

STORAGE DEVELOPER CONFERENCE



Fremont, CA  
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*BY Developers FOR Developers*

A **SNIA** Event

# Open Industry Storage Management with SNIA Swordfish™

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# Abstract

- If you haven't caught the new wave in storage management, it's time to dive in. This presentation provides a broad look at the Redfish and Swordfish ReSTful hierarchies, maps these to some common applications, and provides an overview of the Swordfish tools and documentation ecosystem developed by SNIA's Scalable Storage Management Technical Work Group (SSM TWG) and the Redfish Forum. It will also provide an overview of what's new in '22, including enhancements to NVMe support, storage fabric management, and capacity and performance metric management.
- Learning Objectives
  - Help the audience understand the broad fundamentals of SNIA Swordfish
  - Describe how the Swordfish API functions
  - Define the Swordfish ecosystem

# What are Redfish and Swordfish?

DMTF Redfish™ covers server, data center, basic fabric management

- REST API with JSON payloads; choice of CSDL, JSON and YAML schema for development

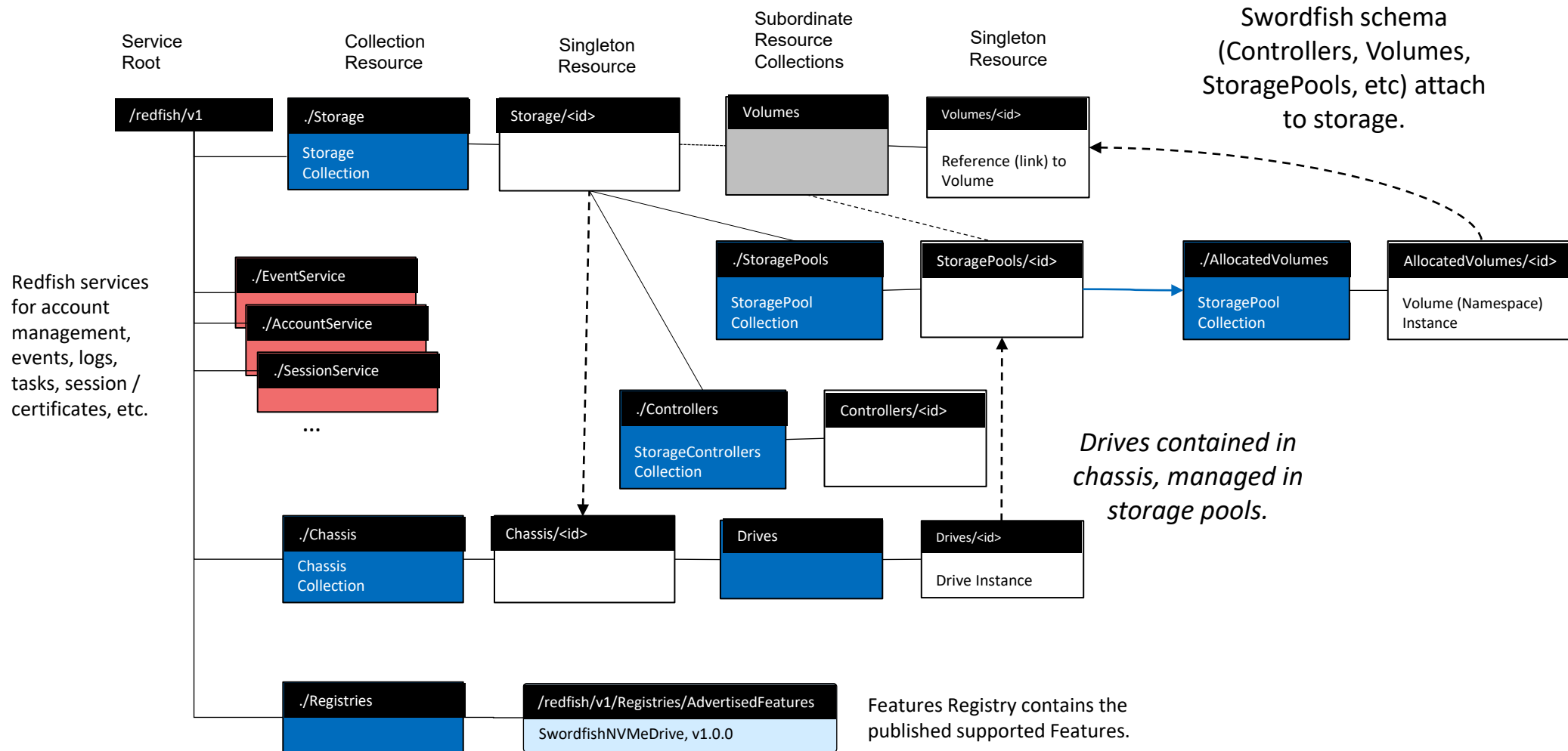
SNIA Swordfish™: Storage Management Specification with REST Based API extends DMTF's Redfish Specification

Swordfish adds storage management to all of these use cases, plus storage fabric management

- Covers block, file, and object storage
- Extend traditional storage domain coverage to include converged environments (servers, storage and fabric together)
- Provides the option for implementation to utilize Class of Service (intent or service level) based provisioning, management, and monitoring
- NVMe / NVMe-oF devices (through an Alliance partnership with NVM Express® and DMTF)
- Storage Fabric Management: An alliance partnership with OFA, DMTF is expanding support in RF/SF for fabrics and storage fabrics management

