

STORAGE DEVELOPER CONFERENCE



BY Developers FOR Developers

Virtual Conference
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A SNIA  Event

Open Industry Storage Management with SNIA Swordfish™

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Storage Technology Enabling, Intel

Agenda

- What is Swordfish?
- Swordfish Overview
 - Swordfish hierarchy, layout
 - Application to block storage, NVMe
 - Storage fabric management
- Example interaction (how can Swordfish be used)
- Swordfish ecosystem overview
 - Specs, schema, documentation
 - Mockups
 - Tools and conformance testing



snia.org/swordfish

What are Redfish and Swordfish?

DMTF Redfish™ covers server, data center, fabric management



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

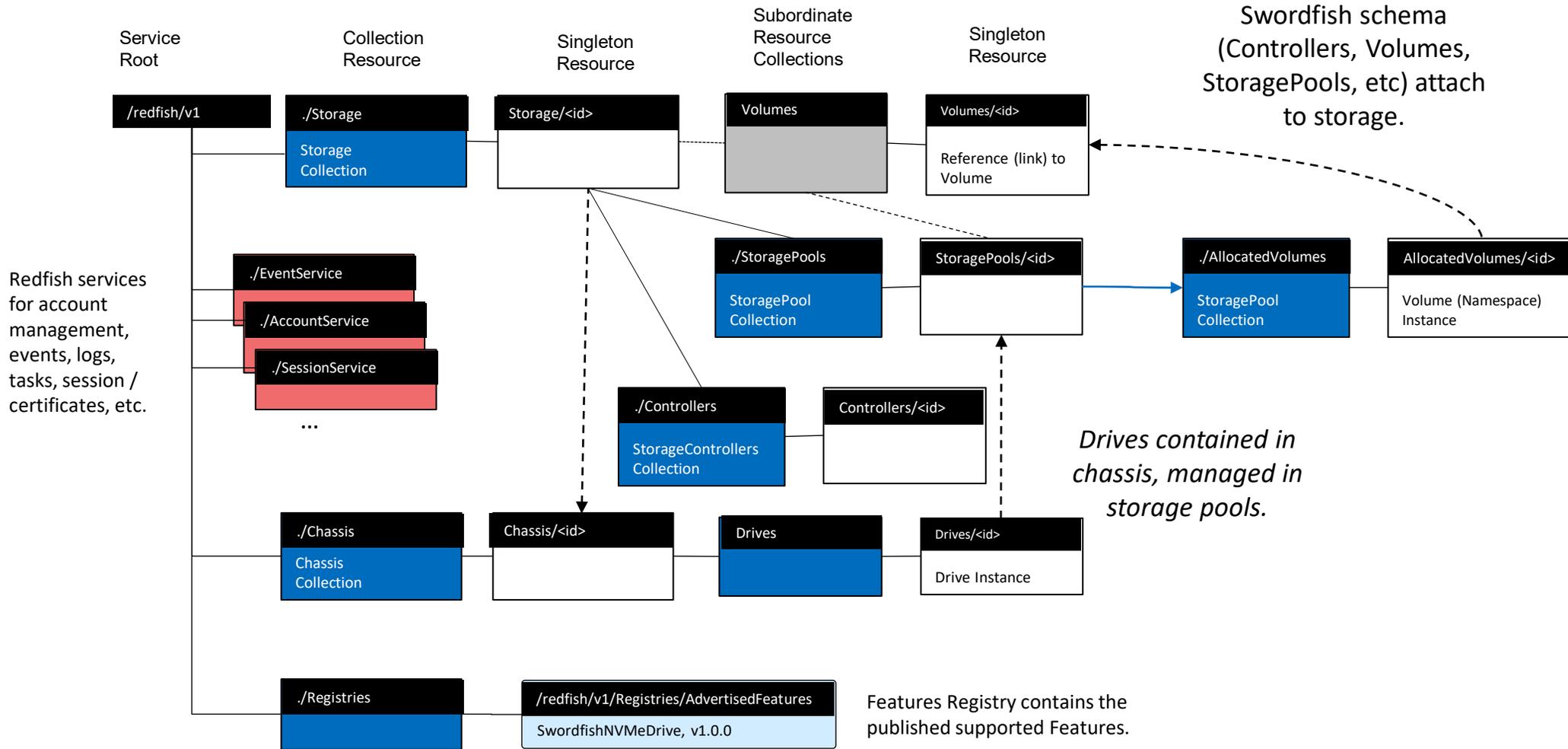
SNIA Swordfish™: Storage Management Specification with REST Based API extends DMTF's Redfish Specification

