Introduction to SNIA Swordfish™ — Scalable Storage Management

Richelle Ahlvers

Principal Storage Management Architect Broadcom Inc.

SNIA Scalable Storage Management (SSM) Technical Work Group Chair

SNIA at-a-glance

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unique member companies

3,500
active contributing members

50,000
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Abstract

- Swordfish™ is an extension of the DMTF Redfish specification developed by the Storage Networking Industry Association (SNIA) to provide a unified approach for the management of storage equipment and services in converged, hyper-converged, hyperscale and cloud infrastructure environments, making it easier for IT administrators and DevOps to integrate scalable solutions into their data centers.
- This presentation shows how Swordfish extends Redfish and provides an overview of basic Swordfish concepts.

Disclaimer

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- 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

There are 3 hard problems…

- There are 3 hard problems in tech today

0. Cache coherence
1. Naming things
1. Off by one errors

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- There are 3 hard problems in tech today

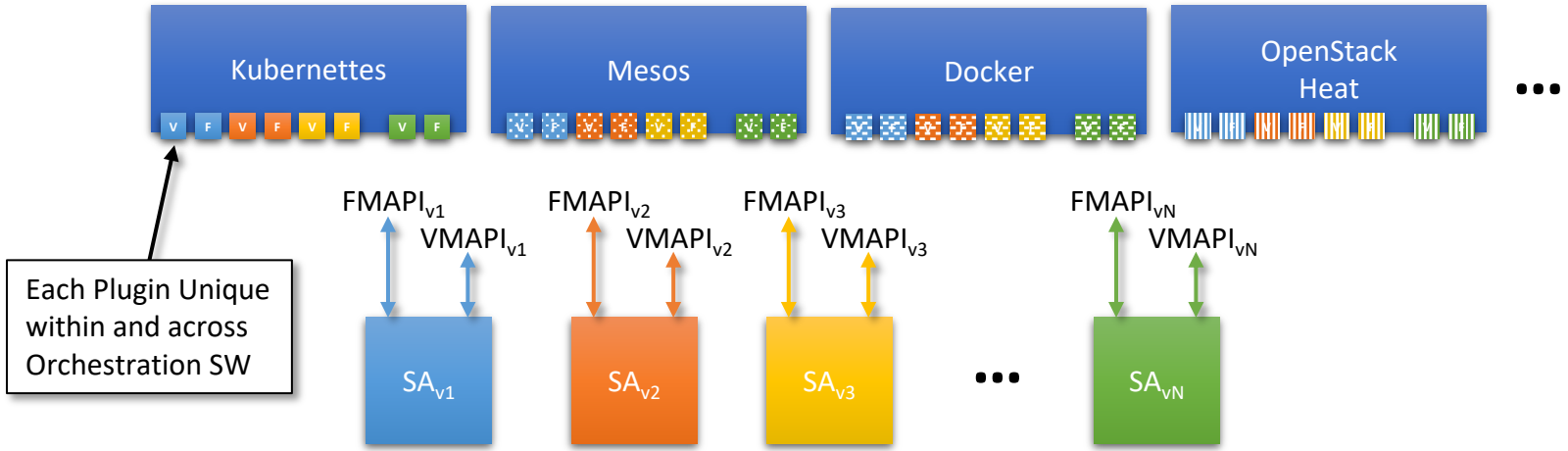
0. Cache coherence
1. Naming things
1. Off by one errors
7. Async callbacks

6

What are the Drivers for SNIA Swordfish™?

- Customers (and vendors) have asked for improvements in storage management APIs
  - Make them simpler to implement and consume
  - Improve access efficiency
    - Fewer transactions, with more useful information in each
  - Provide useful access via a standard browser
  - Expand coverage to include converged, hyper-converged, and hyper-scale
  - Provide compatibility with standard DevOps environments

Problems – Orchestration Interaction



Key
SA = Storage Array
SAv1 = Storage Array Vendor 1
VMAPIv1 = Volume Management API Vendor 1
FMAPIv1 = File Management API Vendor 1

- Orchestration components need plugins for every FMAPI and VMAPI
- Orchestrations layers do not have easy API for plugins
- Currently plugin support is built into the orchestration layer itself
  - Orchestration layers change frequently requiring constant
  - Every orchestration layer will require unique plugins