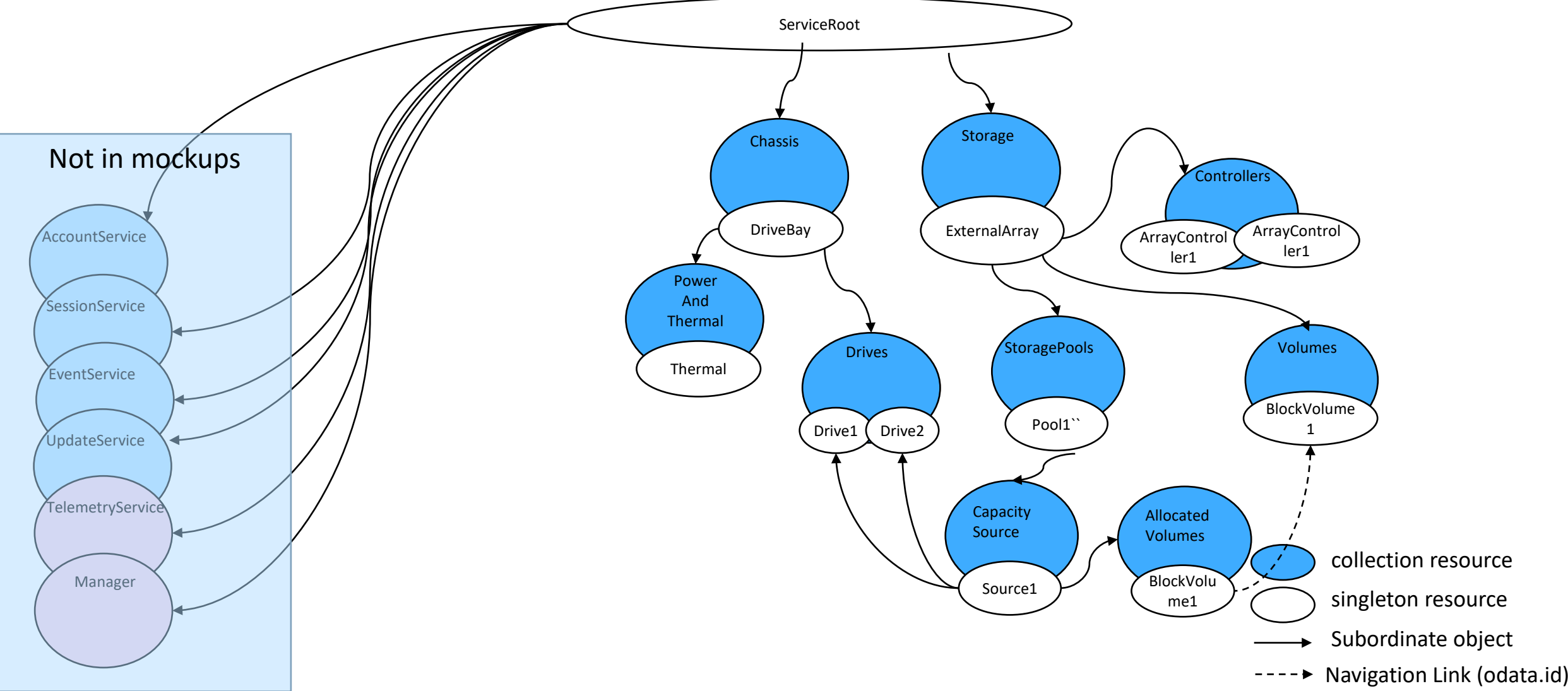


# Building on the Redfish Hierarchical for Swordfish Advanced Storage

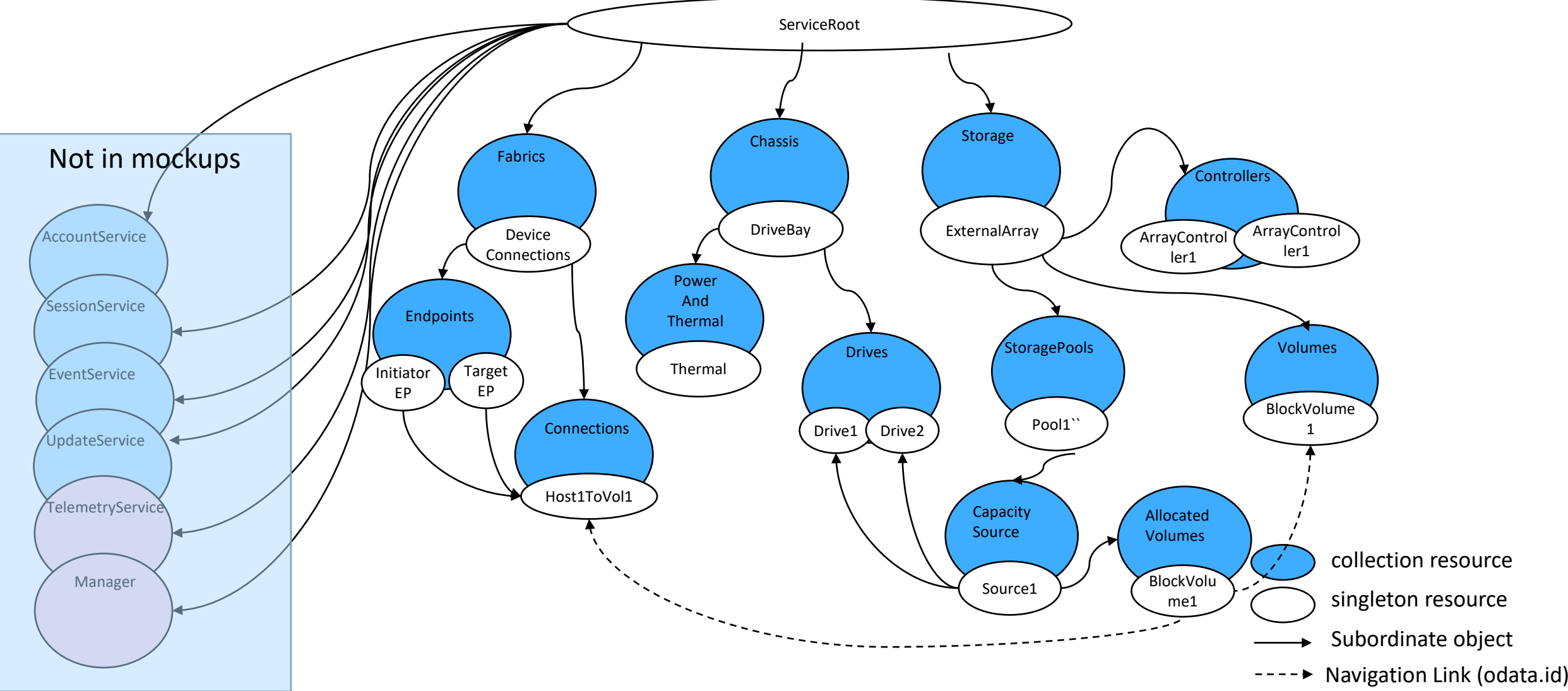


# Swordfish Configurations

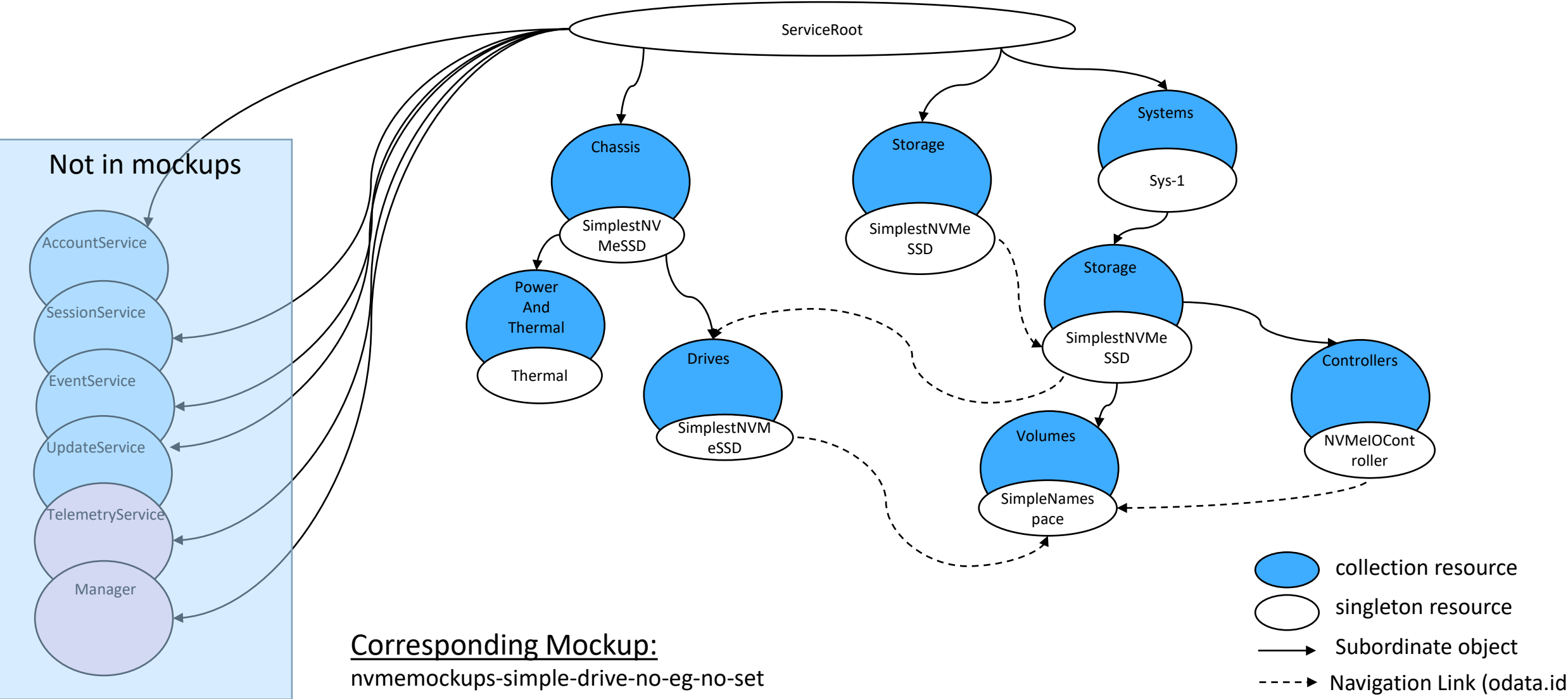
# Simple External Array (The Basics)



# Simple External Array (Adding Mapping)

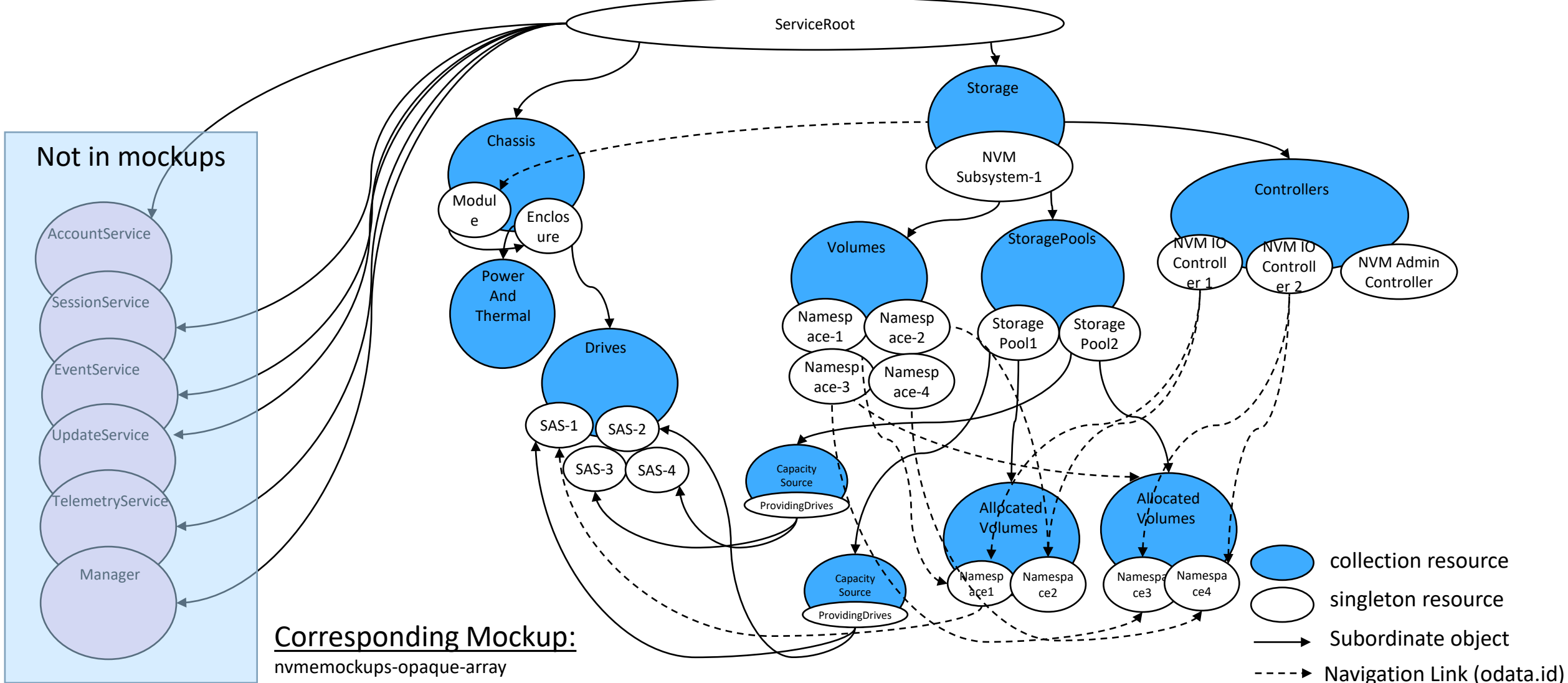


# Simple NVMe Drive: No Namespace Mgmt, No EG, No Set





# “Opaque” Array: NVMe Front-end, SAS Backend (Hybrid)



# What's New in 2022



## ■ Expanding Functionality

- Expanded support for NVMe and NVMe-oF Devices: Through an Alliance partnership with NVM Express®, RF/SF (Redfish and Swordfish) have added NVMe / NVMe oF manageability
- Managing Storage Fabrics: An alliance partnership with OFA is expanding support in RF/SF for fabrics and storage fabrics management

