

SNIA DEVELOPER CONFERENCE



By Developers FOR Developers

Hyatt Regency Santa Clara, CA
September 15-17, 2025



What's New with SNIA Swordfish®

Standards-Based Storage Management for
Enterprise and Data Center

www.sniadeveloper.org

Abstract

- Want a deeper look into what's new in standards-based storage management? Join us for an overview of the latest enhancements and new functionality in SNIA Swordfish® and how it works together with DMTF Redfish® to provide a unified approach for the management of storage and servers in AI, hyperscale and cloud environments. With the broad functionality base in Redfish and Swordfish today, there are now many capabilities available that may not be obvious at first glance.
- The session will highlight a couple of example use cases of new functionality, including:
 - - An introduction to the Swordfish DNA Storage Model
 - - The latest in NVMe Manageability
 - - Learn how to get started with Swordfish.

About the Presenter



Richelle Ahlvers

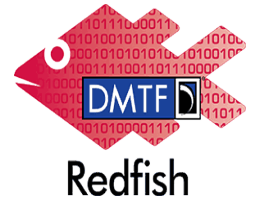
Director of Ecosystem
Enabling, Intel

Richelle Ahlvers runs Technology Initiatives and Ecosystem Enabling for Intel's Datacenter business, promoting and driving enablement of new technologies and standards strategies, as well as driving industry standards. Richelle has spent over 30 years in Enterprise R&D teams in a variety of technical roles, spanning architecture, design and development of software, firmware, and hardware, for everything from enterprise storage solutions to CPUs.

Richelle has been engaged with industry standards initiatives for many years and is actively engaged with many groups including SNIA, DMTF, NVMe, OFA and UCIe. She is Vice-Chair of the SNIA Board of Directors, Chair of the Storage Management Initiative, leads the SSM Technical Work Group developing the Swordfish Scalable Storage Management API, and is a former SNIA Technical Council Chair. She serves on the DMTF Board of Directors as the VP of Alliances.

Redfish and Swordfish ...

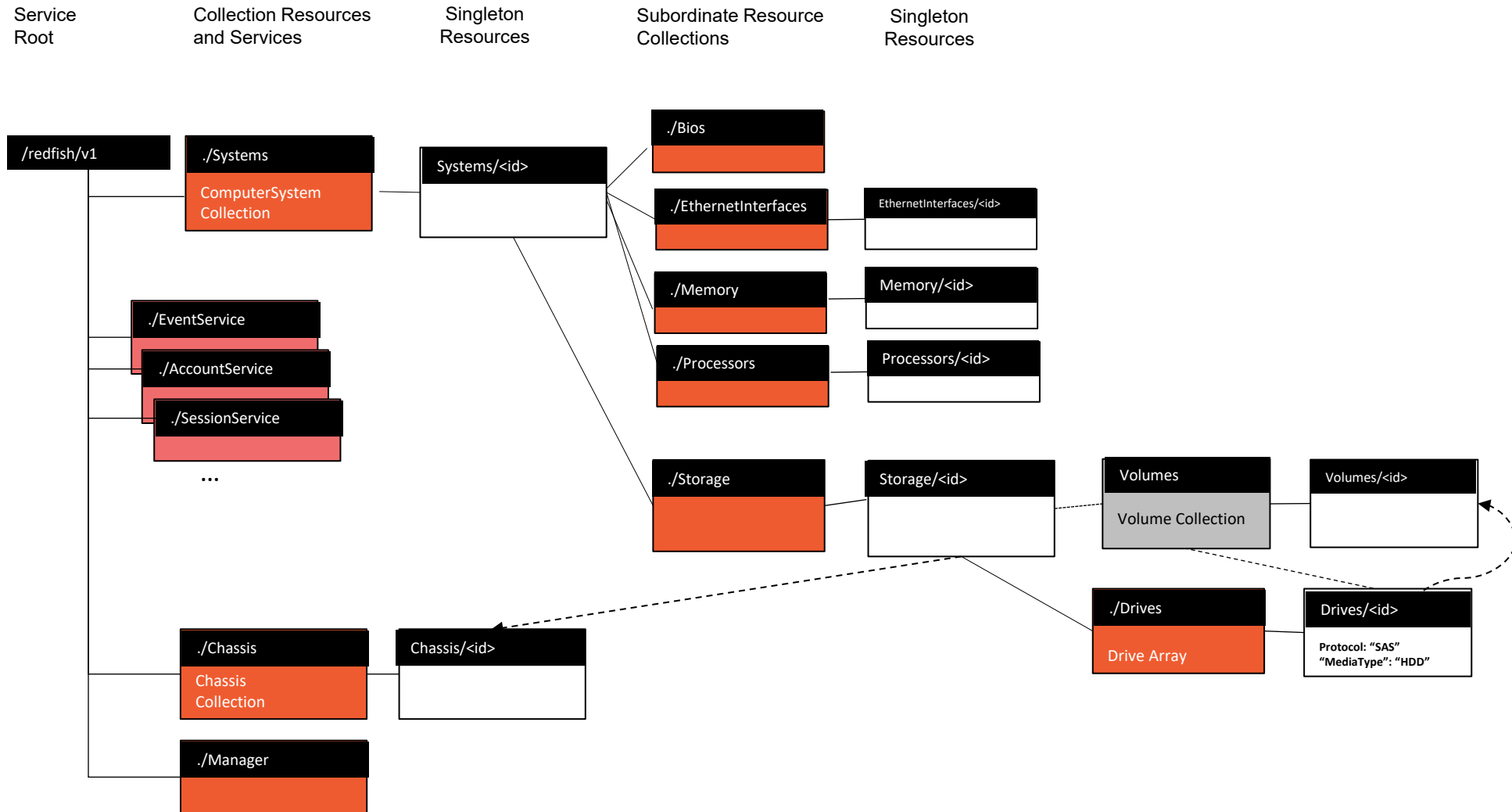
- **DMTF Redfish®** and **SNIA Swordfish®** are both industry standards designed to simplify the management of IT infrastructure, but with different purposes and different scopes.
 - Redfish provides a general-purpose framework for managing IT resources, Swordfish extends Redfish to provide a more specialized and comprehensive solution for managing scalable storage systems.
 - Swordfish offers the benefits of a unified management approach while also addressing the specific needs of storage environments by simply extending and using from the full suite of Redfish resources and functionality.
- **Redfish - a Broad-Based Management Standard:** Redfish is a broader standard that aims to provide a unified interface for managing a wide range of IT resources, including servers, network devices, and more, focused on providing a common data model and RESTful API for discovering, monitoring, and managing these resources.
- **Key Features:**
 - RESTful API for easy integration with management tools
 - JSON-based data model for human-readable representation of resources
 - Support for a wide range of IT resources
 - Focus on general management tasks
- **Swordfish - extends Redfish for Scalable Storage** Swordfish is a more specialized standard that extends Redfish specifically for managing the storage components, including NVMe, as well as scalable storage systems. It provides additional APIs and data models tailored to the unique requirements of storage, including NVMe-specific properties. For storage systems, it covers managing large-scale storage pools, RAID arrays, and data replication.
- **Key Features:**
 - Builds upon the Redfish foundation
 - Provides additional APIs for storage-specific tasks
 - Supports scalable storage architectures
 - Focus on storage-centric management