More Problems – Storage Array Vendors

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- To write the volume and file plugins Storage Vendors have to:
  - Possibly write more than one set per array type per orchestration, as different orchestration versions have evolved their storage support requiring different plugins for different versions
  - Develop strong orchestration product expertise as the plugins are very orchestration specific
  - These plugins will have to run on virtually every node in the cluster
  - Because these plugins may be tied into the orchestration software they may end up in tree for the orchestration SW

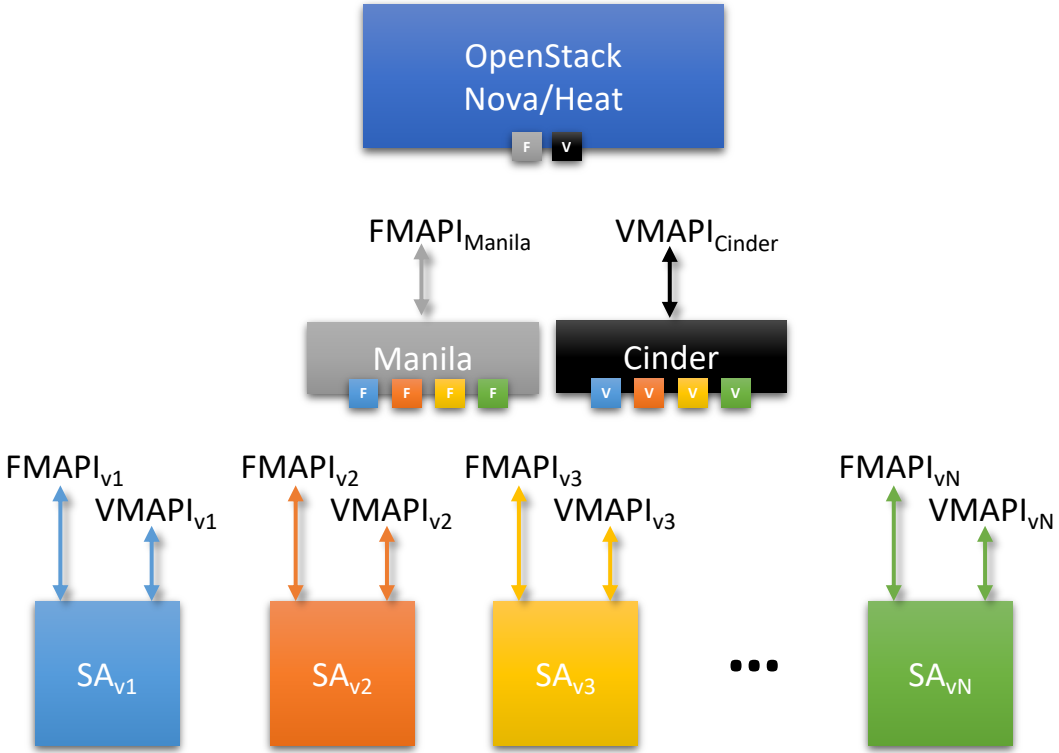
More Problems

- Some orchestration layers may leave array selection as an app/container decision
- No common storage scheduling
  - DevOps should not pick data locations directly
  - No standard based definition of classes of service
- No automated discovery