## ■ Enhanced Documentation

- **NEW:** Swordfish Property Guide – quick reference for developers
- Expanded User's Guide, Mapping Guide, Error Handling Guide
- **New white paper:** Metrics and Telemetry in Swordfish

# Expanding Support for NVMe and NVMe-oF

- NVMe model/device support added in v1.2.0+
  - v1.2.4 released April 2022, SNIA Standard v1.2.4a in August 2022
  - v1.2.3 last update (Q3 '21)
- NVMe specific content
  - Spec / schema updates for new properties
  - Updated NVMe specific use cases in User's Guide
  - NVMe Model Overview and Mapping Guide
    - Detailed descriptions for developers to implement NVMe management interfaces
    - NVMe and NVMe-oF management models: Models reflect a unified view of all NVMe device types (universal model).
  - Mockups: [swordfishmockups.com](http://swordfishmockups.com)
  - Profiles: NVMe Drives, Ethernet-attached drives, advanced NVMe drive features; NVMe Front-End (used for complex devices such as arrays)
    - Profiles feed Swordfish Conformance Test Program
    - CTP Testing available for NVMe Drives
- In v1.2.4:
  - Specifications / profiles / mockups / use cases for: NVMe JBOF, NVMe EBOF; NVMe-oF exported logical subsystems
  - Enumeration of usage: Access rights management; connectivity management
- New releases will continue to track new NVM Express features

# NVMe Functionality

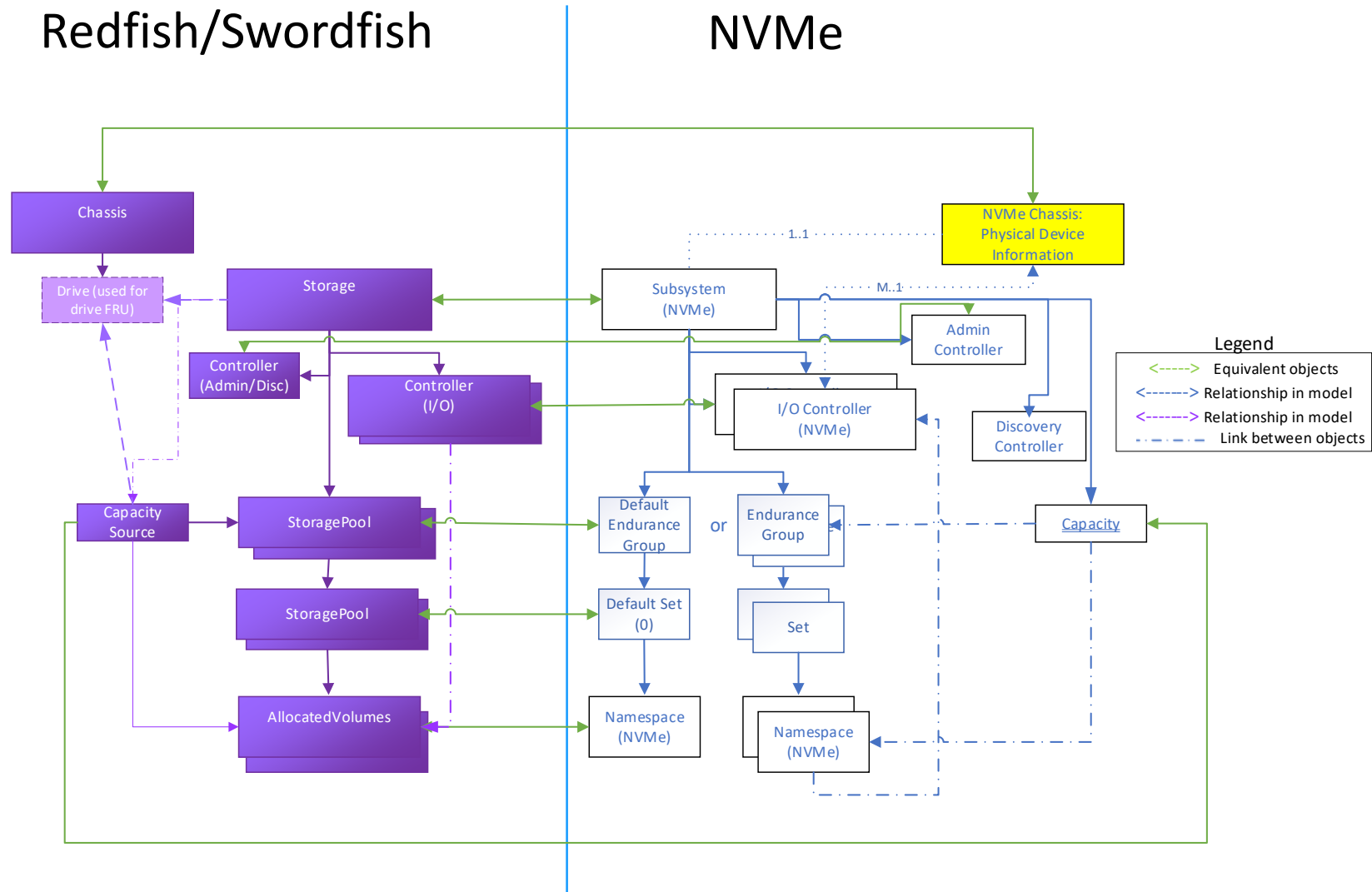
## Mapped NVMe objects to existing RF/SF model

- NVM Subsystem
- NVM Controllers (IO, admin, discovery)
- Namespaces
- Endurance groups
- NVM Sets