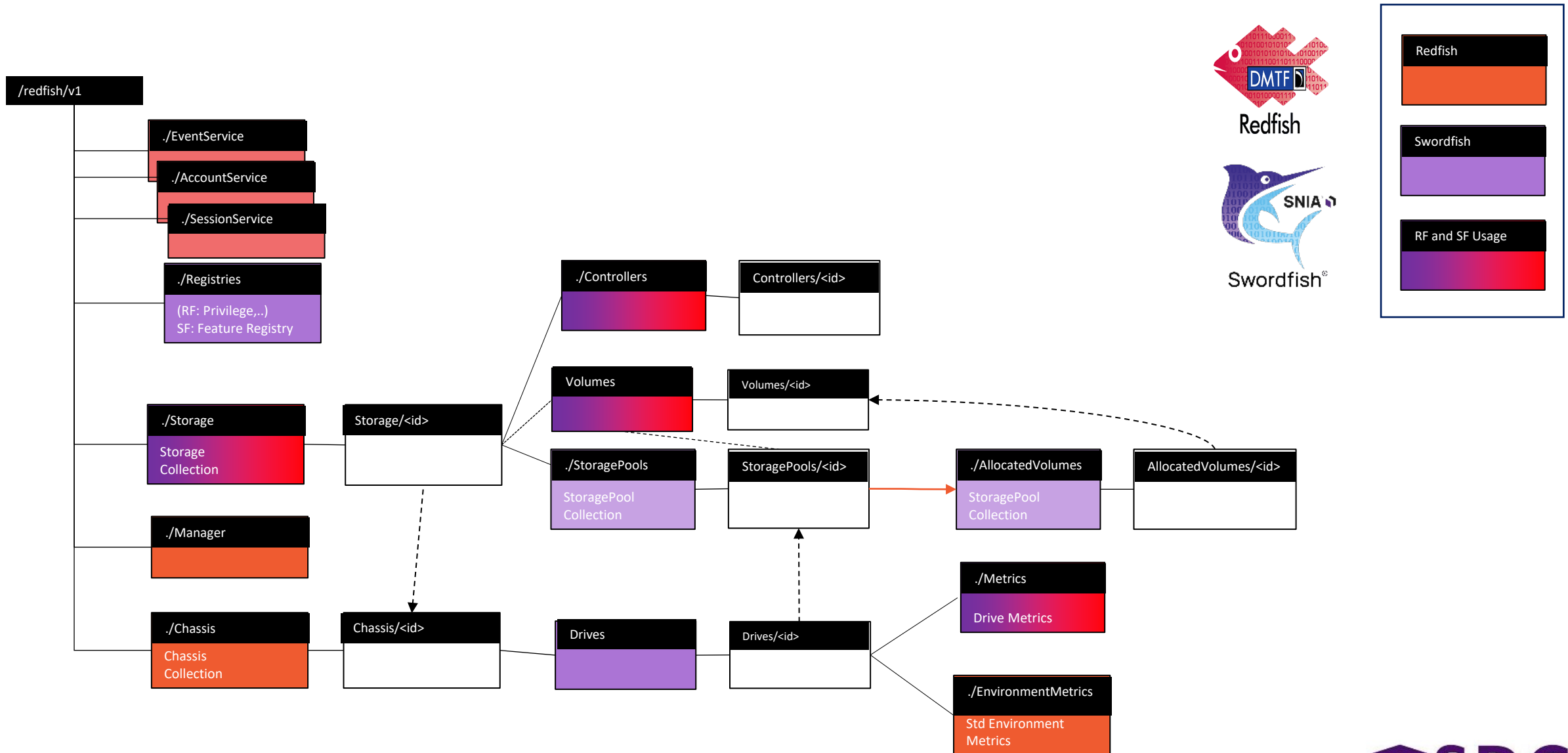


Redfish and Swordfish: A Quick Primer

Basic Redfish System - Local / SAS Drive



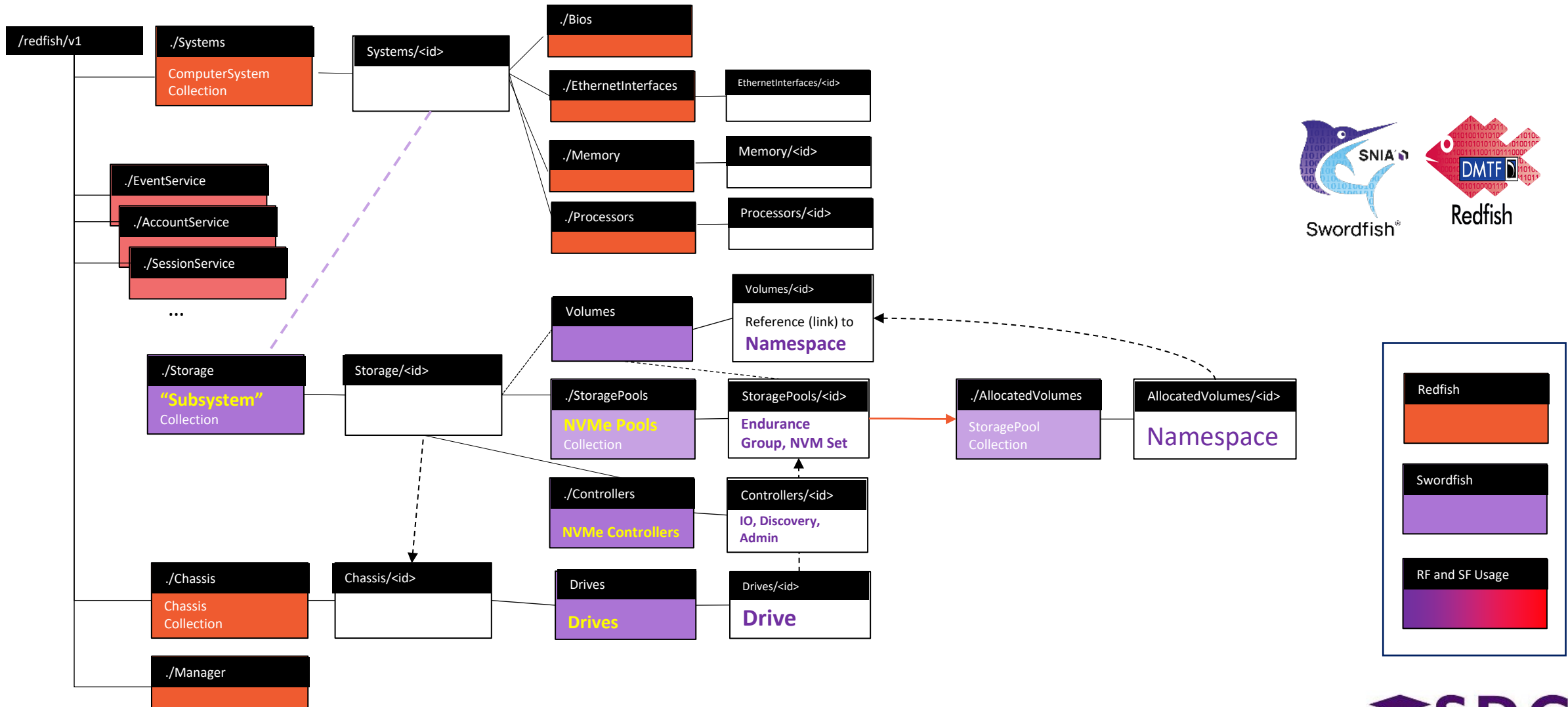
Swordfish Leverages and Extends: Standard Storage Model