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

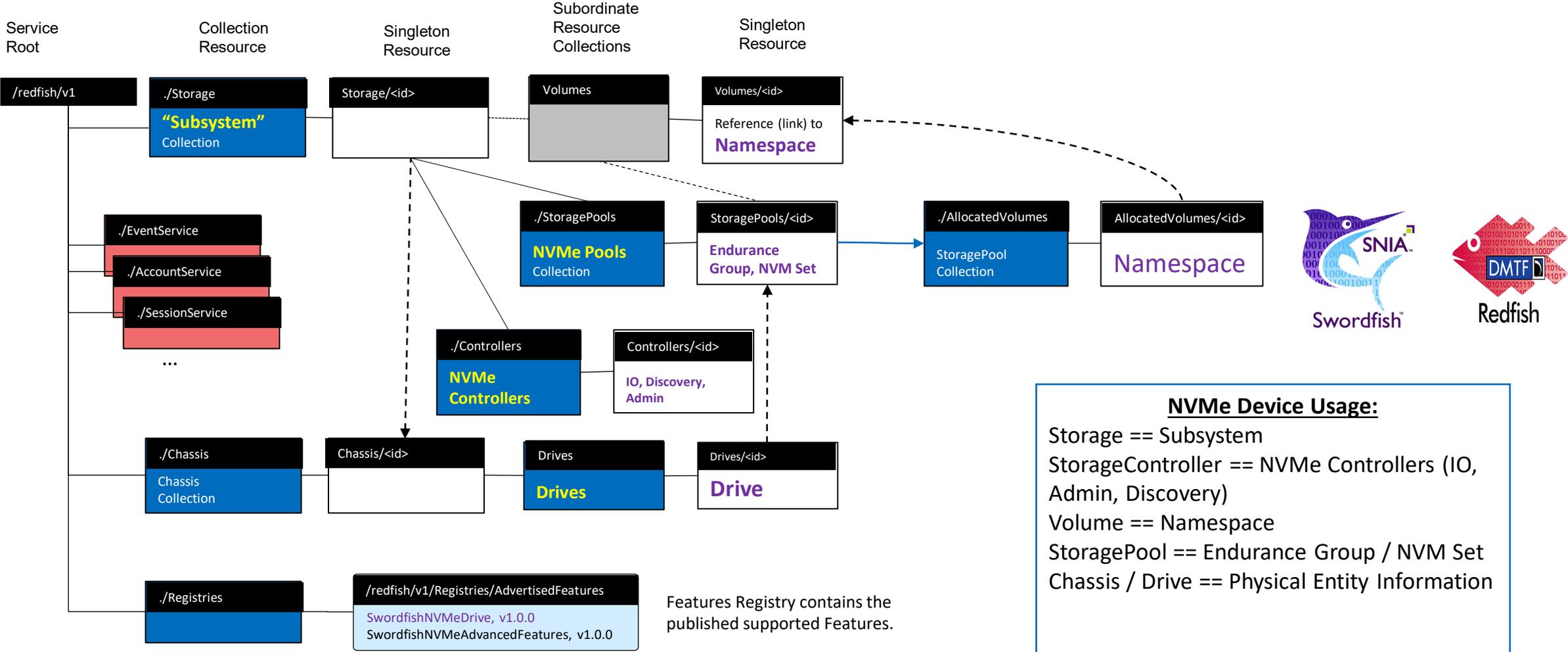
- Covers block, file, and object storage
- Extend traditional storage domain coverage to include converged environments (servers, storage and fabric together)
- Provides the option for implementation to utilize Class of Service (intent or service level) based provisioning, management, and monitoring
- 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