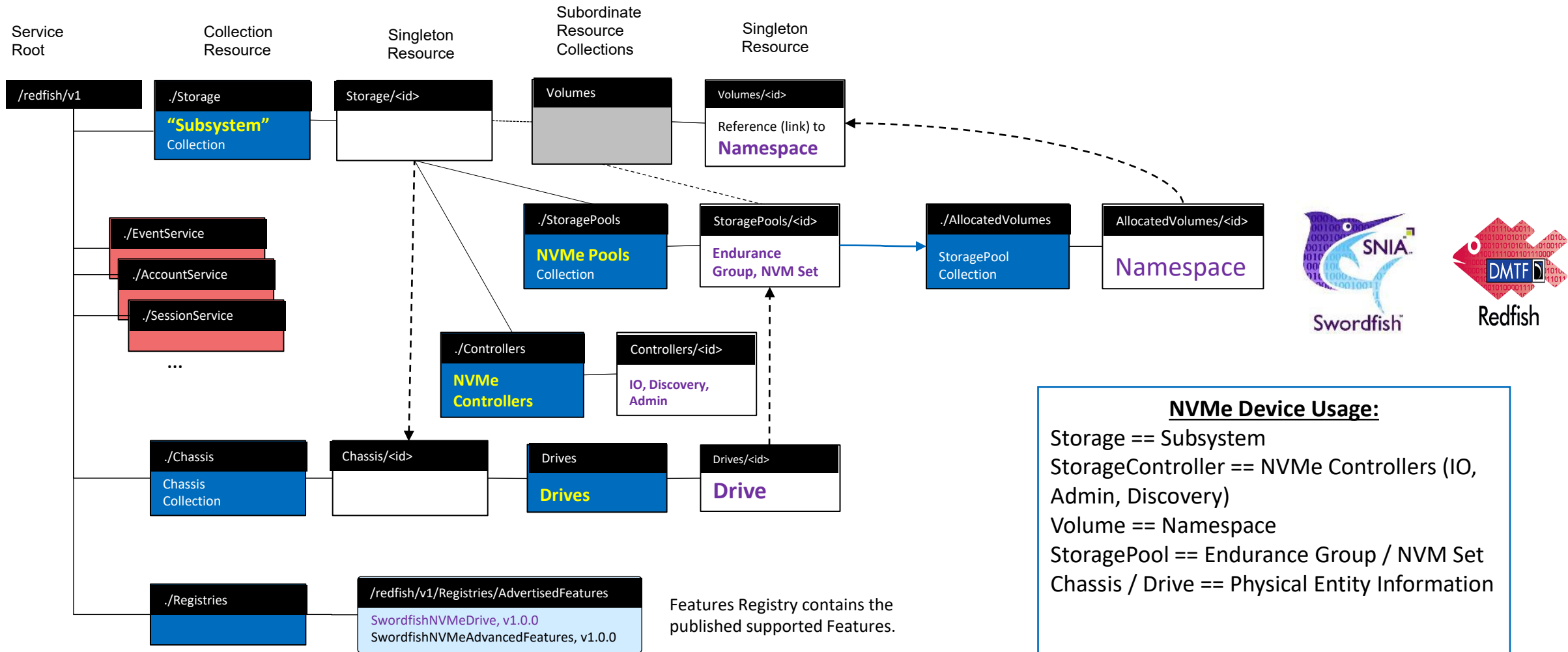
## Create new objects where needed

- NVMe Domains

# NVMe Subsystem Model



# Swordfish and NVMe: Common Usage



# Enterprise Storage Management Concerns

## ■ Scalability

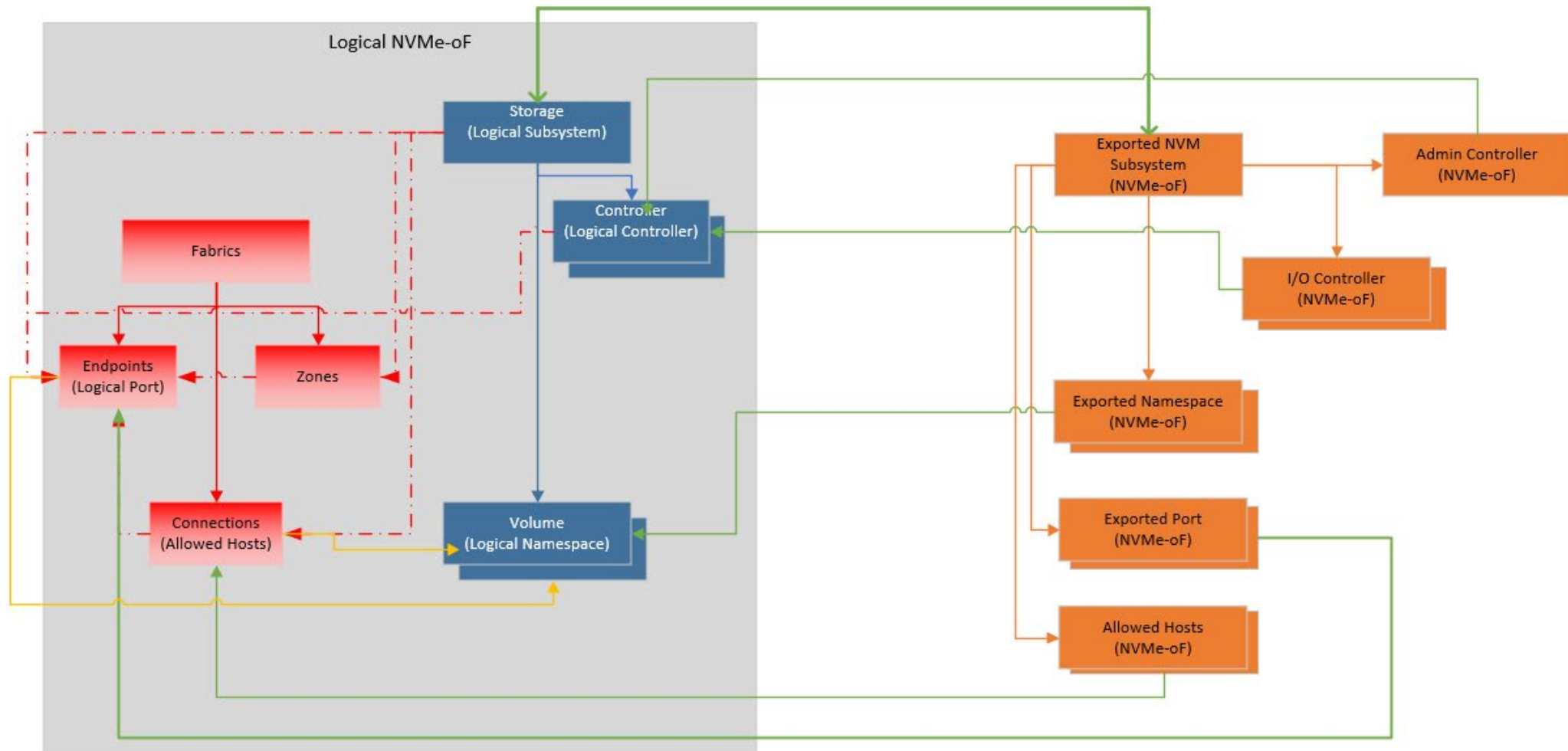
- Scale out orchestration of 10's of thousands of devices possible by using a RESTful API such as DMTF Redfish™ and SNIA Swordfish™
  - Devices can represent their own management information directly
  - Standard service definitions for aggregation, composition

