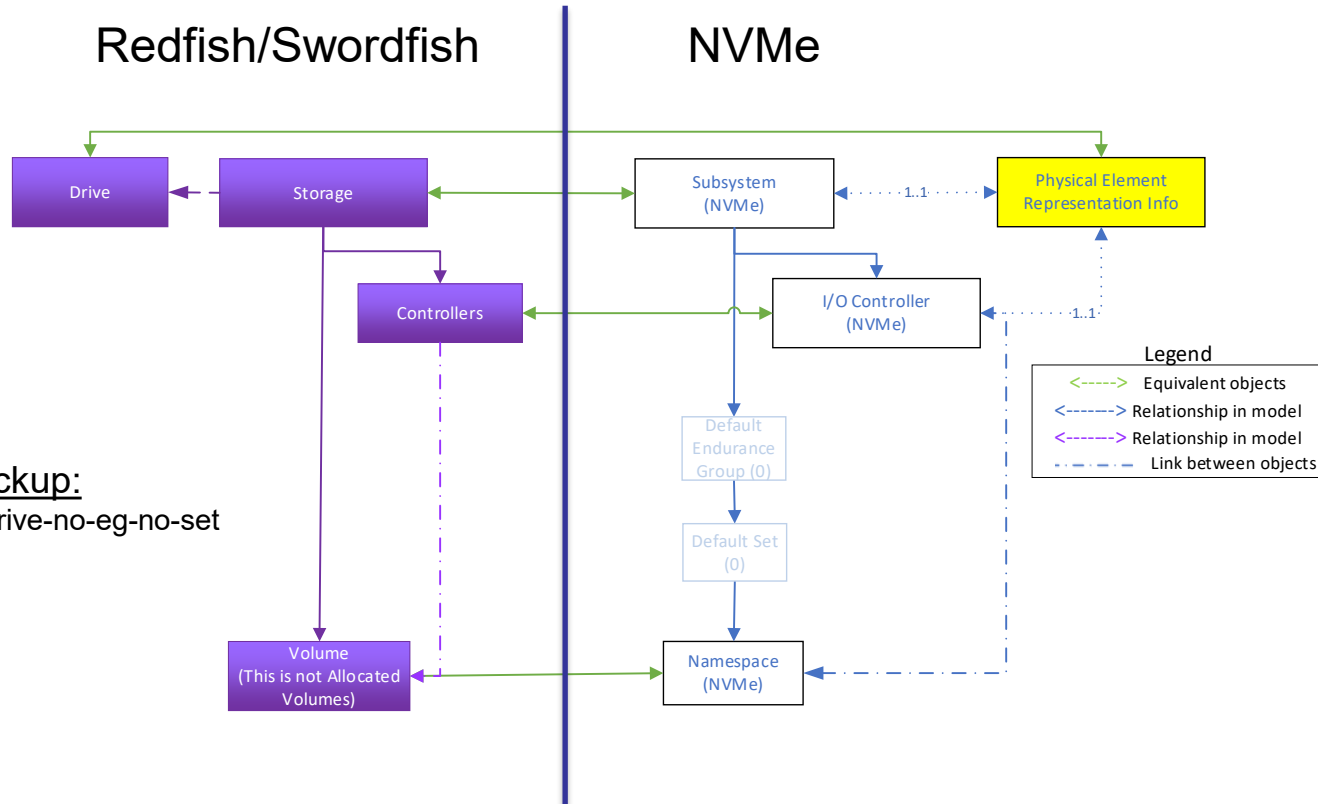
Sample Instantiations – Mockups correspond to these

Mapped Models and Documented Permutations

- Device Model – NVMe
 - Simple SSD
 - Default Endurance Group / Default Set
 - Single Endurance Group / Single Set
 - JBOF – PCIe front-end attach to set of drives
 - EBOF – Ethernet front-end attach to set of drives
 - Fabric Attach Array
 - RBOF – Simple RAID front-end attach to set of drives
 - Opaque Array
 - Front end is NVMe, back end is vendor choice (may incorporate existing technologies with NVMe)
- Subsystem (Fabric) Model – NVMe-oF
 - Fabric-attached subsystem presenting logical subsystem, controller, namespace, port and allowed host
 - Simple SSD with NVMe-oF Attach
 - Default Endurance Group / Default Set
- NVMe Domains