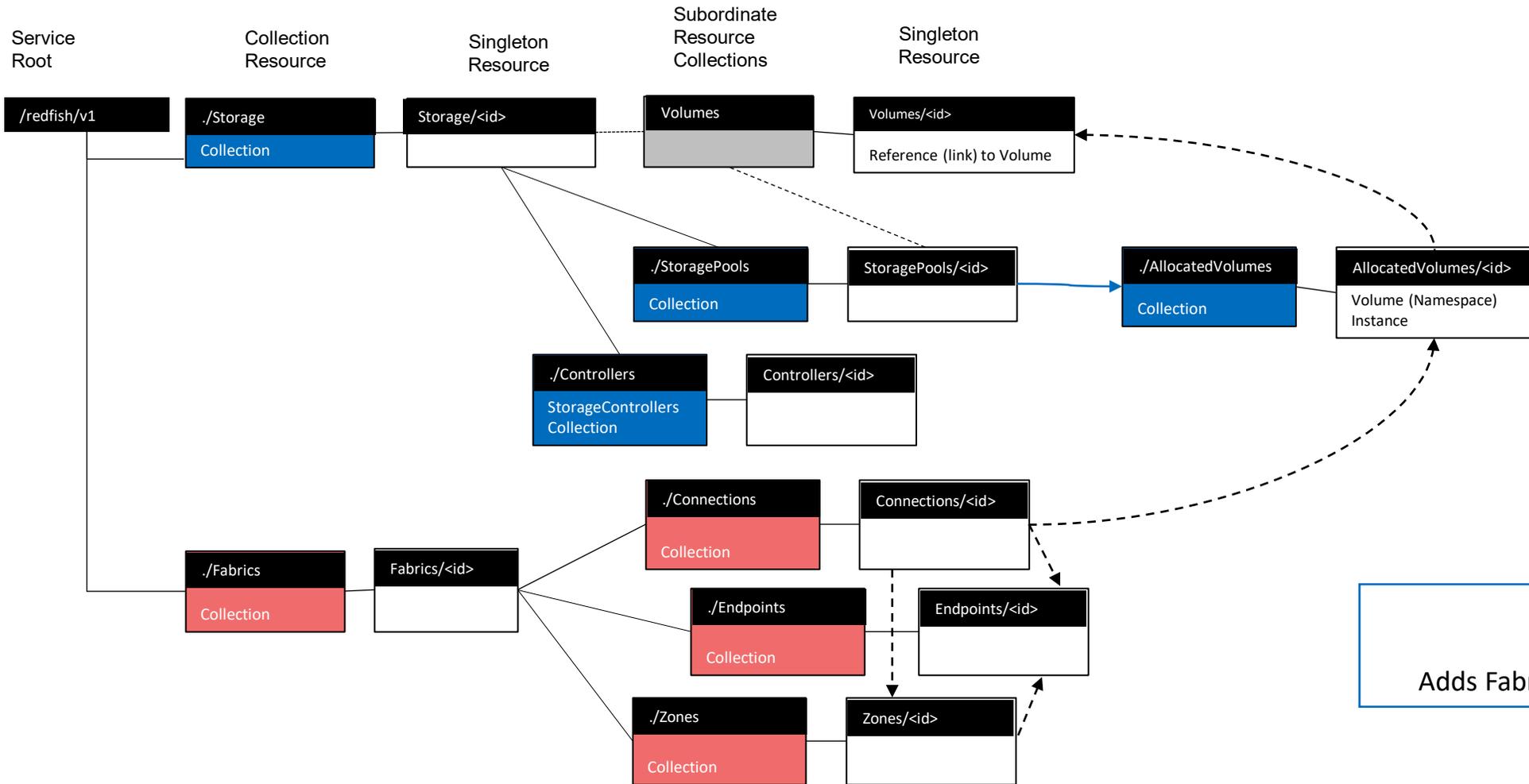
Building on the Redfish Hierarchical for Swordfish Advanced Storage