## ■ Enabling Orchestration

## ■ Connectivity

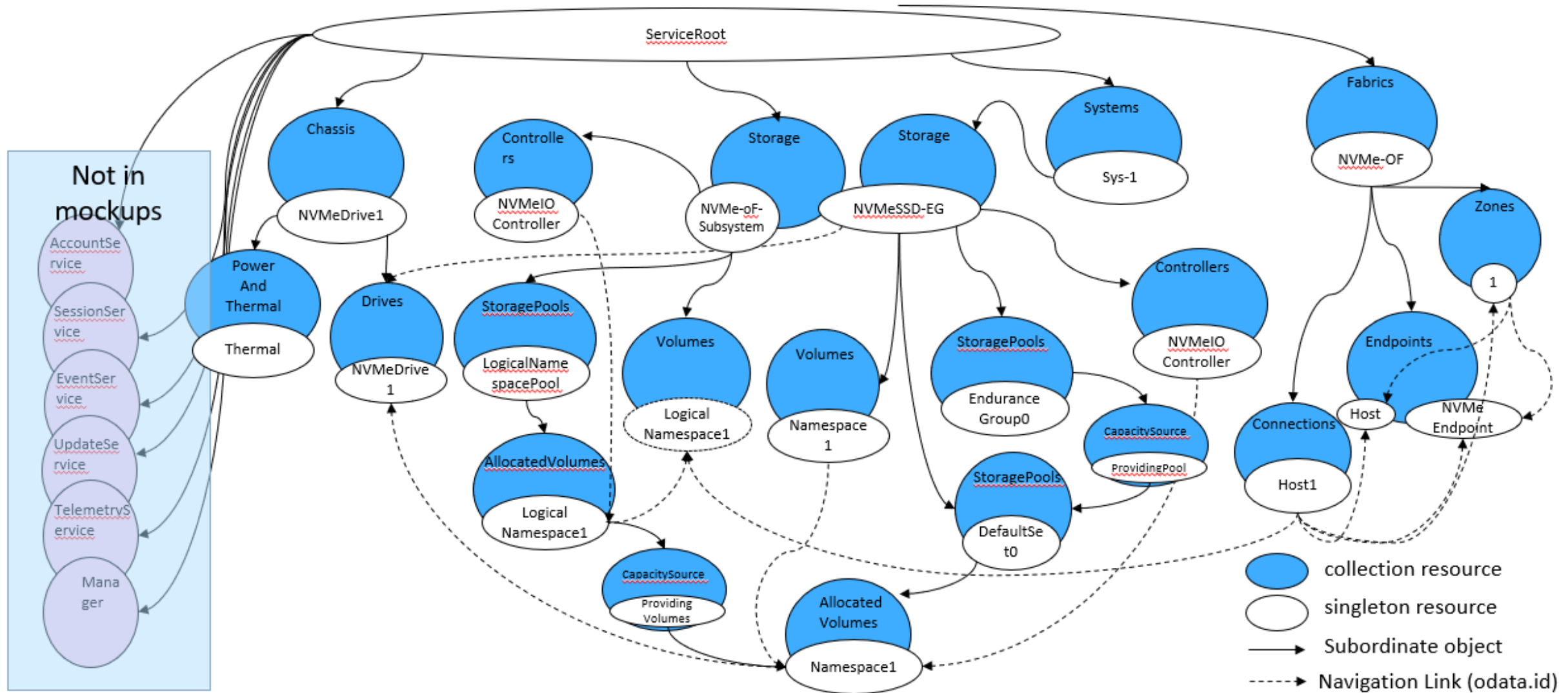
- SNIA is working with DMTF and OFA to apply (and extend) Redfish Fabric Model to multiple fabric types
  - Redfish: basic technology instrumentation
- When basic fabric management in place, adding storage-specific capabilities
  - Storage fabric management
  - Workload optimization
  - Performance instrumentation

# NVMe-oF Exported Logical Subsystem Model

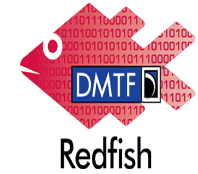
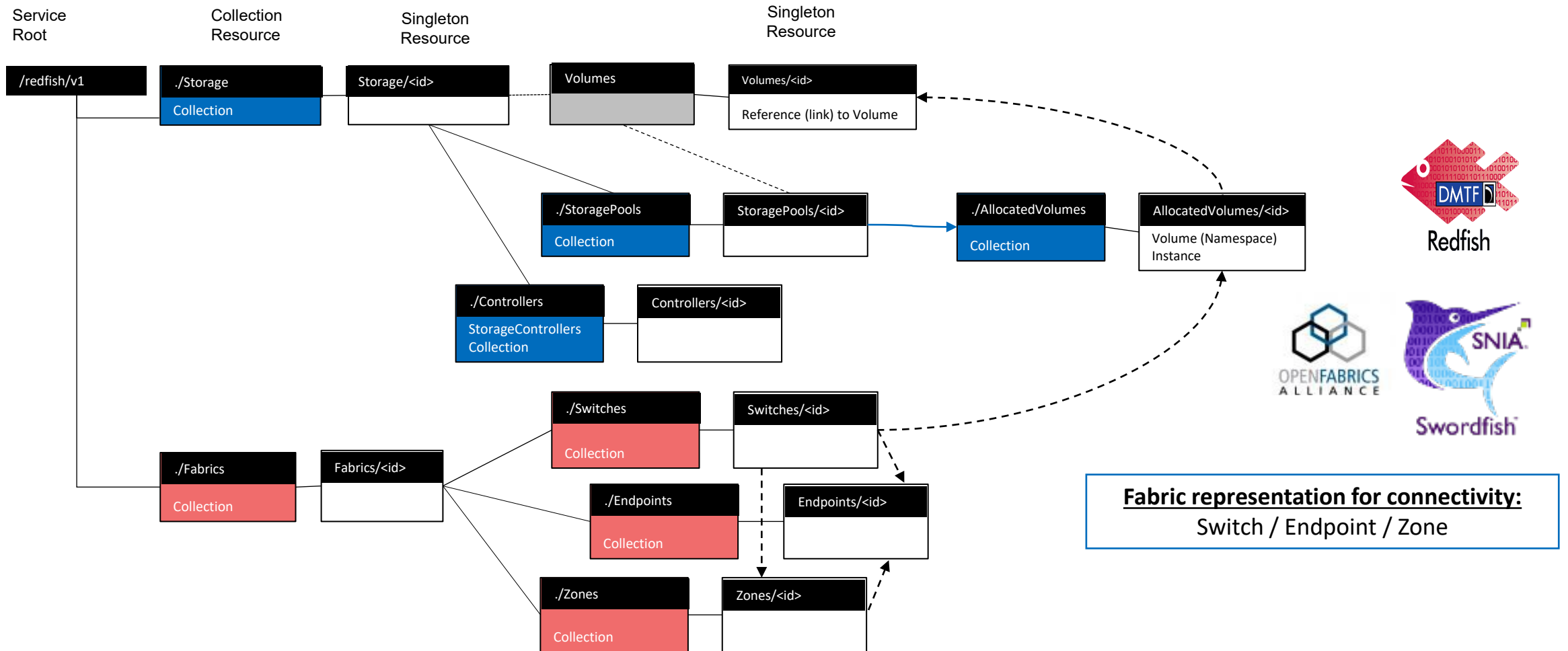