Yellow – TBD Mockups

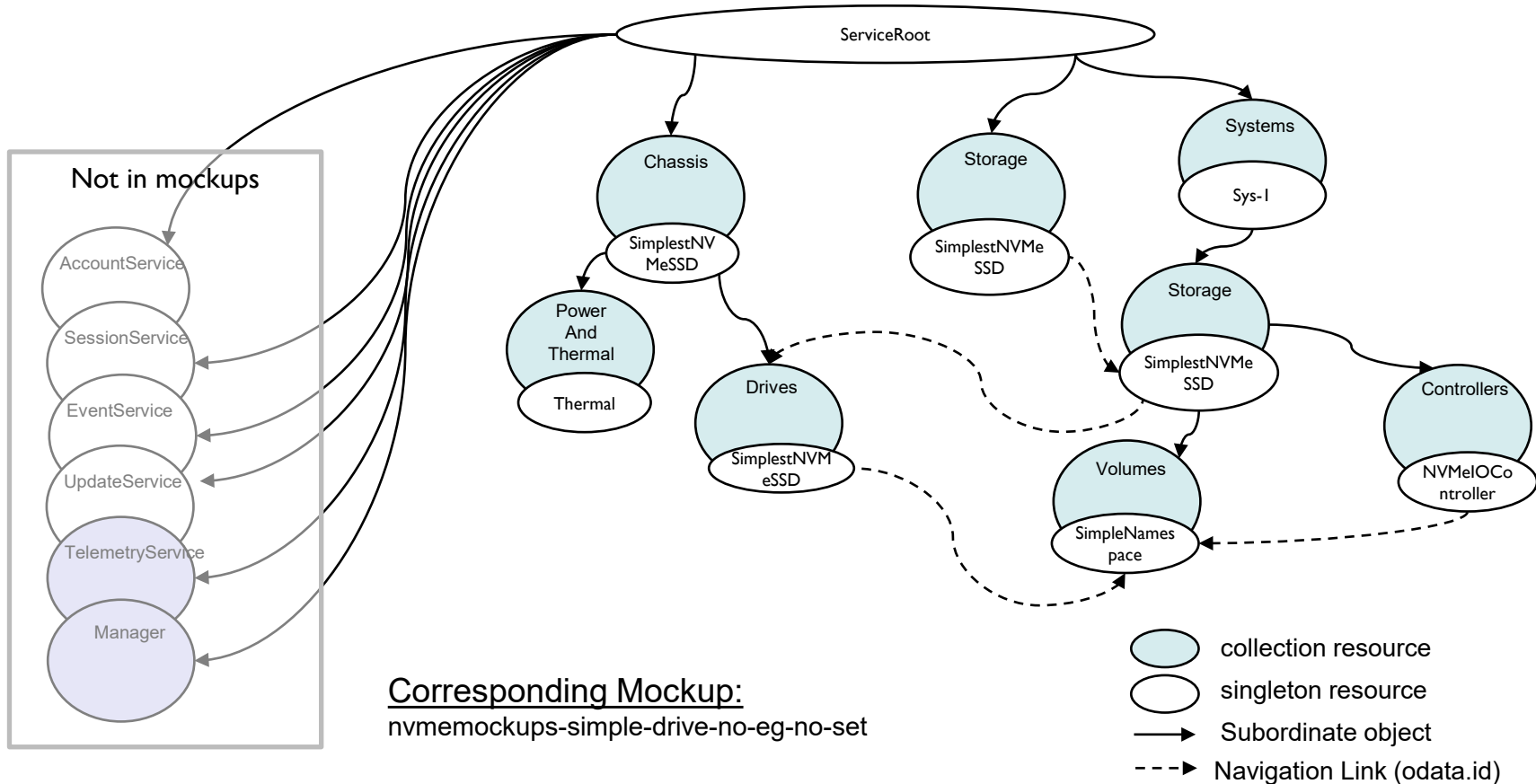
Simple SSD Implementation: Default Endurance Group and Set (Not Implemented in RF / SF)



Corresponding Mockup:

`nvmemockups-simple-drive-no-eg-no-set`

Simple NVMe Drive: No Namespace Mgmt, No EG, No Set



Corresponding Mockup:
 nvmemockups-simple-drive-no-eg-no-set

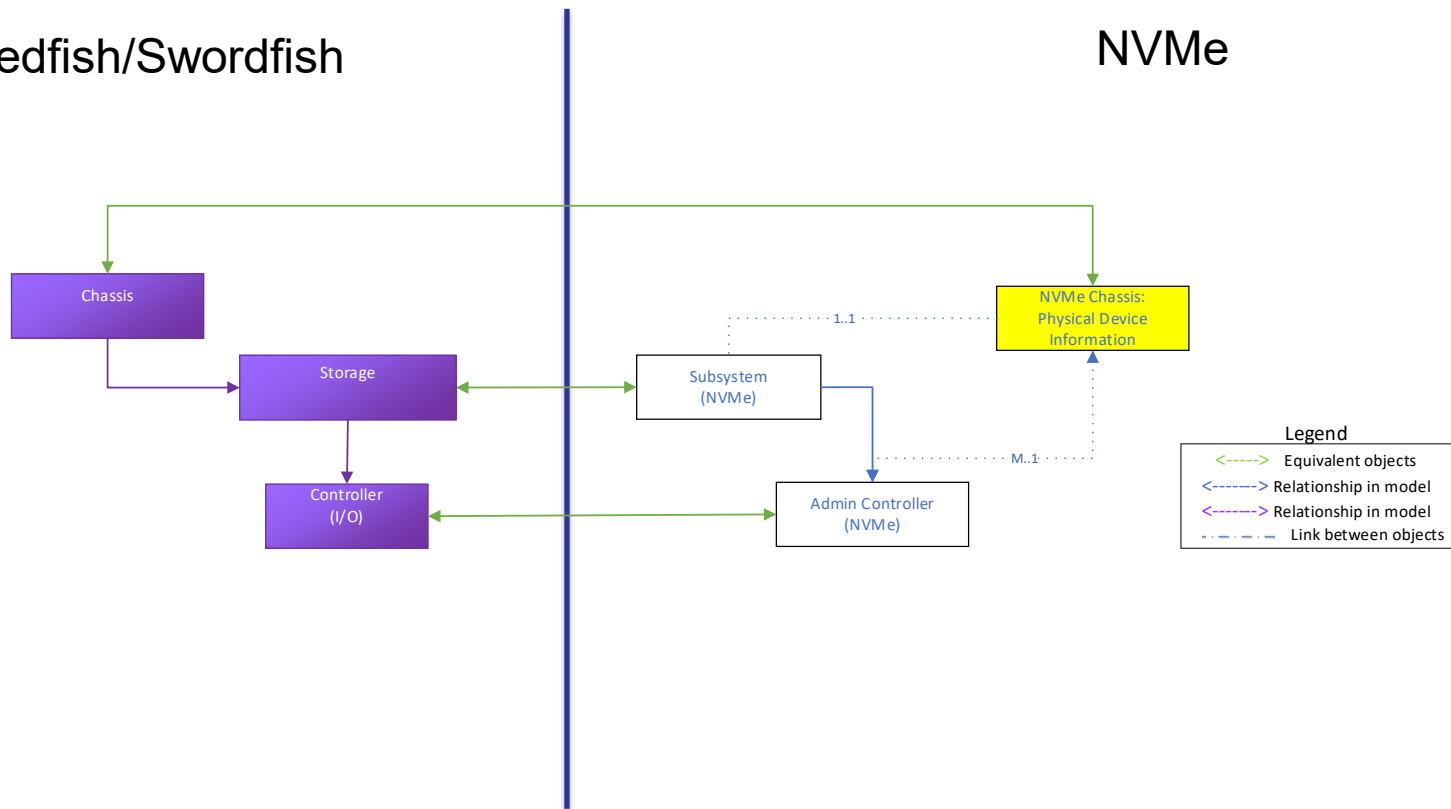
- collection resource
- singleton resource
- Subordinate object
- - - Navigation Link (odata.id)

NVMe JBOF: Controller Only

Corresponding Mockup:
[nvme-jbof-mockups](https://github.com/StorageNinja/nvme-jbof-mockups)