Swordfish and NVMe: Common Usage



Redfish/Swordfish Hierarchy: Adding Fabrics



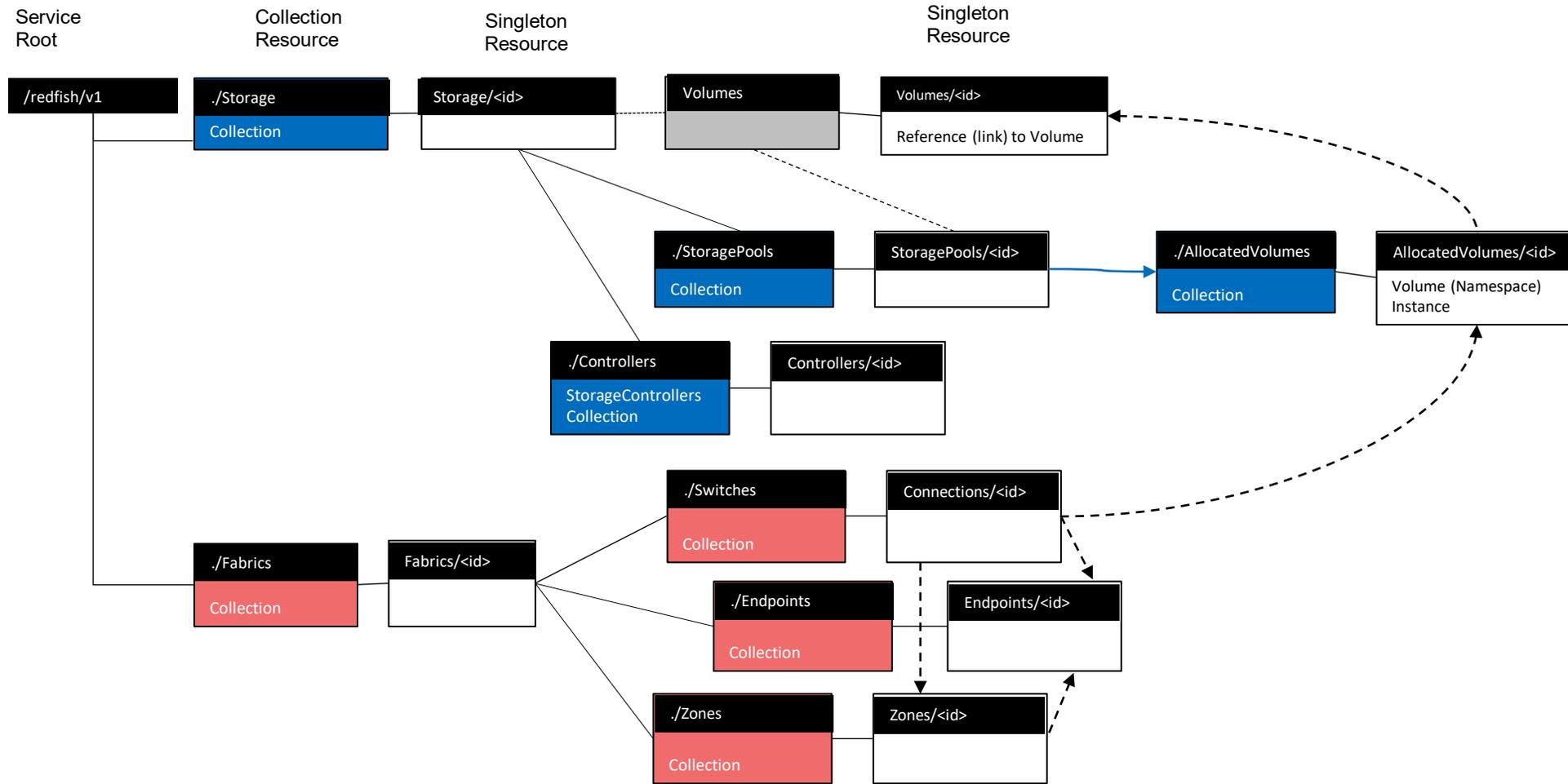
Redfish



Swordfish™

NVMe oF:
Adds Fabric and access rights

Redfish/Swordfish Hierarchy: Extending Fabric Management



Using Swordfish: Get Volume Capacity Information

- Traverse the Service Root to find the selected volume and get its Capacity information:
 1. Read the Service Root
 2. Find the link to the Storage Collection
 3. Get Storage Collection; Pick a Storage Instance
 4. Get the Storage Instance; Read the link to the Volumes Collection
 5. Read the link to the Volume Collection; Pick desired volume
 6. Get Volume; Look at Capacity Information

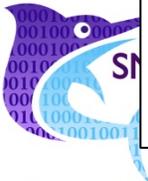
Swordfish Volume Capacity Step 1: Read the Service Root

(Step 2: Find the link to the Storage Collection)

```
GET /redfish/v1/ HTTP/1.1
```

```
HTTP/1.1 200 OK
```

```
{
  "@odata.context": "/redfish/v1/$metadata#ServiceRoot.ServiceRoot",
  "@odata.id": "/redfish/v1/",
  "@odata.type": "#ServiceRoot.v1_9_0.ServiceRoot",
  "Id": "RootService",
  ...
  "Storage": {"@odata.id": "/redfish/v1/Storage"},
  "Chassis": {"@odata.id": "/redfish/v1/Chassis" },
  ...
  "Links": {
    "Sessions": {"@odata.id": "/redfish/v1/SessionService/Sessions" }
  },
}
```



Swordfish Volume Capacity Step 3: Get Storage Collection; Pick a Storage Instance

```
GET /redfish/v1/Storage HTTP/1.1
```

```
HTTP/1.1 200 OK
```

```
{  
  "@odata.id": "/redfish/v1/Storage",  
  "@odata.type": "#StorageCollection.StorageCollection",  
  "Name": "Storage Collection",  
  "Members@odata.count": 4,  
  "Members": [  
    { "@odata.id": "/redfish/v1/Storage/MyDevice" },  