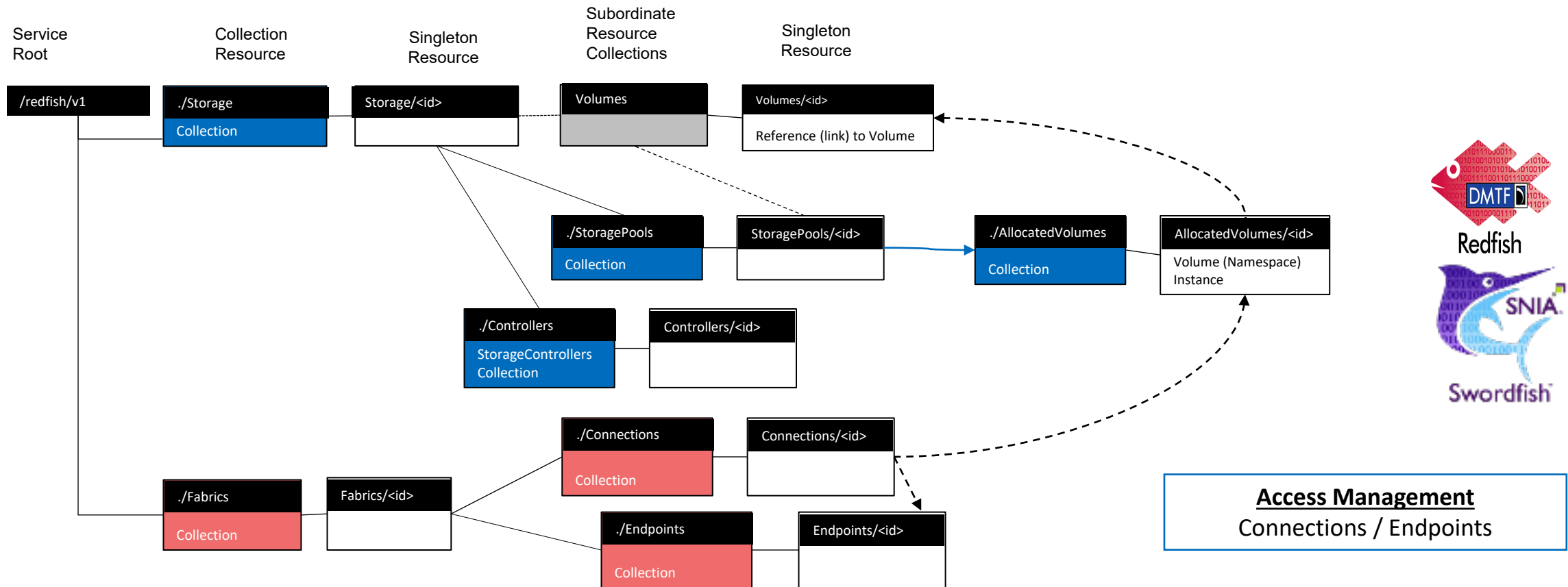
# Sample NVMe-oF Instance



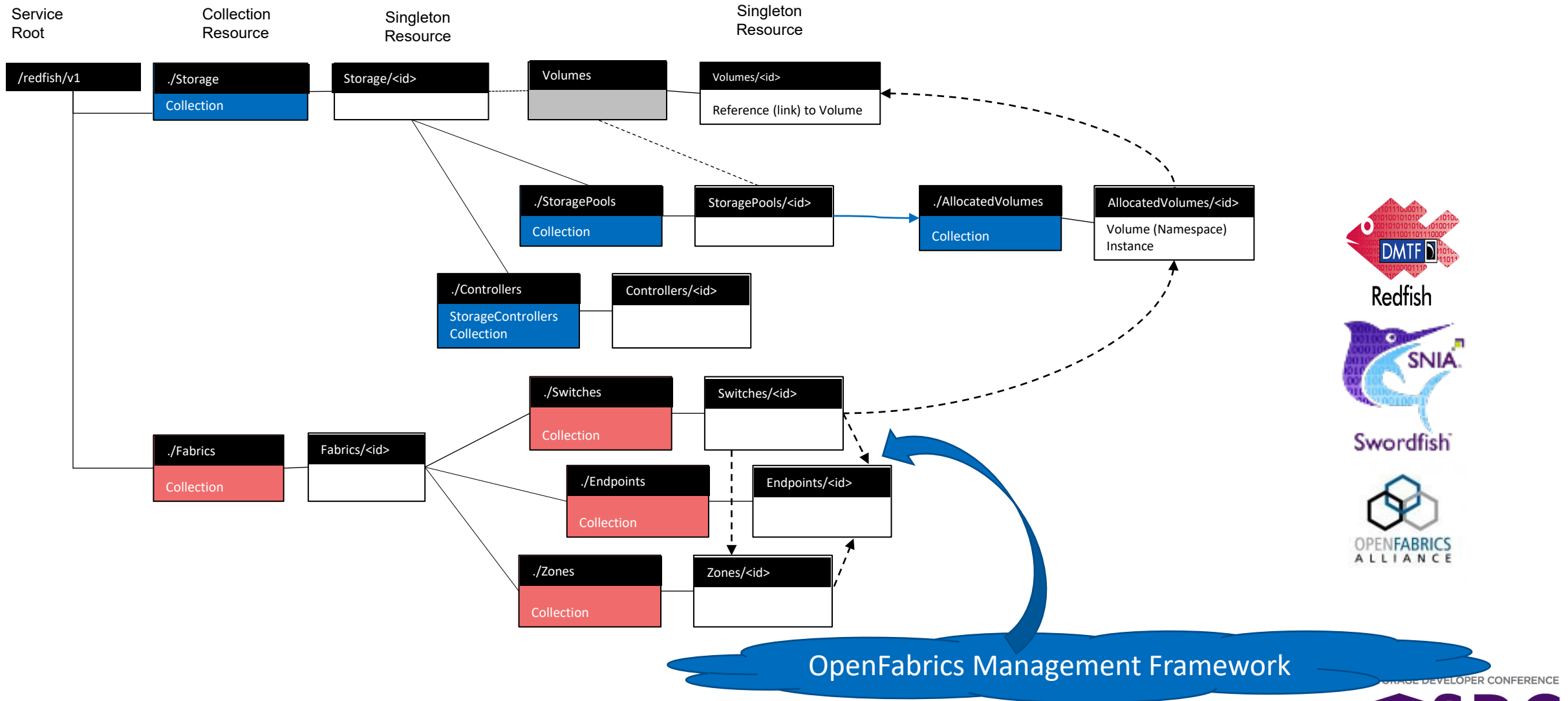
# Redfish/Swordfish Hierarchy: Managing Extended Connectivity