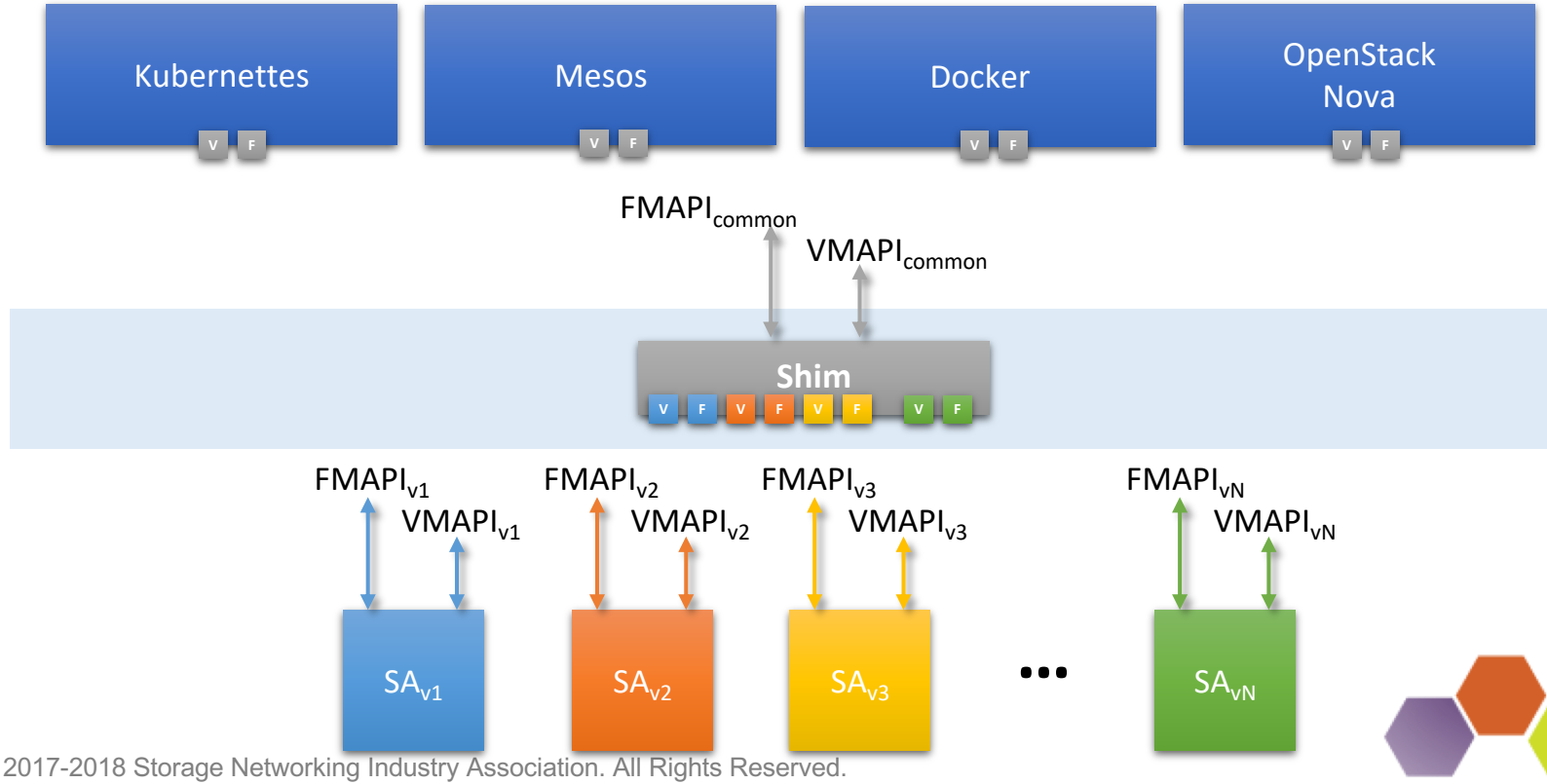
OpenStack Mostly Solved This

- Created a shim layer:
  - Cinder API – Volume Management API
  - Manila API– File Management API
- Each Vendor required to created Cinder and Manila Plugin
  - Cinder/Manila are specific to Openstack
  - Change infrequently
  - Can not be used easily outside of Openstack
    - Being retro fitted to a stand alone mode for other orchestrations
- Cinder has a filter scheduler
  - Based on characteristics and weights will select best array for the app request
- Does not solve all the issues
- Endorsed and deployed widely by the community