    { "@odata.id": "/redfish/v1/Storage/BackupDevice" },  
    { "@odata.id": "/redfish/v1/Storage/FileService" },  
    { "@odata.id": "/redfish/v1/Storage/Simple1" }  
  ]  
}
```



Swordfish Volume Capacity Step 4: Get the Storage Instance; Read the link to the Volumes Collection

```
GET /redfish/v1/Storage/MyDevice HTTP/1.1
```

```
HTTP/1.1 200 OK
```

```
{  
  "@odata.context": "/redfish/v1/$metadata#StorageCollection.StorageCollection",  
  "@odata.id": "/redfish/v1/Storage/MyDevice",  
  "@odata.type": "#Storage.v1_0_0.Storage",  
  "Id": "MyDevice",  
  "Name": "My Storage System",  
  ...  
  "Volumes": {  
    "Members": [ { "@odata.id": "/redfish/v1/StorageSystems/1/Volumes" } ]  
  },  
  "Links": { }  
  ...  
}
```

Swordfish Volume Capacity Step 5: Read the link to the Volume Collection; Pick desired volume

```
GET /redfish/v1/Storage/MyDevice/Volumes HTTP/1.1
```

```
HTTP/1.1 200 OK
```

```
{
  "@odata.id": "/redfish/v1/Storage/MyDevice/Volumes",
  "@odata.type": "#VolumeCollection.VolumeCollection",
  "Id": "Volumes",
  "Name": "Volume Collection",
  "Members@odata.count": 4,
  "Members": [
    { "@odata.id":
      /redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/61001234876545676100123487654567" },
    { "@odata.id": "/redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/
      65456765456761001234876100123487" },
    { "@odata.id": "/redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/3" },
    { "@odata.id": "/redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/ 4" },
    { "@odata.id": "/redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/ 5" },
    { "@odata.id": "/redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/ " }
  ]
}
```