# Redfish/Swordfish Hierarchy: Adding Multi-System Access Management



# Developing the OpenFabrics Framework and Mapping to Redfish and Swordfish



Redfish



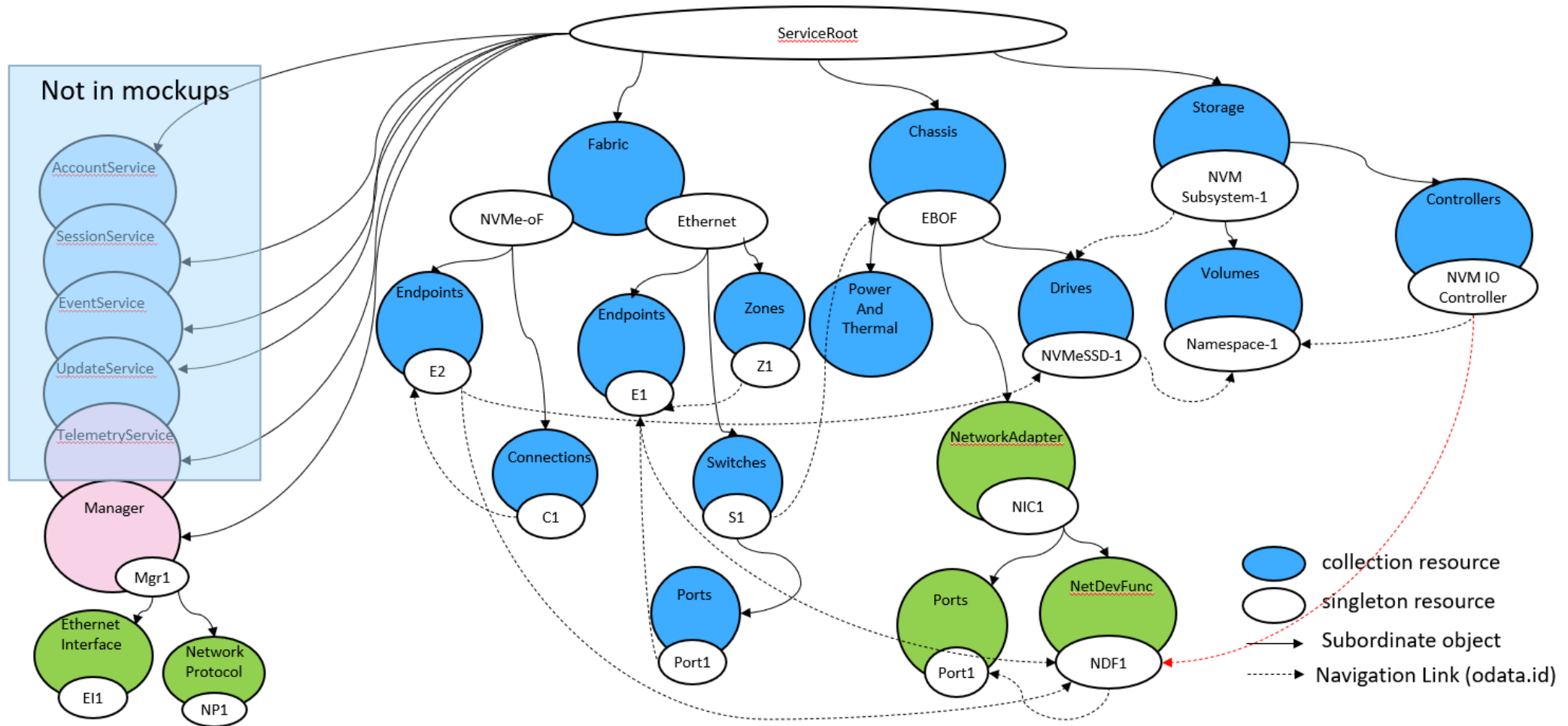
Swordfish



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# Demonstrating Fabric connectivity: EBOF



# Where to Find More Info...

## SNIA Swordfish™

- **Swordfish Standards**
  - Schemas, Specs, Mockups, User and Practical Guide`s, ...  
<https://www.snia.org/swordfish>
  - **NVMe Mapping Guide**
- **Swordfish Specification Forum**
  - Ask and answer questions about 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 & participate: [https://www.snia.org/member\\_com/join-SNIA](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>

## DMTF Redfish™

- **Redfish Standards**
  - Specifications, whitepapers, guides, ...  
<https://www.dmtf.org/standards/redfish>



Redfish



## Open Fabric Management Framework

- OFMF Working Group (OFMFWG)
  - Description & Links <https://www.openfabrics.org/working-groups/>
- OFMFWG mailing list subscription
  - <https://lists.openfabrics.org/mailman/listinfo/ofmfwg>
- Join the Open Fabrics Alliance
  - <https://www.openfabrics.org/membership-how-to-join/>



## NVM Express

- Specifications <https://nvmexpress.org/developers/>
- Join: <https://nvmexpress.org/join-nvme/>





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