The Openstack Solution



A Common Shim solution



Container Storage Interface

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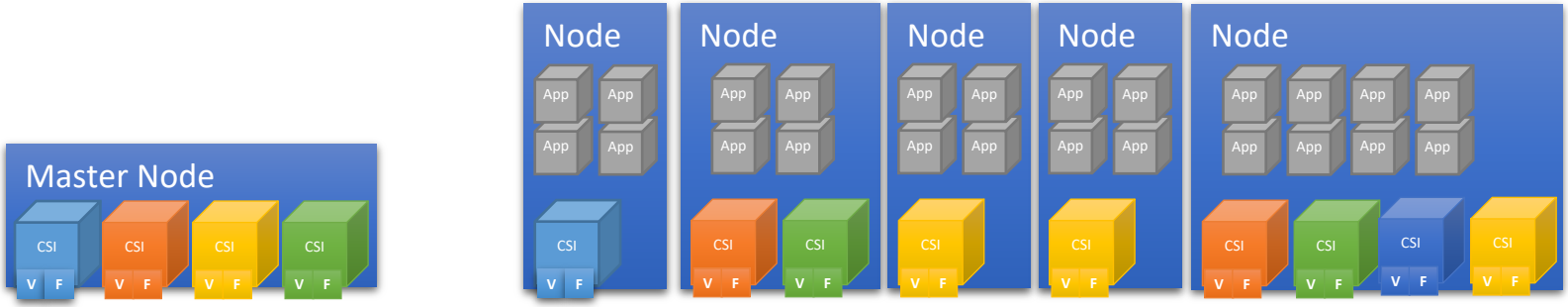
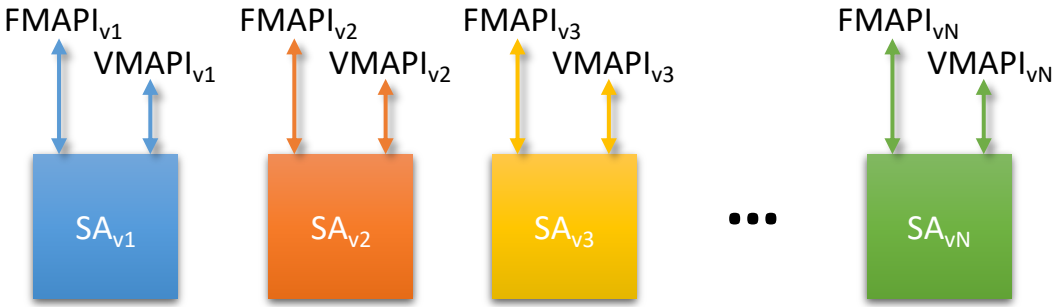
- Orchestrators last year determined this was a problem
  - Set out to define a simple shim service has
    - Common northbound
    - Stable southbound for array plugins
  - Cooperative effort – One API to rule them all
    - Kubernettes
    - Docker
    - Mesos

CSI Direction





Container

CSI Problems

- CSI defines an abstraction that creates an opaque conduit to Storage Array
  - Orchestration layer is only concerned with size and name at this point
  - Container writer must provide array specific blob
- Simple provisioning interface only
  - Even snapshots and replications deferred
  - No object support
  - No tenancy
  - No storage scheduling
    - No classes of service
  - No unified management APIs
    - No events mangement
    - No log management
    - No performance monitoring
    - No migration services
- If there were only a unified model that dealt with all these …..
  - Perhaps a tail-walking, bill-shaking, powerful beast ….

The SNIA Swordfish™ Approach

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- **The What:**
  - Refactor and leverage SMI-S schema into a simplified model that is client oriented
  - Move to Class of Service based provisioning and monitoring
  - Cover block, file and object storage
  - Extend traditional storage domain coverage to include converged environments (covering servers, storage and fabric together)
- **The How:**
  - Leverage and extend DMTF Redfish Specification
  - Build using DMTF's Redfish technologies
    - RESTful interface over HTTPS in JSON format based on OData v4
  - Implement Swordfish as an ***extension*** of the Redfish API

Who is Developing Redfish and Swordfish*?