Redfish/Swordfish

NVMe



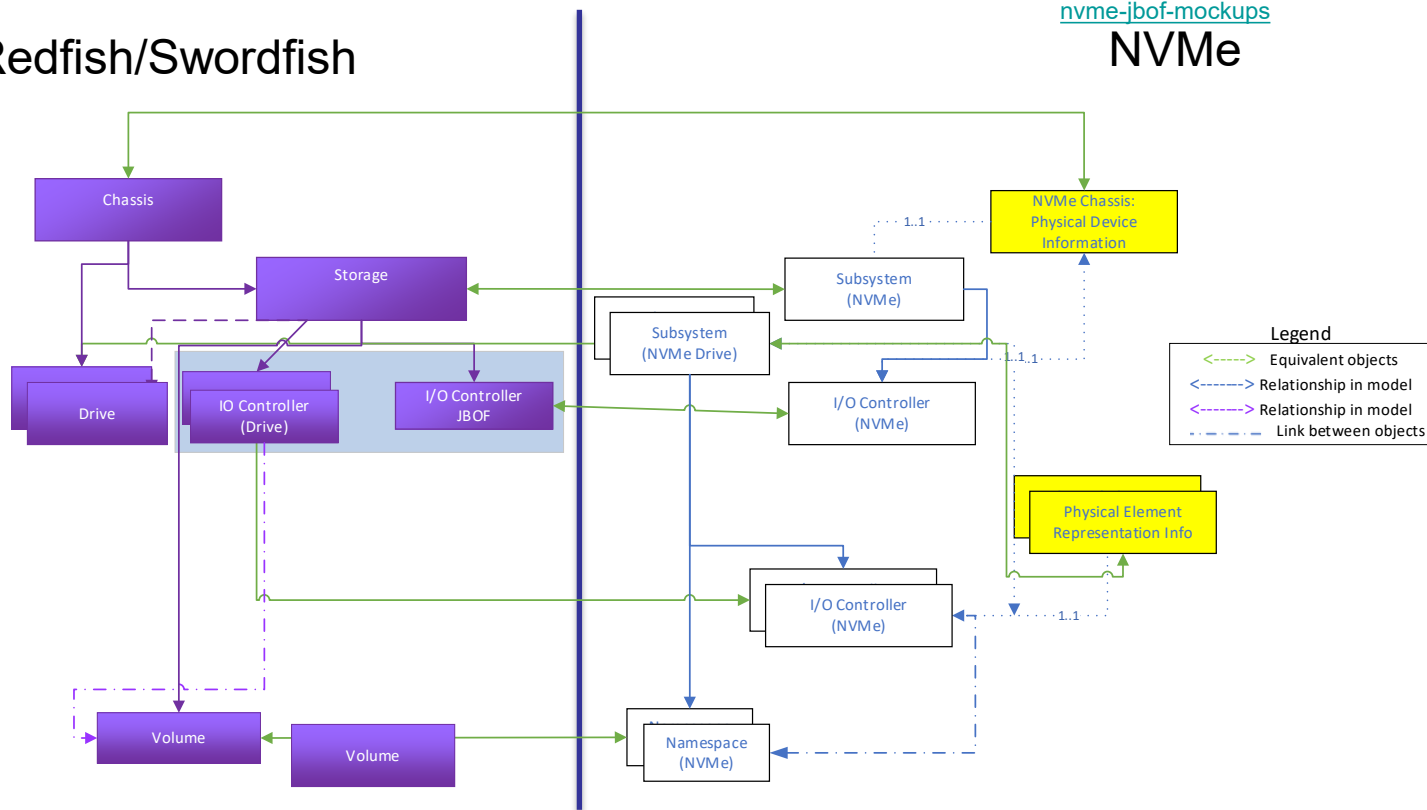
NVMe JBOF: Controller Plus Drives

Corresponding Mockup:

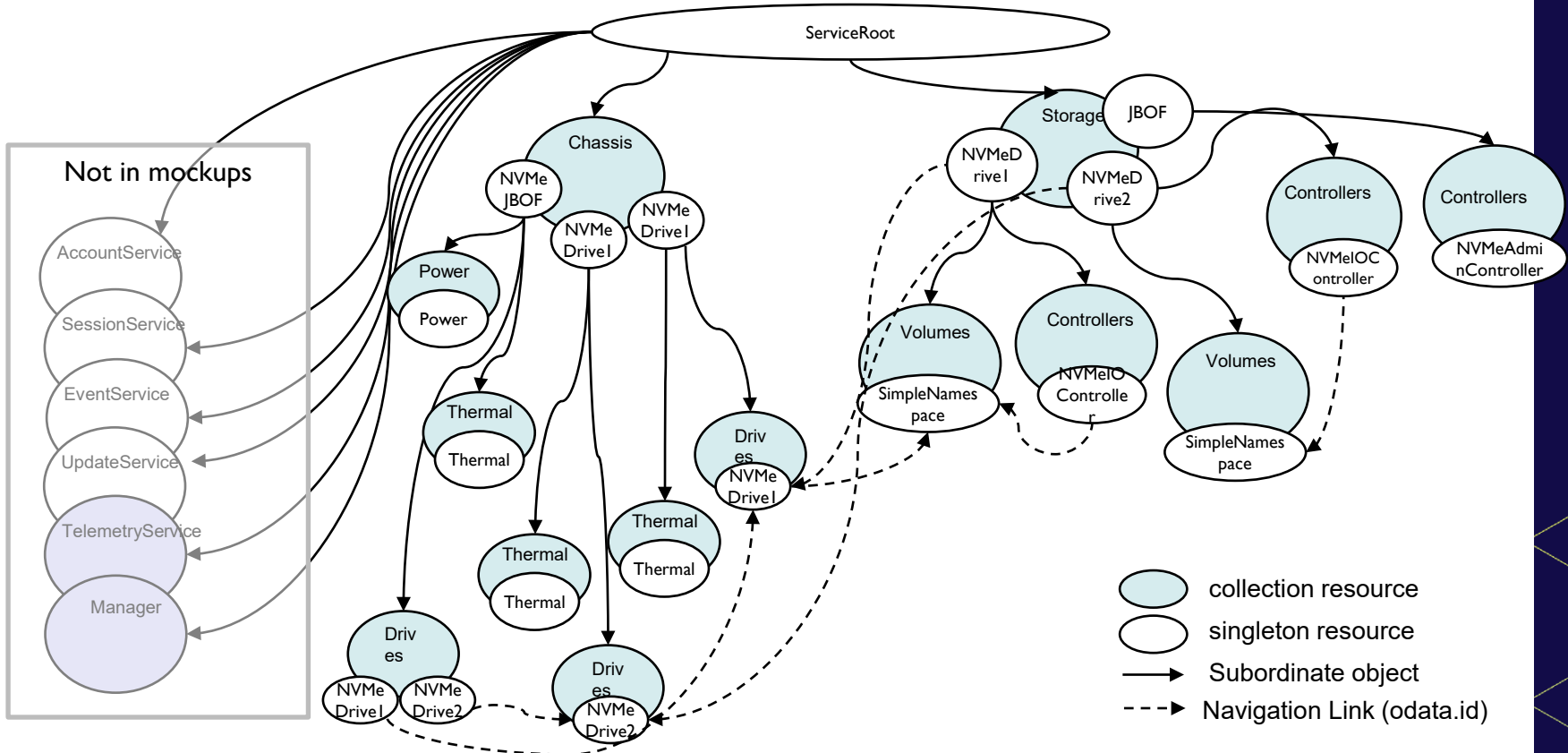
[nvme-jbof-mockups](#)