Swordfish Volume Capacity Step 6: Get Volume; Look at Capacity Information

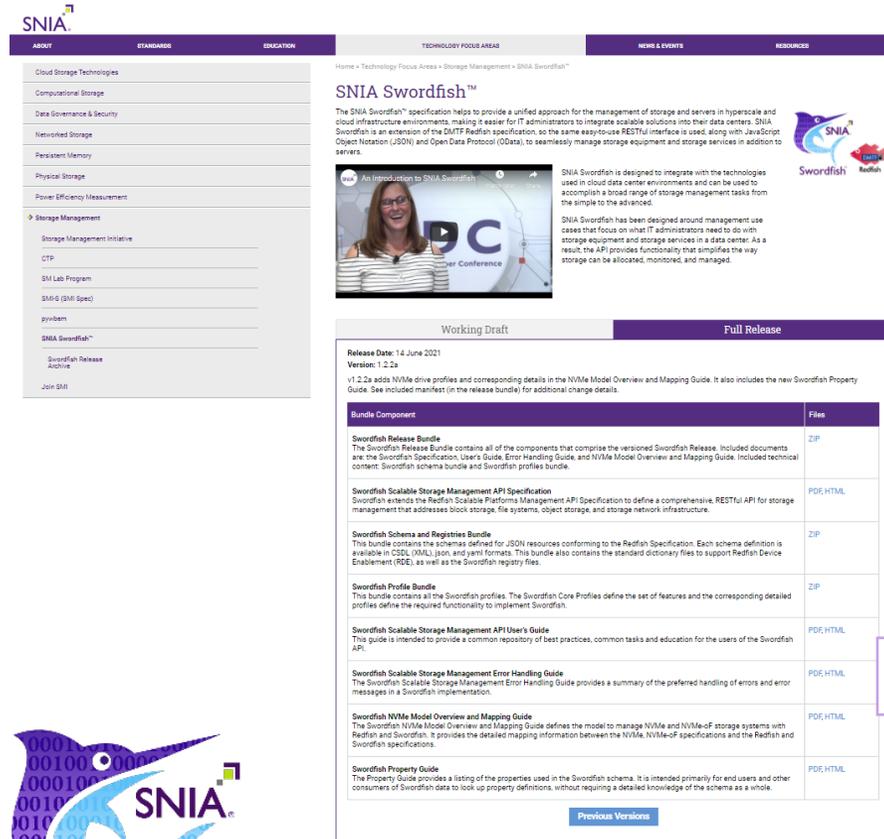
```
GET /redfish/v1/Storage/MyDevice/StoragePools/Pool1/AllocatedVolumes/61001234876545676100123487654567
HTTP/1.1
```

```
HTTP/1.1 200 OK
```

```
{
...
  "Id": "61001234876545676100123487654567",
...
  "Capacity": {
    "Data": {
      "ConsumedBytes": 0,
      "AllocatedBytes": 10737418240,
      "GuaranteedBytes": 536870912,
      "ProvisionedBytes": 1099511627776
    }
  }
}
```

SNIA – developing an ecosystem to enable industry interoperability

- **Swordfish Resources**
 - Swordfish Specification, schema, and other documentation
 - Online reference mockups swordfishmockups.com
 - OpenSource Tools to accelerate development
- **Swordfish Conformance Test Program** to validate implementations



The screenshot shows the SNIA website's 'Swordfish' resources page. The navigation menu includes 'ABOUT', 'STANDARDS', 'EDUCATION', 'TECHNOLOGY FOCUS AREAS', 'NEWS & EVENTS', and 'RESOURCES'. The main content area is titled 'SNIA Swordfish™' and describes the specification's purpose. A video player shows a woman speaking at a conference. Below the video, there are two tabs: 'Working Draft' and 'Full Release'. The 'Full Release' tab is active, showing the release date (14 June 2021) and version (1.2.2a). A table lists the components of the release bundle, including the Swordfish Release Bundle, Scalable Storage Management API Specification, Schema and Registries Bundle, Profile Bundle, Scalable Storage Management API User's Guide, Scalable Storage Management Error Handling Guide, NVMe Model Overview and Mapping Guide, and Property Guide.