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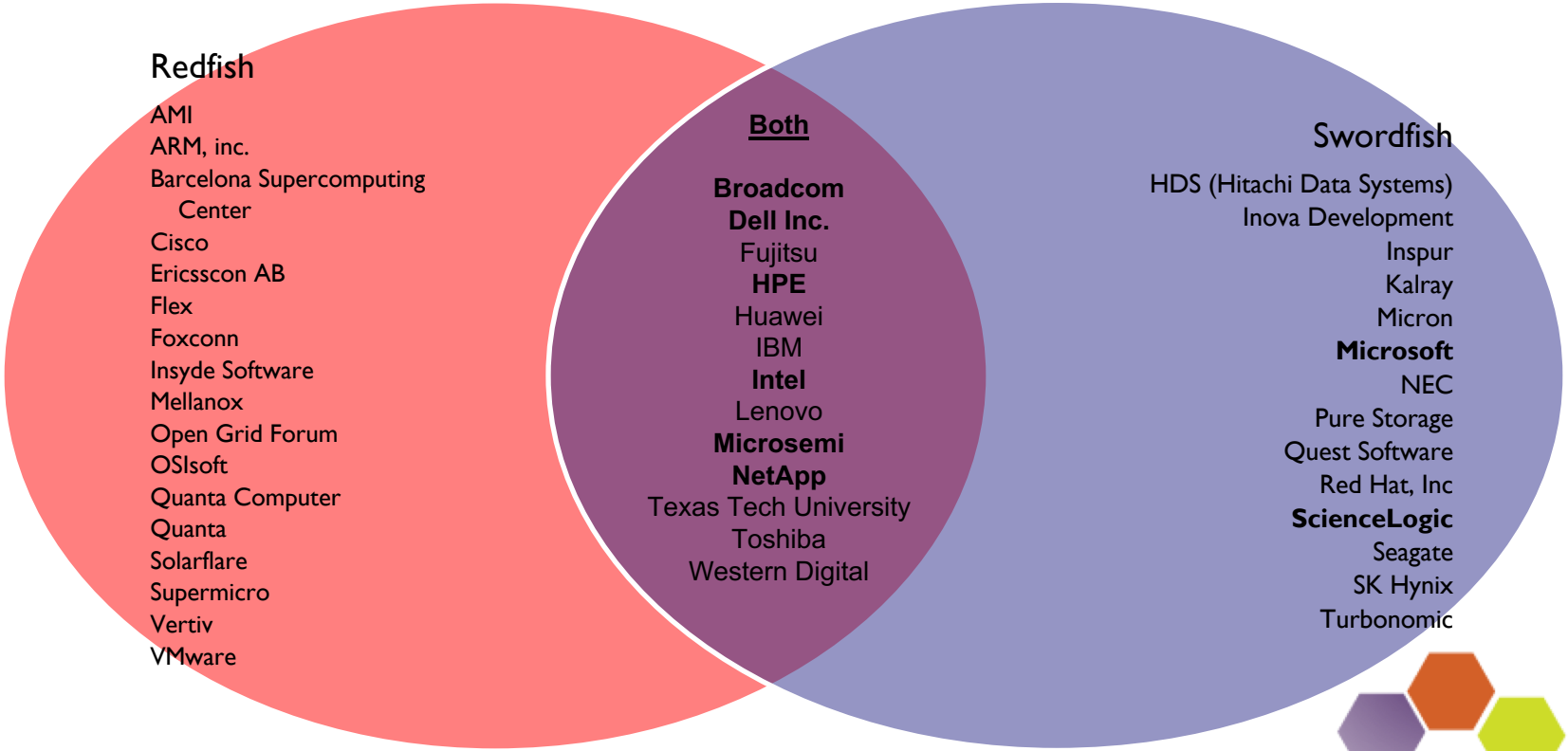