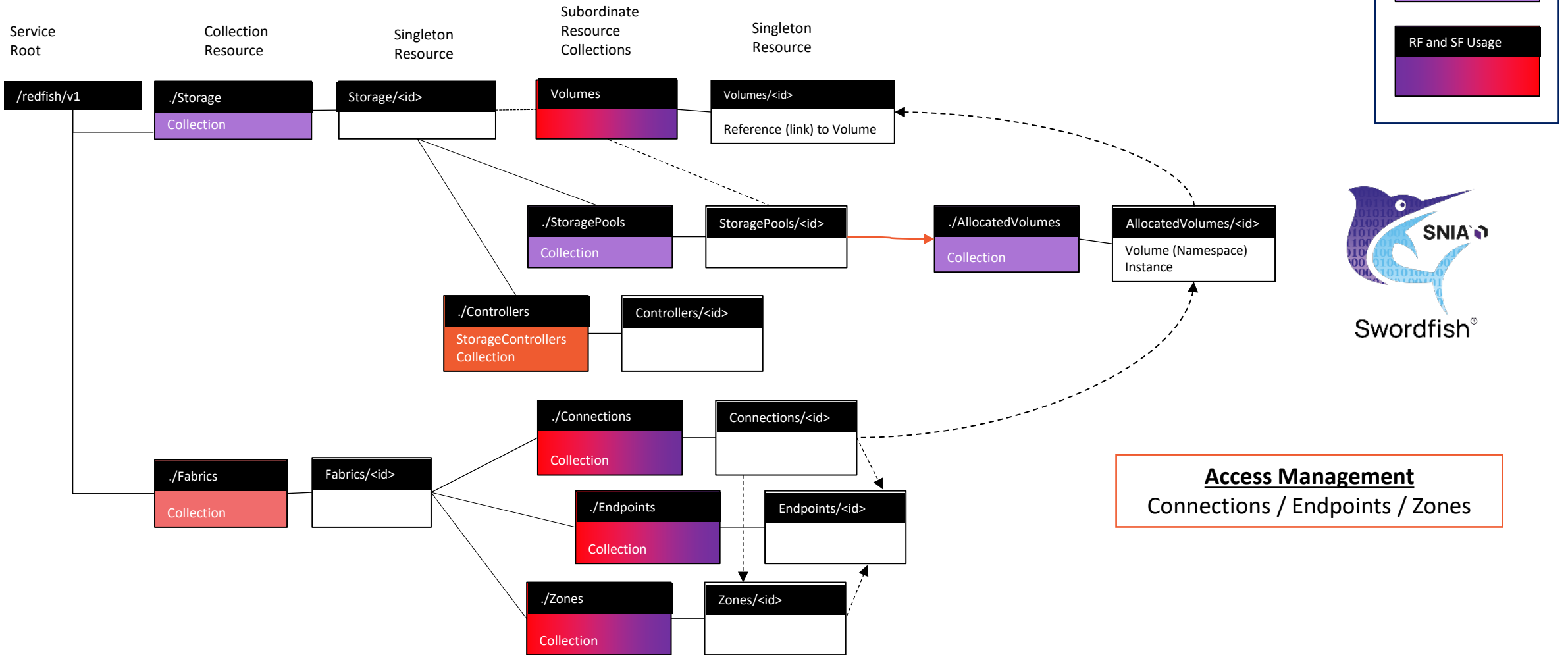
Adding NVMe...

- Many different potential models for NVMe devices, so DMTF, SNIA, and NVMe worked together in a SNIA-led alliance to develop the Redfish/Swordfish model for managing devices.
 - Schema owned by ***BOTH*** DMTF and SNIA
 - SNIA develops and provides NVMe specific implementers guides and white papers (latest at snia.org/swordfish)
 - **Swordfish NVMe Model Overview and Mapping Guide**
 - **Swordfish and NVMe-oF Whitepaper**
 - **Industry defined profiles for various NVMe configurations**

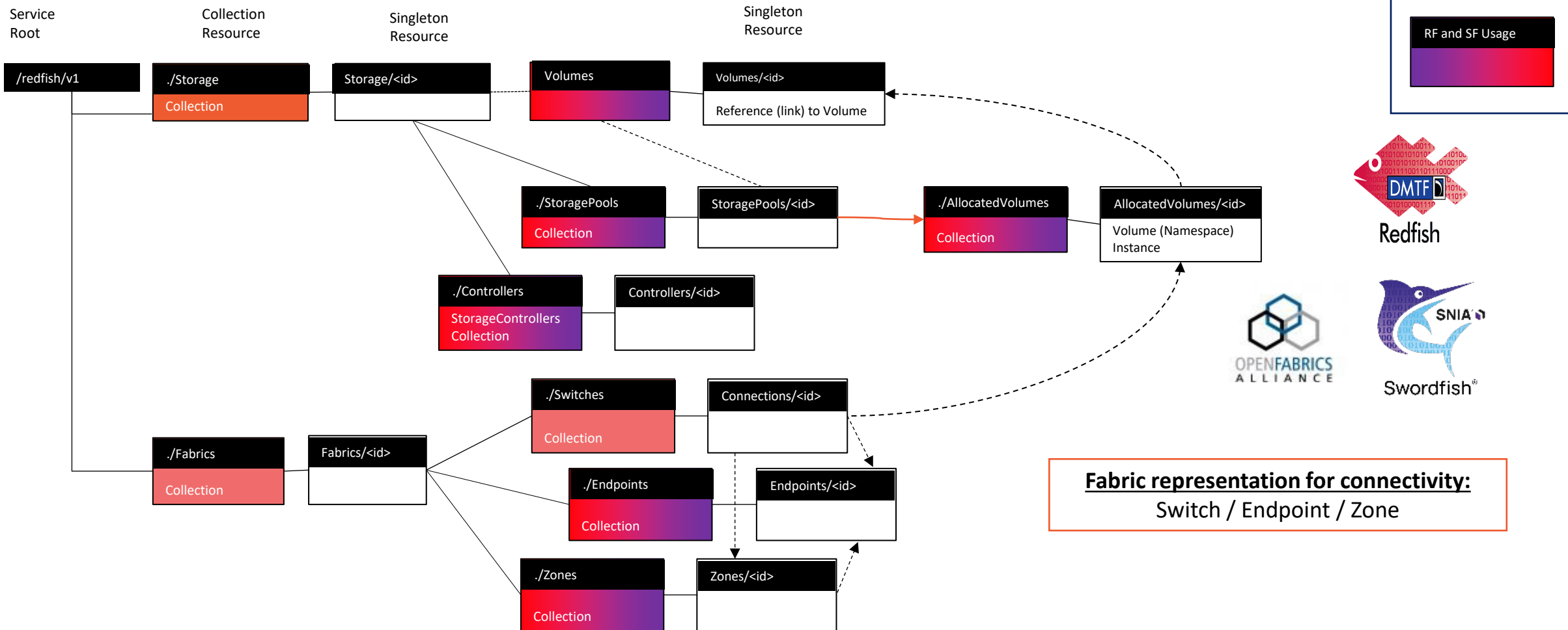
A Redfish system with NVMe Drive has "Swordfish" Content