NVMe

Redfish/Swordfish



NVMe JBOF: Controller Plus Drives (2 Drives Shown)





NVMe-OF: Model

NVMe-oF: Subsystem Model

Redfish/Swordfish

NVMe

NVMe-oF Model:
Subsystem Target View

Subsystem Model

Logical NVMe-oF

Storage
(Logical Subsystem)

Controller
(Logical Controller)

Volume
(Logical Namespace)

Fabrics

Endpoints
(Logical Port)

Zones

Connections
(Allowed Hosts)

Chassis

Drive (used for
drive FBU)

Network Adapter

NetworkPort

Network Device
Function

Storage

Controller

Capacity
Source

StoragePool

StoragePool

Volume

Subsystem
(NVMe)

I/O Controller
(NVMe)

Default
Endurance
Group

Default Set
(0)

Namespace
(NVMe)

or

Endurance
Group

Set

Namespace
(NVMe)

Capacity

NVMe Chassis:
Physical Device
Information

Logical NVM Subsystem
(NVMe-oF)

Logical I/O Controller
(NVMe-oF)

Logical Namespace
(NVMe-oF)

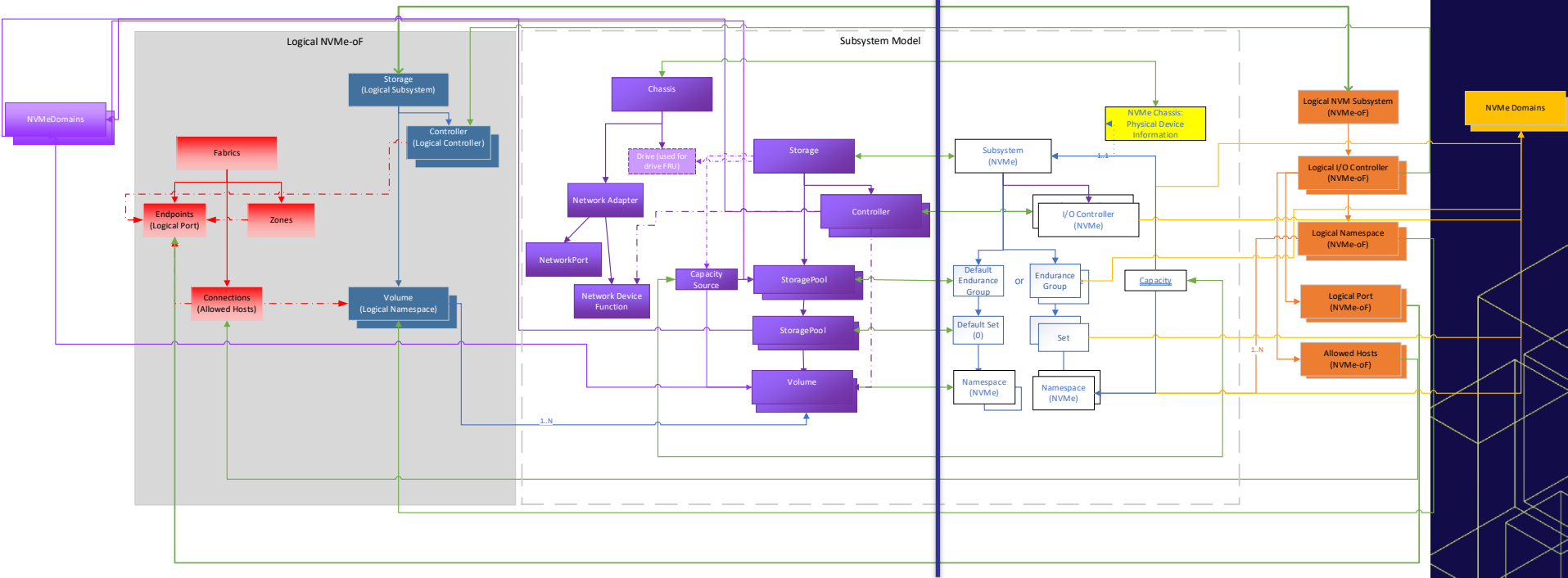
Logical Port
(NVMe-oF)

Allowed Hosts
(NVMe-oF)