*as of Feb 15, 2018

Functionality Included in the Swordfish v1.0.x API Specification

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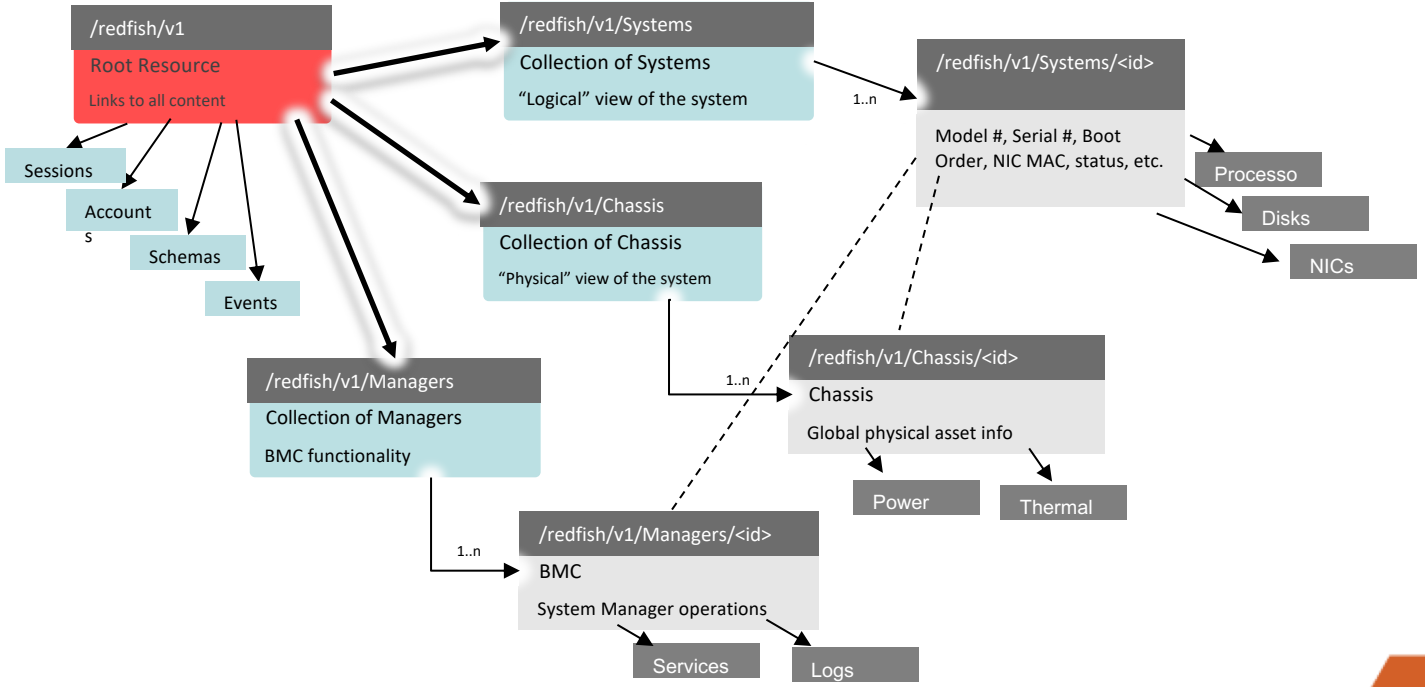
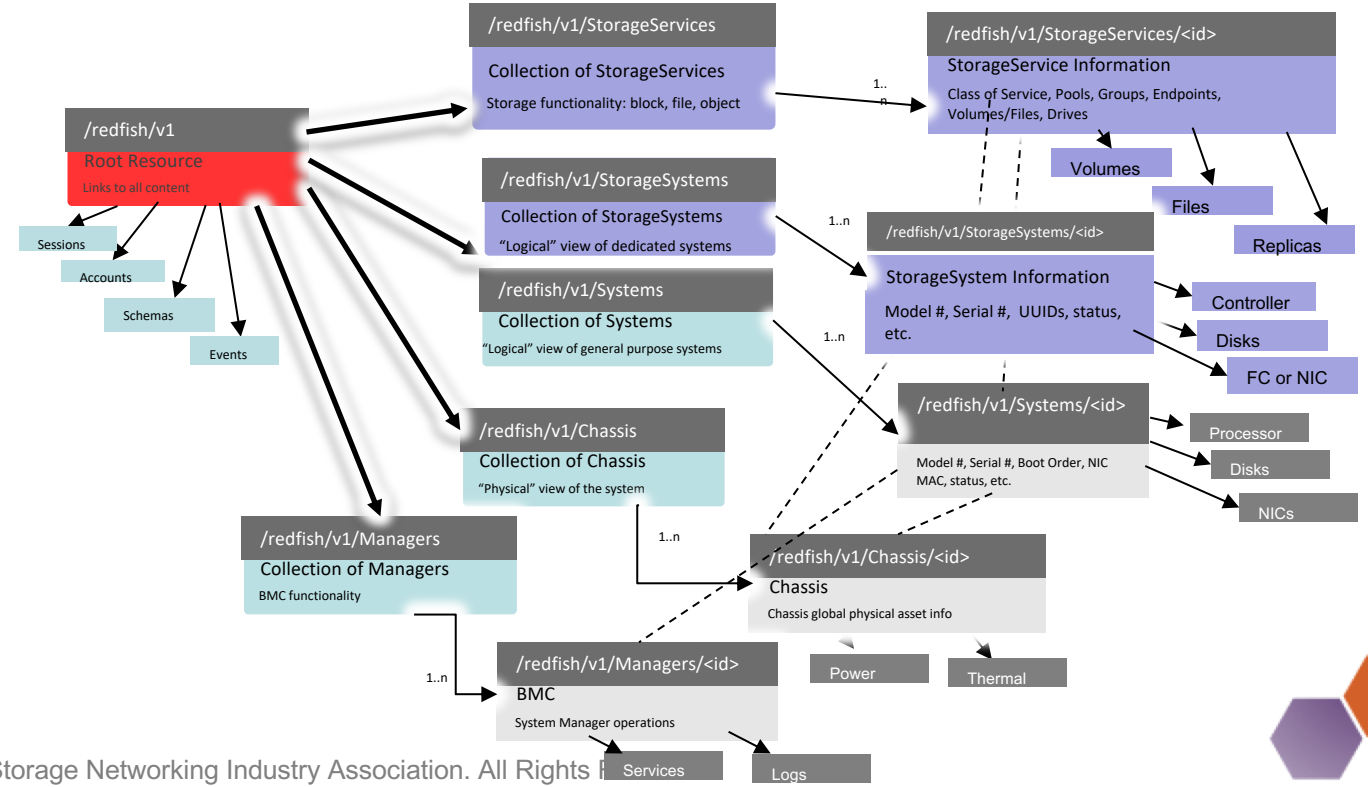
- Block storage
  - Provisioning with **class of service** control
  - Volume Mapping and Masking
  - Replication
  - Capacity and health metrics
- File system storage
  - Adds File System and File Share
  - Leverages all other concepts – provisioning with class of service, replication, …
- Additional content
  - Object drive storage