Adding Complexity: Access Management



... And Connectivity



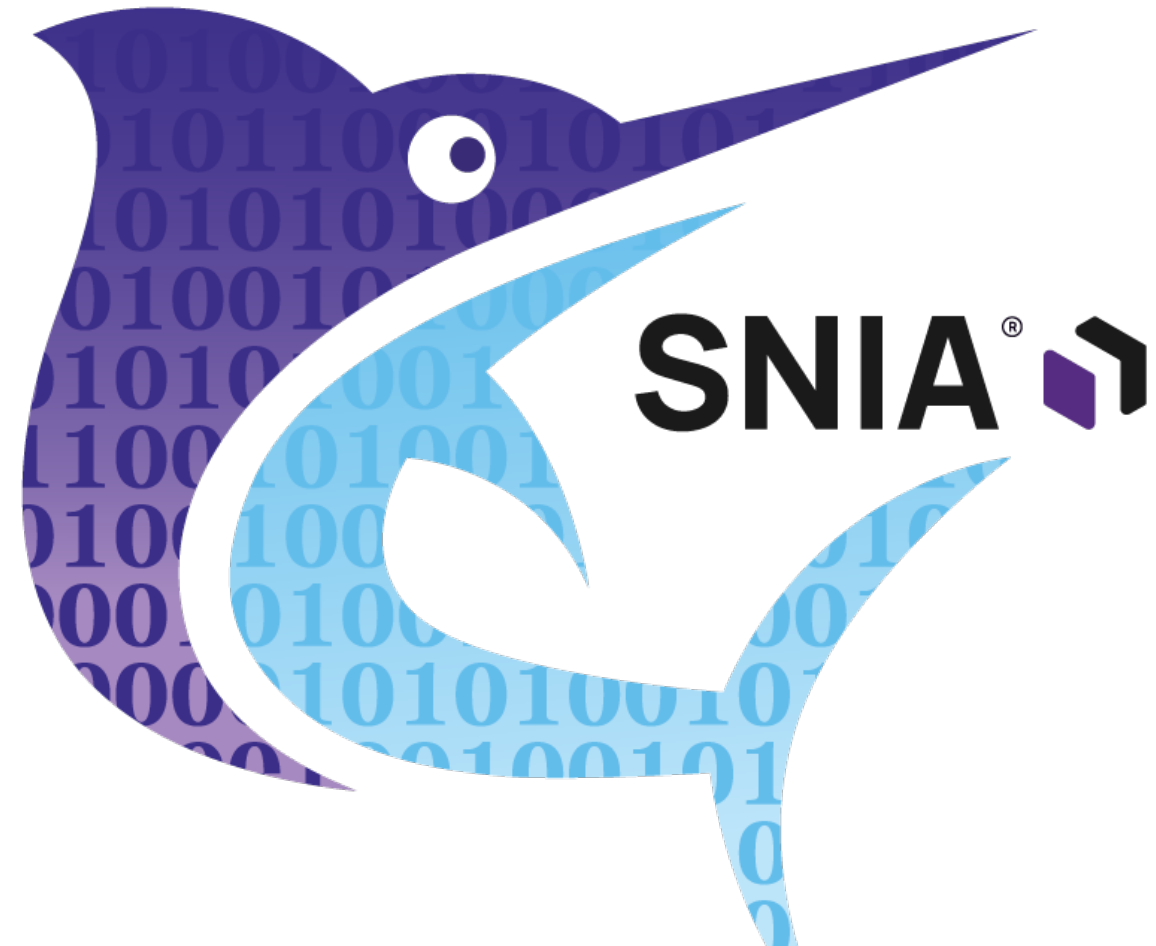


Swordfish[®]

What's New... and Next

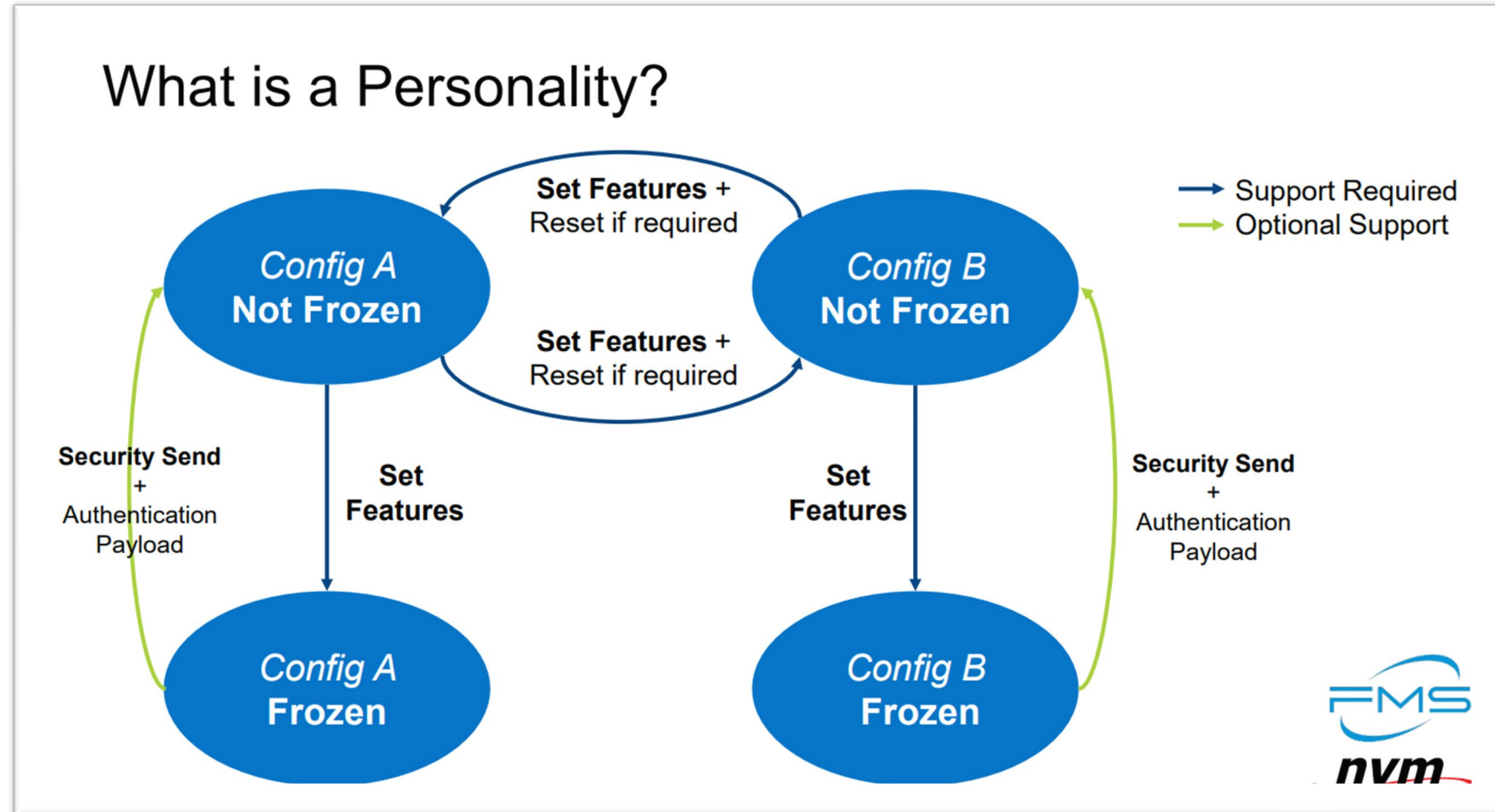
Added in the last year...

- Key updates and features of Swordfish v1.2.8 include:
 - Enhancements to the NVMe-oF™ white paper.
 - Updates to NVMe® functionality and mapping guide for namespace management
 - Advancements to filesystem use cases and mockups
 - Revisions to mapping and masking functionality
 - Expanded StoragePool Metrics
- 1.2.7:
 - New Swordfish Interoperability Guide, a comprehensive reference guide to the Swordfish-specific extensions to the profile syntax, and a detailed usage guide for Swordfish features and profiles.
 - Swordfish Features Registry enhanced to support resource-level features.
 - NVMe functionality for NVMe, expanding to include support for Command and Feature Lockdown via a trio of commands: ConfigurationLock, TargetConfigurationLockLevel and ConfigurationLockState.



