DIVING INTO THE NEW WAVE OF STORAGE MANAGEMENT

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ABSTRACT

- As the NVM Express® (NVMe®) family of specifications continue to develop, the corresponding Swordfish management capabilities are evolving: the SNIA Swordfish™ specification has expanded to include full NVMe and NVMe-oF™ enablement and alignment across DMTF™, NVMe, and SNIA for NVMe and NVMe-oF use cases.

- The SSM TWG and OFA™ OFMFWG are working together to bring to life an open-source OpenFabrics Management Framework, with a Redfish/Swordfish management model and interface.

- 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. These include:
  - Expanded support for NVMe and NVMe-oF Devices
  - Managing Storage Fabrics

- This presentation provides an update on the latest NVMe-oF configuration and provisioning capabilities available through Swordfish, and an overview of the most recent work adding detailed implementation requirements for specific configurations, ensuring NVMe and NVMe-oF environments can be represented entirely in Swordfish and Redfish environments.
WHAT IS 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
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
  - New white paper: Metrics and Telemetry in Swordfish
EXPANDING SUPPORT FOR NVME AND NVME-OF

- **NVMe model/device support added in v1.2.0+**
  - v1.2.3 last update (Q3 ‘21)
  - v1.2.4 releasing April 2022

- **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
  - 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

- **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
IMPLEMENTING AN NVME DRIVE IN RF / SF

NVMe Device Usage:
- Storage == Subsystem
- StorageController == NVMe Controllers (IO, Admin, Discovery)
- Volume == Namespace
- StoragePool == Endurance Group / NVM Set
- Chassis / Drive == Physical Entity Information

Features Registry contains the published supported Features.

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SAMPLE NVME-OF INSTANCE
EXPANDING STORAGE FABRIC MANAGEMENT

- 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, add storage-specific capabilities
  - Storage fabric management
  - Workload optimization
  - Performance instrumentation
Fabric representation for connectivity:
Switch / Endpoint / Zone
REDFISH/SWORDFISH HIERARCHY: ADDING MULTI-SYSTEM ACCESS MANAGEMENT

Service Root

/./redfish/v1

Collection Resource

/./Storage

Singleton Resource

Storage/<id>

Subordinate Resource Collections

Volumes

Singleton Resource

Volumes/<id>

Reference (link) to Volume

/./StoragePools

Volume (Namespace) Instance

StoragePools/<id>

/./Controllers

Controllers/<id>

/./Fabrics

Fabrics/<id>

/./Connections

Connections/<id>

/./Endpoints

Endpoints/<id>

/./Zones

Zones/<id>

Access Management
Connections / Endpoints / Zones
DEVELOPING THE OPENFABRICS FRAMEWORK AND MAPPING TO REDFISH AND SWORDFISH
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](https://www.snia.org/swordfish)
- **Swordfish Specification Forum**
  - Ask and answer questions about Swordfish
- **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](https://www.snia.org/forums/smi/about/join)

**DMTF Redfish™**
- **Redfish Standards**
  - Specifications, whitepapers, guides,…
    [https://www.dmtf.org/standards/redfish](https://www.dmtf.org/standards/redfish)

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

**NVM Express**
- **Specifications** [https://nvmexpress.org/developers/](https://nvmexpress.org/developers/)
- **Join** [https://nvmexpress.org/join-nvme/](https://nvmexpress.org/join-nvme/)
THANK YOU
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