Bundle Component	Files
Swordfish Release Bundle The Swordfish Release Bundle contains all of the components that comprise the versioned Swordfish Release. Included documents are the Swordfish Specification, User's Guide, Error Handling Guide, and NVMe Model Overview and Mapping Guide. Included technical content: Swordfish schema bundle and Swordfish profiles bundle.	ZIP
Swordfish Scalable Storage Management API Specification Swordfish extends the Redfish Scalable Storage Management API Specification to define a comprehensive, RESTful API for storage management that addresses block storage, file systems, object storage, and storage network infrastructure.	PDF, HTML
Swordfish Schema and Registries Bundle This bundle contains the schemas defined for JSON resources conforming to the Redfish Specification. Each schema definition is available in CDDL, XML, json, and yaml formats. This bundle also contains the standard dictionary files to support Redfish Device Enablement (RDE), as well as the Swordfish registry files.	ZIP
Swordfish Profile Bundle This bundle contains all the Swordfish profiles. The Swordfish Core Profiles define the set of features and the corresponding detailed profiles define the required functionality to implement Swordfish.	ZIP
Swordfish Scalable Storage Management API User's Guide This guide is intended to provide a common repository of best practices, common tasks and education for the users of the Swordfish API.	PDF, HTML
Swordfish Scalable Storage Management Error Handling Guide The Swordfish Scalable Storage Management Error Handling Guide provides a summary of the preferred handling of errors and error messages in a Swordfish implementation.	PDF, HTML
Swordfish NVMe Model Overview and Mapping Guide The Swordfish NVMe Model Overview and Mapping Guide defines the model to manage NVMe and NVMe-oF storage systems with Redfish and Swordfish. It provides the detailed mapping information between the NVMe, NVMe-oF specifications and the Redfish and Swordfish specifications.	PDF, HTML
Swordfish Property Guide The Property Guide provides a listing of the properties used in the Swordfish schema. It is intended primarily for end users and other consumers of Redfish data to look up property definitions, without requiring a detailed knowledge of the schema as a whole.	PDF, HTML

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For deeper dives: Tools - Don Deel, “Expanding Development of your Swordfish Implementations Using Open Source Tools”
For CTP – Richelle Ahlvers, “Drive Adoption of Your Products with the Swordfish Conformance Test Program”

What's In the Swordfish Bundle

- **Swordfish Scalable Storage Management API Specification**
 - defines a comprehensive, RESTful API for storage management that addresses block storage, file systems, object storage, and storage network infrastructure.
- **Swordfish Schema and Registries Bundle**
 - Contains the schemas defined for JSON resources conforming to the Redfish Specification. Schema definitions are available in CSDL (XML), json, and yaml formats.
- **Swordfish Profile Bundle**
 - Contains all the Swordfish profiles, defining the set of features and the corresponding detailed profiles define the required functionality to implement Swordfish.
- **Swordfish Scalable Storage Management API User's Guide**
 - Provides a common repository of best practices, common tasks and education for the users of the Swordfish API.
- **Swordfish Scalable Storage Management Error Handling Guide**
 - Provides a summary of the preferred handling of errors and error messages in a Swordfish implementation.
- **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.
- **Swordfish Property Guide**
 - Provides a listing of the properties used in the Swordfish schema.

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Where to Find More Info..

SNIA Swordfish™

- **Swordfish Standards**
 - Schemas, Specs, Mockups, User and Practical Guide`s, ...
<https://www.snia.org/swordfish>
- **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
- **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>



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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