What's Coming... NVMe Personalities

Support to manage (read/control) NVMe personalities (pre-configured collection of settings that determine how the NVM subsystem functions).



*from FMS '25: NVMe State of the Union, Configurable Device Security and Quality of Service (QoS)

Other Functionality Coming in 1.2.9...



➤ Reservations

- Adding OOB reporting of in-band reservation configuration information
- Focus on SCSI-3 / NVMe capabilities

➤ New Swordfish / storage events

- Restructuring current event message registries
- Adding dedicated events for mapping / masking, CoS,...

➤ Enhanced documentation:

- Updates to spec guidance for event message registries (RF and SF)
- Adding Event usage information - descriptions, use cases
- NVMe Mapping Guide updates for personalities

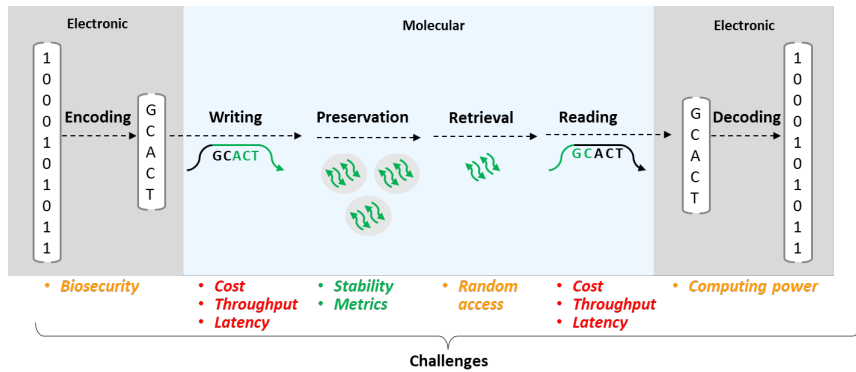
Other Future Functionality...

- Storage specific privilege registry
 - Privilege definitions for Storage Administrators and Storage Operators
- Tools to support privilege registry integration
- DNA Data Storage models

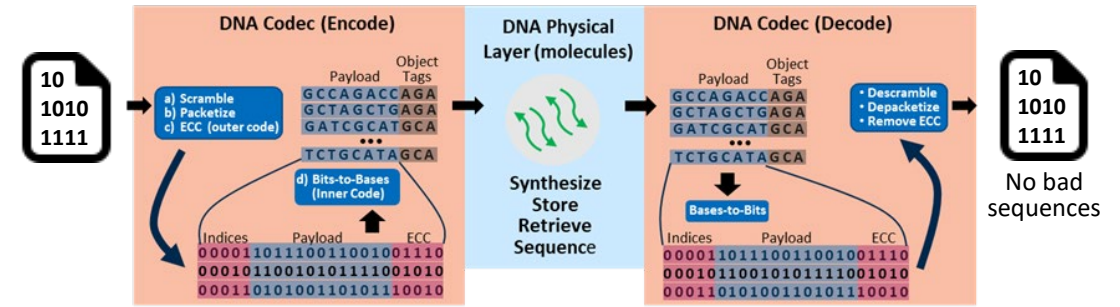


Mission: Create an interoperable storage ecosystem based on DNA as a data storage and compute medium