NVMe-oF: Model with Domains

Redfish/Swordfish

NVMe

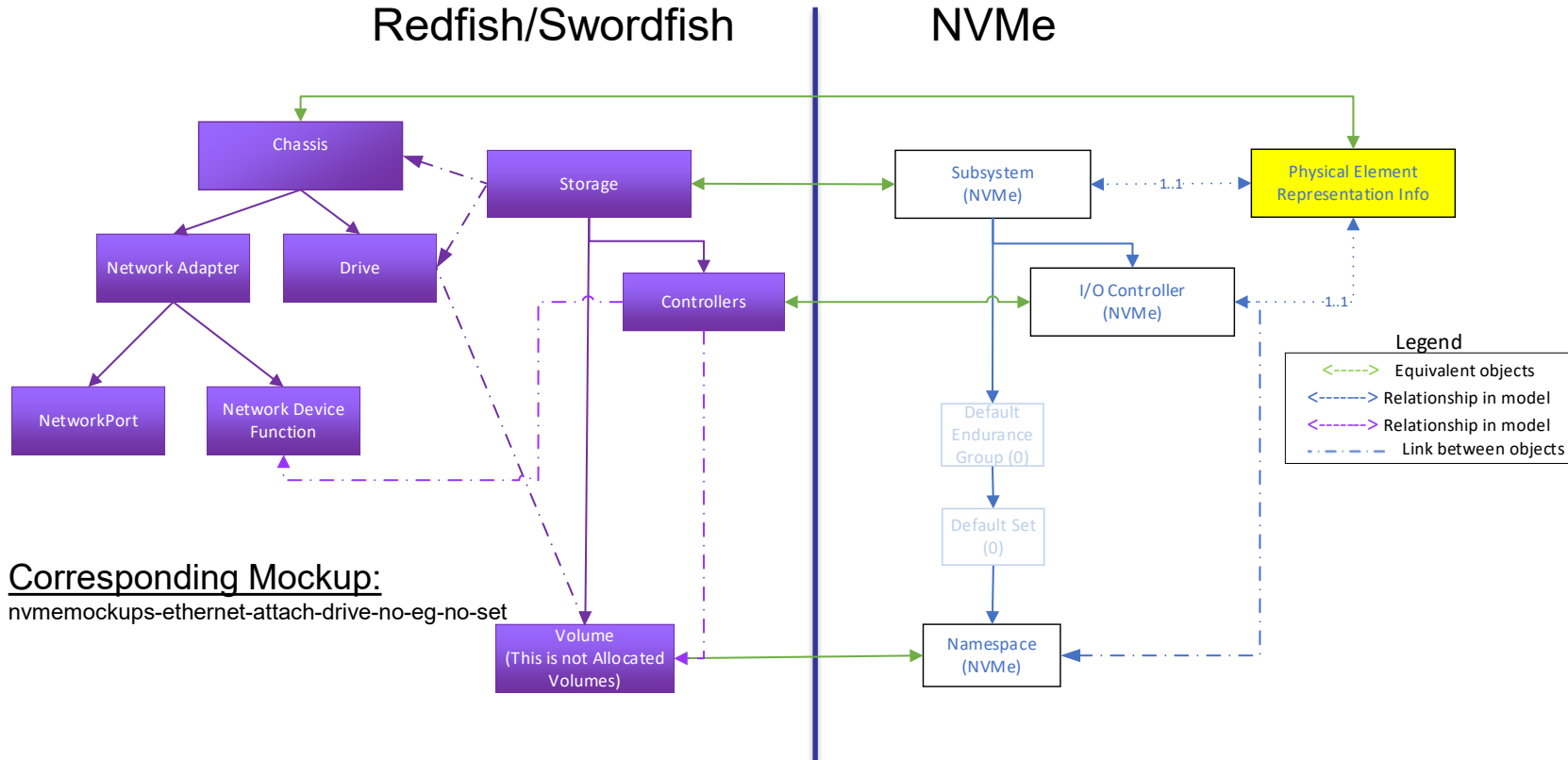




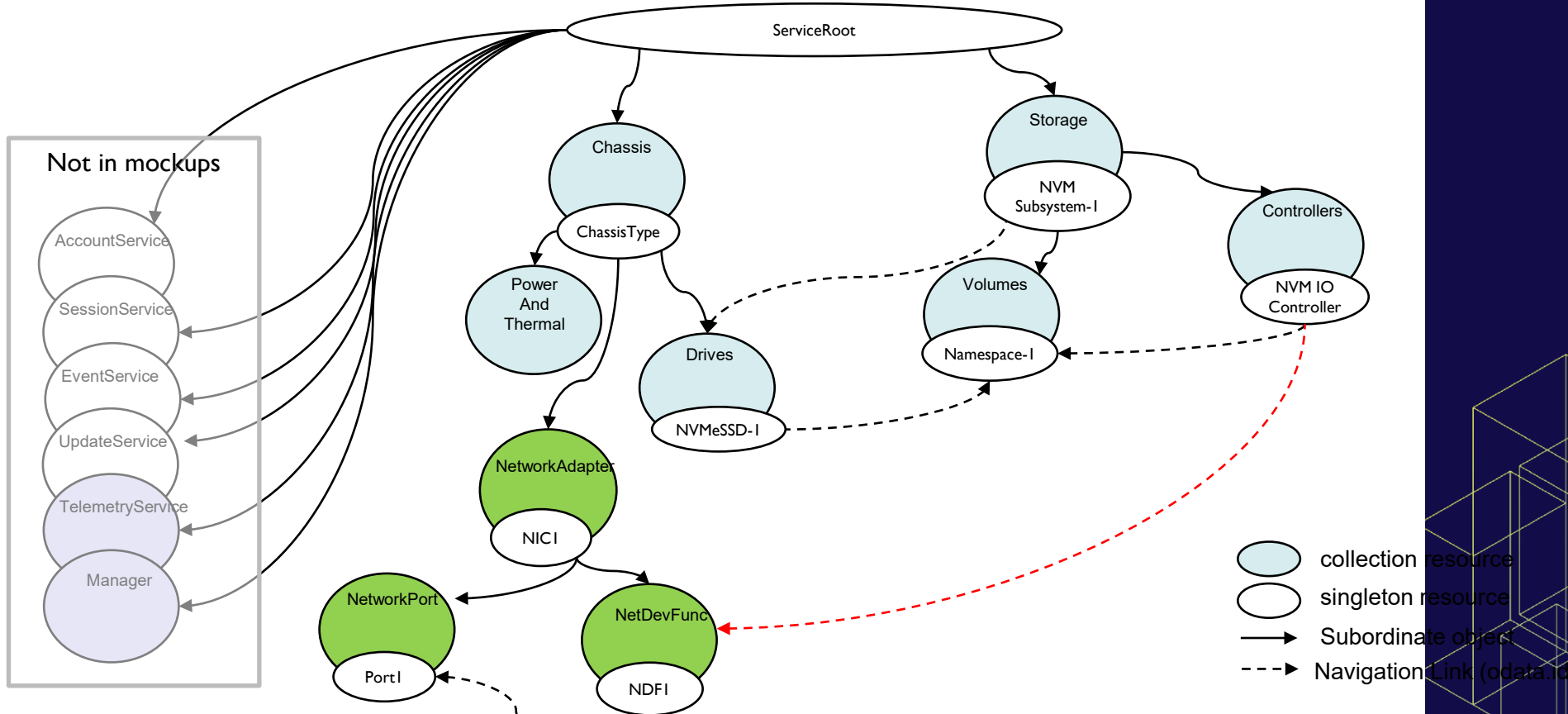
Sample instantiations

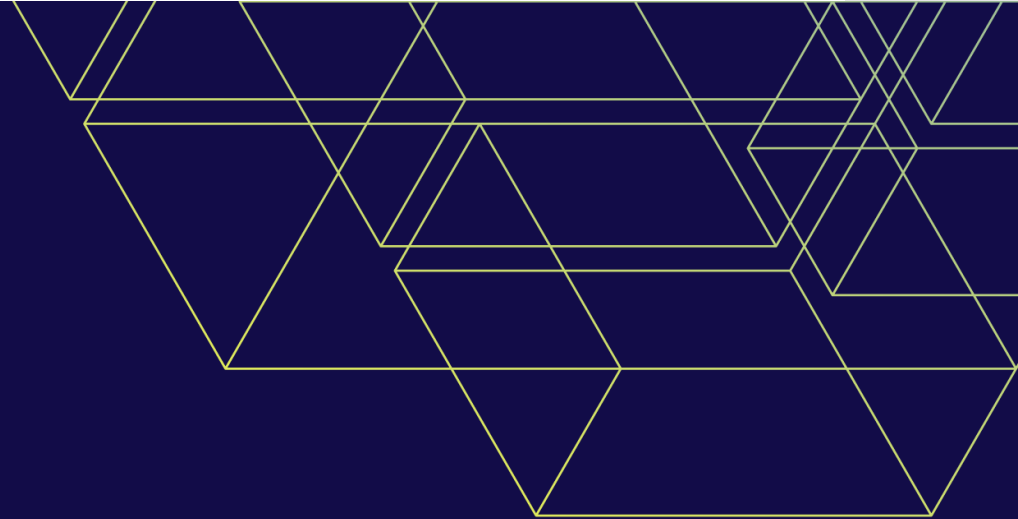
Sample Instantiations – Mockups correspond to these

Simple SSD with NVMe-oF Attach (not NVMe TP 6011)



Simple NVMe Drive Network / Ethernet Attach (not TP 6011)





Additional Content

New Documents

- Swordfish Error Handling Guide
 - Provides a summary of the preferred handling of errors and error messages in a Swordfish implementation, and is targeted as a guide for implementers
- Swordfish NVMe Model Overview and Mapping Guide
 - Defines the model to manage NVMe and NVMe-oF storage systems with Redfish and Swordfish, and provides the detailed mapping information between the NVMe, NVMe-oF specifications and the Redfish and Swordfish specifications.