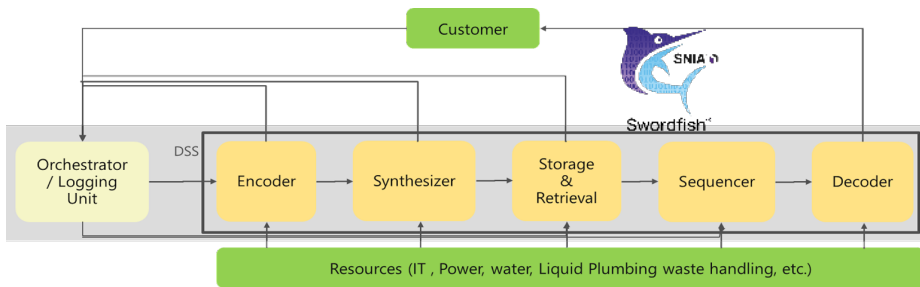
Roadmaps, White Papers



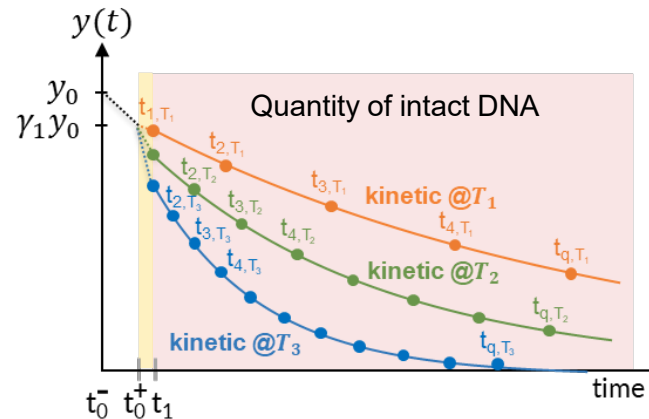
Biosecurity/Biosafety



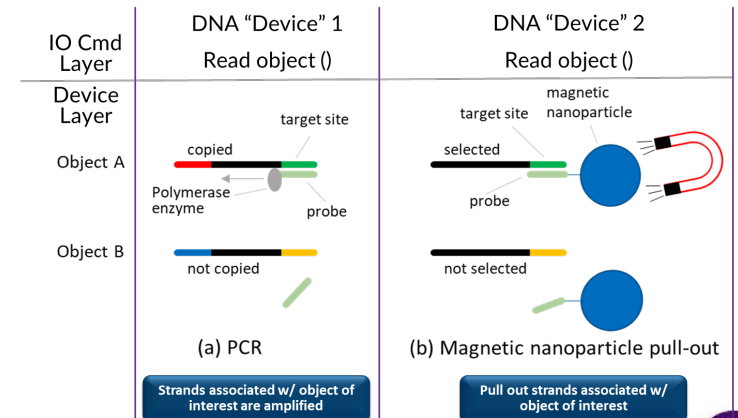
Interoperability, Commercialization



Data Retention

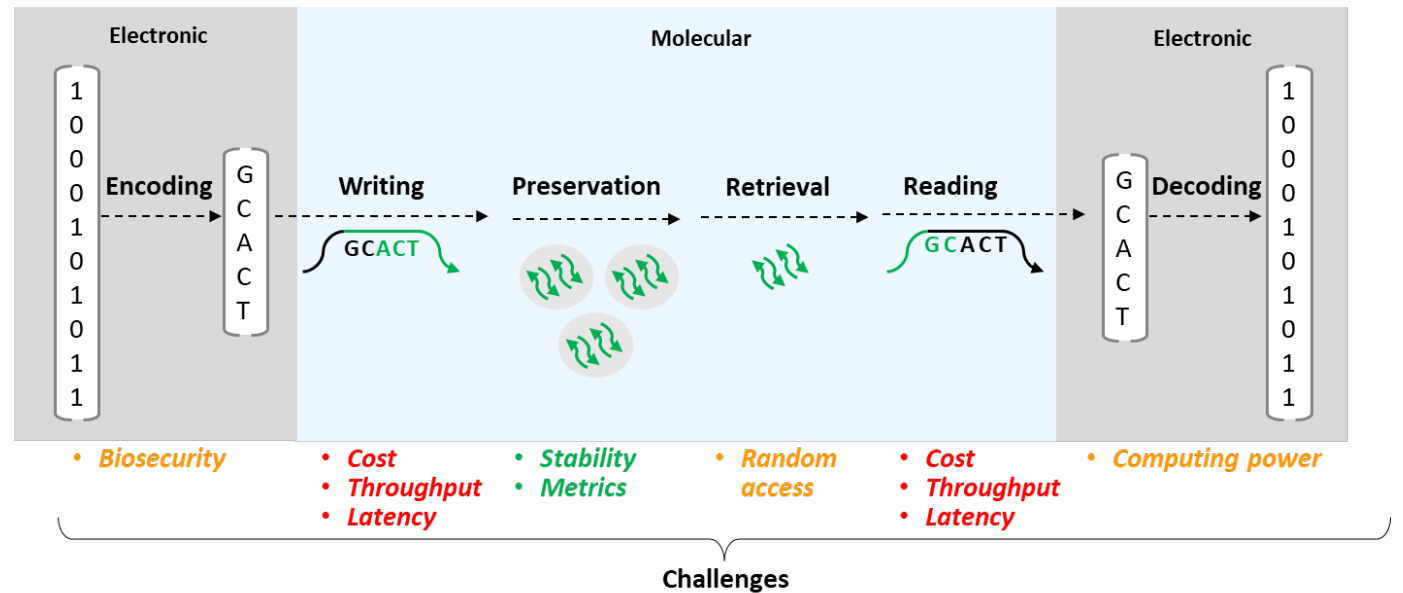


Random Access

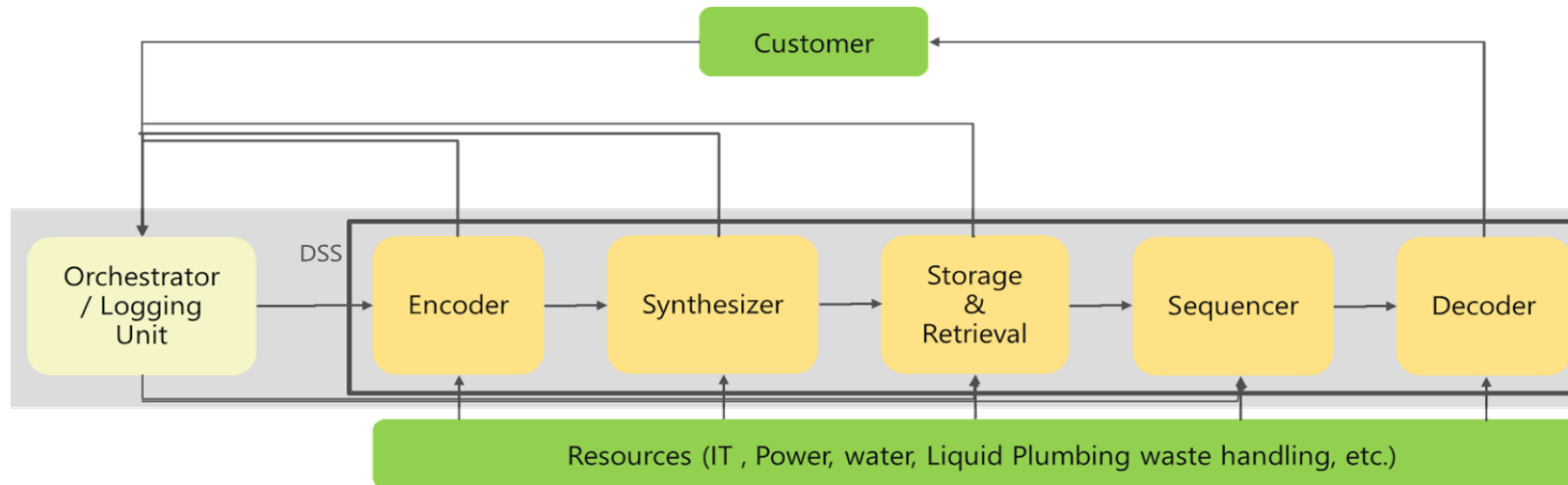


DNA Data Storage: The basics

- Writing:
 - Take a data object and encode in DNA for long-term storage.
- Reading:
 - Decode and reassemble:
Read / rewrite

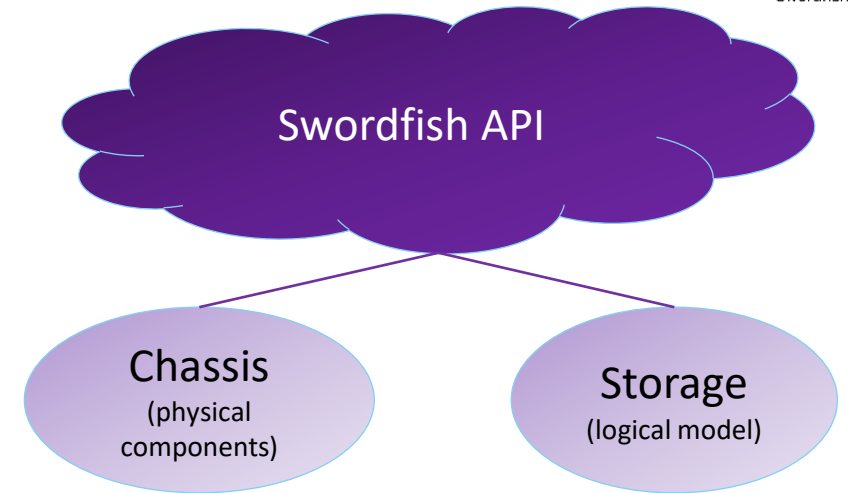
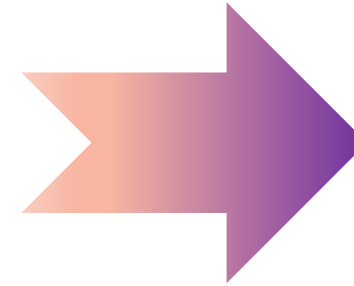
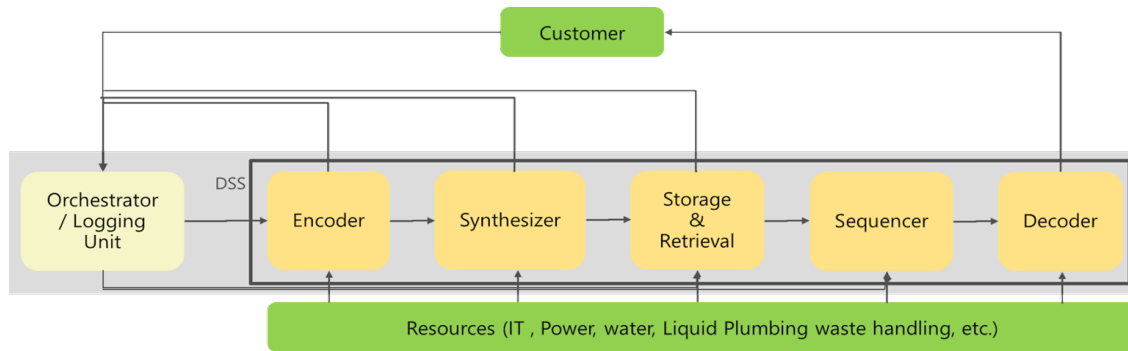


DNA Data Storage: Standardizing the workflow



- Define the common elements used in the process, standardization of terminology
- Characterize use cases:
 - Enterprise deployments – add standards-based management

Creating a Standards-based Interface



- Work in progress in Swordfish TWG to develop the Swordfish standard-based API to manage / monitor DNA Data Storage systems.
 - Starting with data center primary functionality, map to equivalent Swordfish resources, create new where needed; adding Object stores to Swordfish, plus DNA process resources
- Working draft to be released for public review in Q4'25; join the Swordfish TWG to influence work

Swordfish Plugfests

- Swordfish Plugfests:
 - April '25 in conjunction with SDC Regional
 - This week (Sept. 15-16)
- Provides hands-on access to SNIA Swordfish® and DMTF Redfish® systems in the SNIA Innovations Lab
- Attendees receive:
 - Access to vendor-agnostic interfaces in SNIA's interoperability labs
 - In-person assistance and feedback from Swordfish experts in a collaborative environment and real-time troubleshooting
 - Participation in interactive sessions for consuming the Swordfish API

➤ Next Swordfish Plugfest still TBD.

- Contact storagemanagement@snia.org for scheduling information



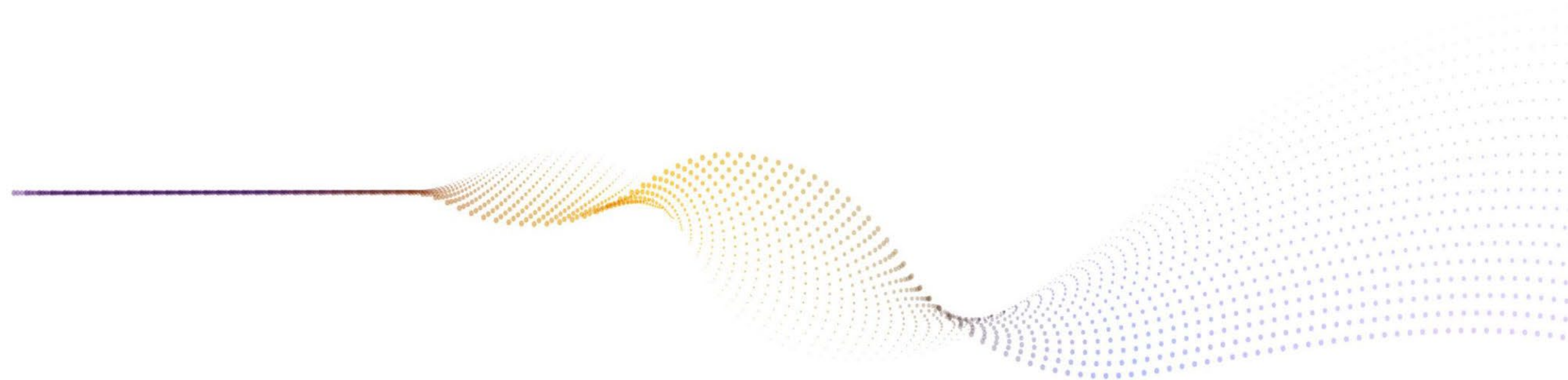


Getting Started...

Tools to Accelerate your Development

- Get started building:
 - Redfish Mockup Creator - create mockups from an existing system (use as starting point)
 - Redfish mockup server - show your mockups in a static system
 - Swordfish API Emulator - create a POC fast
- Figure out what's missing:
 - Swordfish metadata generator
- Validate your implementation as you go...
 - Swordfish profile parser
 - Redfish use case checker
 - Run individually, or bundled in Swordfish CTP:
 - Redfish service validator
 - Swordfish interop validator (Extended version of Redfish interop validator)

SNIA: <https://github.com/SNIA>
DMTF: <https://github.com/DMTF>



Swordfish Conformance Test Framework and Tests

CTP Test Framework

- The test framework leverages the “Redfish-Test-Framework”, an open source framework from the Redfish Forum
 - No need to learn complex setup: Framework is bundled with simple command-line interface specific to Swordfish
- Test early and often
 - CTP supports checking compliance level using mockups
 - Or, use an emulator as a test / development tool: Swordfish API Emulator and DEM both being enhanced to support CTP compliance
- Enhancements (some work in progress, some TBD):
 - SNIA authenticated self-run test result mechanism (e.g., certificate based authentication for CTP members for submitted test results)

```
(.env) [root@e7f161f18cda swordfish-ctp-tests]# python ./run_snia_test.py -h
usage: run_snia_test.py [-h] [--user USER] [--password PASSWORD]
                       [--secure SECURE] [--authtype AUTHTYPE]
                       [--profiles PROFILES [PROFILES ...]]
                       [--profile_version PROFILE_VERSION]
                       host level

Python Script for the official Swordfish CTP Testing Suite.
  The hostname provided should be a full URI, as example `https://example.com:8000`.

  The hostname may also be provided as a mockup directory as formatted for the Redfish-Mockup-Server or Redfish-Protocol-Validator

  The following test levels are available:  serviceroottest, servicetest, officialtest

  After performing the run, your test directory will be output into your Swordfish-CTP-Tests folder as "test_dir_currentdate".


positional arguments:
  host                Full URL of System being tested (or directory of mockup)
  level              Level of testing

optional arguments:
  -h, --help          show this help message and exit
  --user USER, -u USER  Username for server
  --password PASSWORD, -p PASSWORD  Password of server
  --secure SECURE, -s SECURE  Ensures certificate checking on https servers
  --authtype AUTHTYPE  Specify that we are using redfish session or not
  --profiles PROFILES [PROFILES ...]  Specify profiles to test against service
  --profile_version PROFILE_VERSION  Default version of profiles to test against

(.env) [root@e7f161f18cda swordfish-ctp-tests]#
```

Test Results: Summary results available from individual test runs

- Each run shows results of each test run
- Submit results when desired tests are passing
 - Redfish service-level tests required
 - Swordfish Discovery feature required
- From final / validated test results, these results will be transformed into results posted online at snia.org/ctp
 - Results will be categorized as Base Redfish, and by Swordfish Feature - only "passed" features published



Conformant

SNIA Swordfish(Tm) Conformance Test Program Results

Start Time: 2021-09-10 22:48:47
Duration: 38.72 s
Summary: Total: 5, Pass: 2, Fail: 3

Swordfish CTP Test	Status
Redfish Protocol Validator	Fail View
Redfish URI Validator	Fail View
SNIA Drives Capacity Test	Pass View
SNIA Registries Test	Fail View
SwordfishDiscovery	Pass View

Test Results: Published Results

- Final / validated test results will be posted online at snia.org/swordfish-ctp
 - Results will be categorized as Base Redfish, and by Swordfish Feature
 - Only “passed” features published


Example Company "A"

Official SNIA Swordfish™ CTP Test Results

CTP Test version: v1.2.2

Tested Software: Example Company "A" Storage Manager v1.2

Swordfish version: v1.2.2



Conformant

Swordfish Conformant Tests
Redfish Protocol Tests
Swordfish Discovery
Swordfish Block Provisioning
Swordfish NVMe SSD Drive
Swordfish NVMe SSD Drive Advanced Features
Swordfish NVMe SSD Drive Ethernet Attach

Applicable Product Family: Example Company "A" NVMe SSD Ethernet-Attached Drives
Products in Family: Product Name X01 NVMeGen3 Drive, NVMeGen4 Drive

[Company product family page.](#)