New Mockups Features in 2020

Revamped swordfishmockups.com site, with new mockups for v1.1.0 and v1.2.x configurations:

<http://swordfishmockups.com/>

Swordfish Standalone Configurations

[Midrange External System Mockup](#)

[Midrange System with Replication Mockup](#)

Swordfish Integrated Configuration

[Direct-Attach Storage Mockup](#)

Service-Based Configurations

[Hosted Service Configuration Mockups](#)

NVMe and NVMe-oF Configurations

[Device Model – NVMe](#)

NVMe SSD Configurations:

[Default Endurance Group / Default Set Mockup](#)

[Single Endurance Group / Single Set Mockup](#)

[JBOF Mockup](#)

[Fabric Attach Array Mockup](#)

[Opaque Array Mockup](#)

Subsystem (Fabric) Model – NVMe-oF

[Fabric-attached subsystem Mockup](#)

[Simple SSD with NVMe-oF Attach Mockup](#)

SNIA Swordfish™ Mockups Site

SNIA Swordfish Mockups

Overview

Welcome to the SNIA Swordfish Mockup site.

You can use this site to "test drive" a set of static, example Swordfish systems and learn how Swordfish is constructed. Note that the Swordfish mockups are not designed to be an interactive system; they simply provide an overview of the overall Swordfish model, and an example static view of possible configurations.

The Swordfish mockups show the types of information that can be modeled by a storage system in different configurations. They show the types of information that may be returned in these configurations, but do not represent an actual implementation. There are Swordfish mockups that show four different block storage system instances, as well as one file system.

There are two ways to navigate to each storage system; from Swordfish v1.2.0 forward, you can now find storage systems in a Swordfish service directly from the ServiceRoot in the /Storage collection (/redfish/v1/Storage). If the system has instrumented the value-add StorageServices feature, there will also be a /StorageServices collection at the ServiceRoot.

Available Mockups

The Swordfish mockups show the types of information that can be modeled by a storage system in different configurations. They show the types of information that may be returned in these configurations, but do not represent an actual implementation. There are Swordfish mockups that show four different block storage system instances, as well as one file system.

The following list provides an index to the various set of mockups. Click on each mockup link to get a description and link to the mockup.

Swordfish Standalone Configurations

- [Midrange External System Mockup](#)
- [Midrange System with Replication Mockup](#)

Swordfish Integrated Configuration

- [Direct-Attach Storage Mockup](#)

Service-Based Configurations

- [Hosted Service Configuration Mockups](#)

NVMe and NVMe-oF Configurations

Device Model – NVMe

NVMe SSD Configurations:

There are two mockups of SSD Drives. One shows the expectation for a typical NVMe drive, conforming to the existing NVMe specifications, which doesn't instrument endurance groups or sets (or instruments a default endurance group / NVM set). This is reflected in the Redfish/Swordfish schema as "not instrumented" for simplicity, as the corresponding implementation in the drives is, effectively, no functionality as well. The second mockup shows a drive "with" a single endurance group and a single set.

- [Default Endurance Group / Default Set Mockup](#)
- [Single Endurance Group / Single Set Mockup](#)
- [JBOF Mockup](#)
- [Fabric Attach Array Mockup](#)
- [Opaque Array Mockup](#)

Subsystem (Fabric) Model – NVMe-oF

- [Fabric-attached subsystem Mockup](#)
- [Simple SSD with NVMe-oF Attach Mockup](#)

ISO Standardization

- The SNIA Swordfish specification has started the process to become an ISO specification (projected process completion date: sometime in 2021)
 - Availability as an international standards

Expanded Tools Ecosystem

- Automated / offline build and test infrastructure for Swordfish schema and mockup contributors
 - Multiple tests now available to test validity against schema
- New open source tools...
 - Windows Powershell toolkit – open source tools for Windows developers to accelerate Swordfish development
- (More details in tools preso)

What is Swordfish CTP?

- Swordfish CTP:
 - A vendor-neutral test suite to validate conformance to the SNIA Swordfish Specification
 - Uses the Redfish specification, Swordfish Specification and published Swordfish Profiles to determine compliance
 - Profiles define required subsets of functionality that implementations can advertise as customer “Features”
 - Each Feature corresponds to key customer functionality

Swordfish Conformance Test Program

- SNIA Swordfish CTP Program in development
 - Framework and test infrastructure in place, CTP dev team working on integration of automated and enhanced tests

Ready to Participate?

- We are working with companies now to “test the tests”.
 - Please contact us at storagemanagement@snia.org if you are interested in joining the SNIA Swordfish CTP Program
- Full program launch coming soon...

Thank you for watching

- **SNIA Swordfish™ Standards**
 - Schemas, Specs, Mockups, Users Guide, Practical Guide & more
<https://www.snia.org/swordfish>
- **Redfish / Swordfish Specification Forum**
 - This is where you can ask and answer questions about Redfish and Swordfish
 - <http://swordfishforum.com/>
- **Scalable Storage Management (SSM) TWG**
 - Technical Work Group that defines Swordfish
 - Influence the next generation of the Swordfish standard
 - Join SNIA and participate: https://www.snia.org/member_com/join-SNIA
- **Join the SNIA Storage Management Initiative**
 - Unifies the storage industry to develop and standardize interoperable storage management technologies
 - <https://www.snia.org/forums/smi/about/join>





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