Redfish Service Tests

/redfish/v1/ (response time: 0.003722) ServiceRoot				
/redfish/v1/ (response time: 0.003722)		Context: redfish/v1/\$metadata=ServiceRoot.ServiceRoot File Origin: localFile:///.../metadata/ServiceRoot_v1.xml Resource Type: #ServiceRoot.v1_9_0.ServiceRoot		GET Success HTTP Code (200)
Show Results Show Payload				pass: 8 passGet: 1 refine: 1 skipOptional: 25
Property Name	Value	Type	Exists	Result
@odata.context	redfish/v1/\$metadata=ServiceRoot.ServiceRoot	odata	Exists	PASS
@odata.id	redfish/v1/	odata	Exists	PASS
@odata.type	#ServiceRoot.v1_9_0.ServiceRoot	odata	Exists	PASS
Storage	Link: /redfish/v1/Storage	link to: StorageCollection	Yes	PASS
AggregationService	-	link to: AggregationService	No	Optional
PowerEquipment	-	link to: PowerEquipment	No	Optional
Facilities	-	link to: FacilityCollection	No	Optional
Vendor	-	string	No	Optional
CertificateService	-	link to: CertificateService	No	Optional
ResourceBlocks	-	link to: ResourceBlockCollection	No	Optional
JobService	-	link to: JobService	No	Optional
TelemetryService	-	link to: TelemetryService	No	Optional
Product	-	string	No	Optional
ProtocolFeaturesSupported	-	ServiceRoot.v1_3_0.ProtocolFeaturesSupported	No	Optional
CompositionService	-	link to: CompositionService	No	Optional
StorageSystems	-	link to: StorageSystemCollection	No	Optional
StorageServices	-	link to: StorageServiceCollection	No	Optional
Fabrics	-	link to: FabricCollection	No	Optional
UpdateService	-	link to: UpdateService	No	Optional
RedfishVersion	1.12.0	string	Yes	PASS
UUID	92384634-2938-2342-8820-489239905423	GUID	Yes	PASS
Systems	-	link to: ComputerSystemCollection	No	Optional
Chassis	Link: /redfish/v1/Chassis	link to: ChassisCollection	Yes	PASS
Managers	-	link to: ManagerCollection	No	Optional
Tasks	-	link to: TaskService	No	Optional
SessionService	Link: /redfish/v1/SessionService	link to: SessionService	Yes	PASS
AccountService	-	link to: AccountService	No	Optional
EventService	-	link to: EventService	No	Optional
Registries	-	link to: MessageRegistryFileCollection	No	Optional
JsonSchemas	-	link to: JsonSchemaFileCollection	No	Optional
Links	[JSON Object]	ServiceRoot.v1_0_0.Links	Yes	complex
Links.Sessions	Link: /redfish/v1/SessionService/Sessions	link to: SessionCollection	Yes	PASS
Links.Oem	-	Resource.Oem	No	Optional
Id	RootService	string	Yes	PASS
Description	-	string	No	Optional
Name	Root Service	string	Yes	PASS
Oem	-	Resource.Oem	No	Optional
No errors				
No warns				

Service validator checks general conformance to schema

Troubleshooting from test results

PhysicalPortAssignment	-	link to: NetworkPort	No	Optional
BootMode	Disabled	string (enum)	Yes	PASS
VirtualFunctionsEnabled	True	boolean	Yes	PASS
MaxVirtualFunctions	16	number	Yes	PASS
Links	[JSON Object]	NetworkDeviceFunction.v1_0_0.Links	Yes	complex
Links.EthernetInterfaces	Array (size: 1)	array of: EthernetInterface	Yes	...
Links.EthernetInterfaces[0]	Link: /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11100/EthernetInterfaces	EthernetInterface	Yes	FAIL
Links.OffloadSystem	-	link to: ComputerSystem	No	Optional
Links.OffloadProcessors	-	Processor	No	Optional
Links.PhysicalNetworkPortAssignment	-	link to: Port	No	Optional
Links.EthernetInterface	-	link to: EthernetInterface	No	Optional
Links.PhysicalPortAssignment	-	link to: NetworkPort	No	Optional
Links.Endpoints	-	Endpoint	No	Optional
Links.PCIeFunction	-	link to: PCIeFunction	No	Optional
Links.Oem	-	Resource.Oem	No	Optional
Id	11100	string	Yes	PASS
Description	-	string	No	Optional
Name	Network Device Function View	string	Yes	PASS
Oem	-	Resource.Oem	No	Optional

ERROR - Links.EthernetInterfaces[0]: Linked resource reports schema version (or namespace): EthernetInterface.EthernetInterface not found in typechain

WARNING - /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11101 @odata.id: Expected @odata.id to match URI link /redfish/v1/Chassis/EBOFEnclosure/NetworkAdapters/8fd725a1/NetworkDeviceFunctions/11100

- Descriptive messages show issues with any failures or warnings
- Additional log files available for more detailed reporting

Individual Features Tests

Each test run has parameters, system info

Results show PASS/FAIL for each item

SNIA Swordfish (tm) Conformance Test Report



Tool Version: 2.0.0
 Fri Sep 10 22:49:25 2021
 (Run time: 0:00:00)

The Swordfish CTP Test Framework is provided and maintained by the SNIA. For feedback on the Swordfish CTP framework, go to:
<https://www.snia.org/feedback>
 This tool is provided and maintained by the DMTF. For feedback, please open issues in the tool's Github repository:
<https://github.com/DMTF/Redfish-Service-Validator/issues>

Description: My Target System Root Service, version 1.12.0, 92384634-2938-2342-8820-489239905423
 System: http://192.168.1.42:5000

Profile: ['./profiles/SwordfishDiscovery.json']
 Schema: None

authtype: None, certificatebundle: None, certificatecheck: False, config: None
 configuri: http://192.168.1.42:5000, debugging: False, forceauth: False, ip: http://192.168.1.42:5000
 logdir: logdir, oemcheck: True, online_profiles: True, payload: None
 timeout: 10, token: None, username: , usessl: False
 verbose: 0, warnrecommended: False, writecheck: False

/redfish/v1/ (response time: 0) ServiceRoot					
/redfish/v1/ (response time: 0) Show Results	Context: /redfish/v1 \$metadata=ServiceRoot.ServiceRoot File Origin: None Resource Type: #ServiceRoot.v1_9_0.ServiceRoot	GET Success	pass: 3 passGet: 1 totaltests: 3		
Property Name	Value	Expected	Actual	Result	
Storage.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
Systems.ReadRequirement	Implemented	Any	DNE	PASS	
StorageSystems.ReadRequirement	Implemented	Any	DNE	PASS	
No errors					
No warns					
/redfish/v1/Storage (response time: 0) StorageCollection					
/redfish/v1/Storage (response time: 0) Show Results	Context: /redfish/v1 \$metadata=StorageCollection.StorageCollection File Origin: None Resource Type: #StorageCollection.StorageCollection	GET Success	pass: 2 passGet: 1 totaltests: 2		
Property Name	Value	Expected	Actual	Result	
Members.MinCount	1	<=	1	PASS	
Members#0.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
No errors					
No warns					
/redfish/v1/Storage/IPAttachedDrive/Volumes (response time: 0) VolumeCollection					
/redfish/v1/Storage/IPAttachedDrive/Volumes (response time: 0) Show Results	Context: /redfish/v1 \$metadata=#VolumeCollection.VolumeCollection File Origin: None Resource Type: #VolumeCollection.VolumeCollection	GET Success	pass: 2 passGet: 1 totaltests: 2		
Property Name	Value	Expected	Actual	Result	
Members.MinCount	0	<=	1	PASS	
Members#0.ReadRequirement	Mandatory	Must Exist	Exists	PASS	
No errors					
No warns					

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

Relationship to SM Lab

- Swordfish SM Lab has a symbiotic relationship with the Swordfish Conformance program
 - Participants can use the SM Lab to test their own products as well as interoperability with the latest and greatest versions of other companies' products.
 - Regular automated results reporting of available infrastructure
- Multiple participation options
 - Virtual plugfests
 - Membership
 - F2F Plugfests

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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<http://sniadeveloper.org/conference>