Starting with Redfish: An Overview

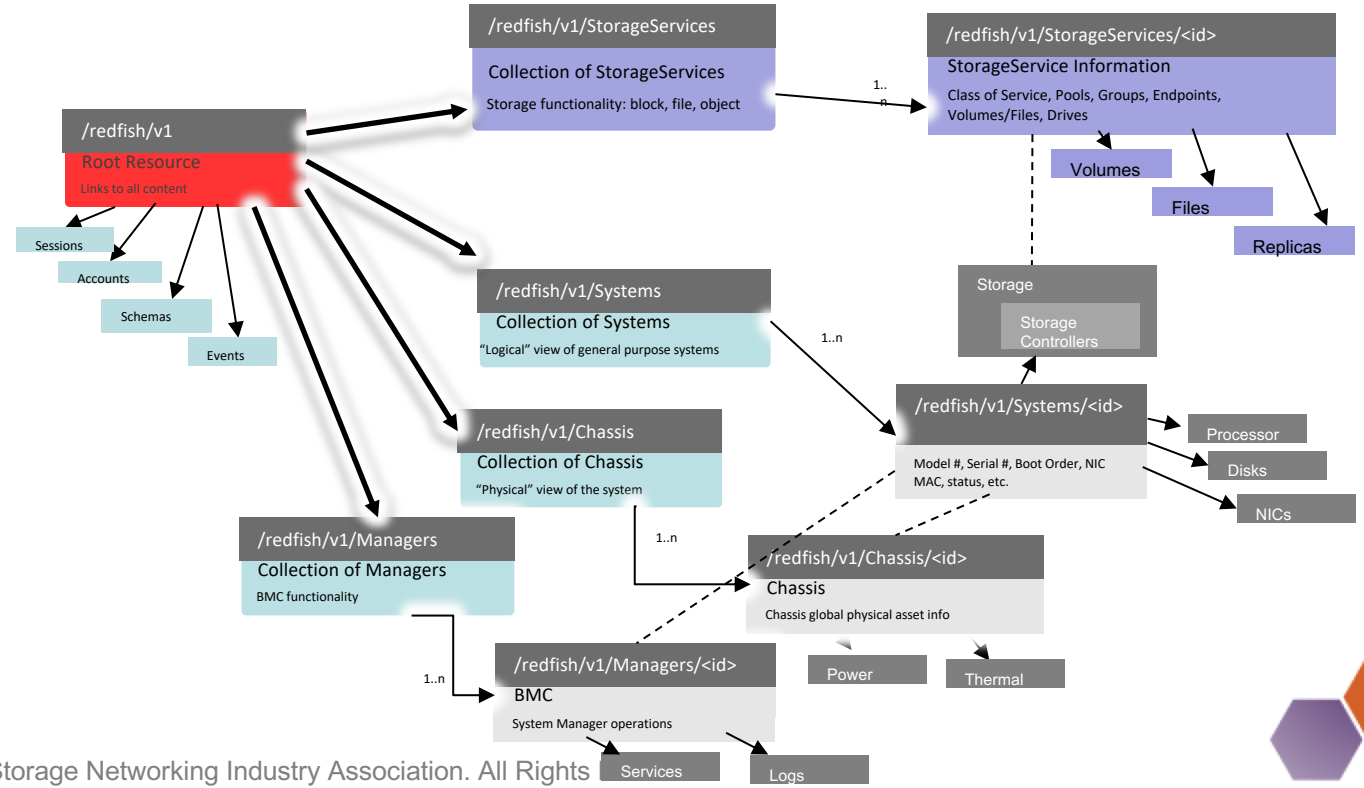
Redfish Resource Map



Adding Storage to Redfish (2 Ways):
Hosted Service Configuration



Adding Storage to Redfish (2 Ways):
Integrated Service Configuration



See example Swordfish configurations

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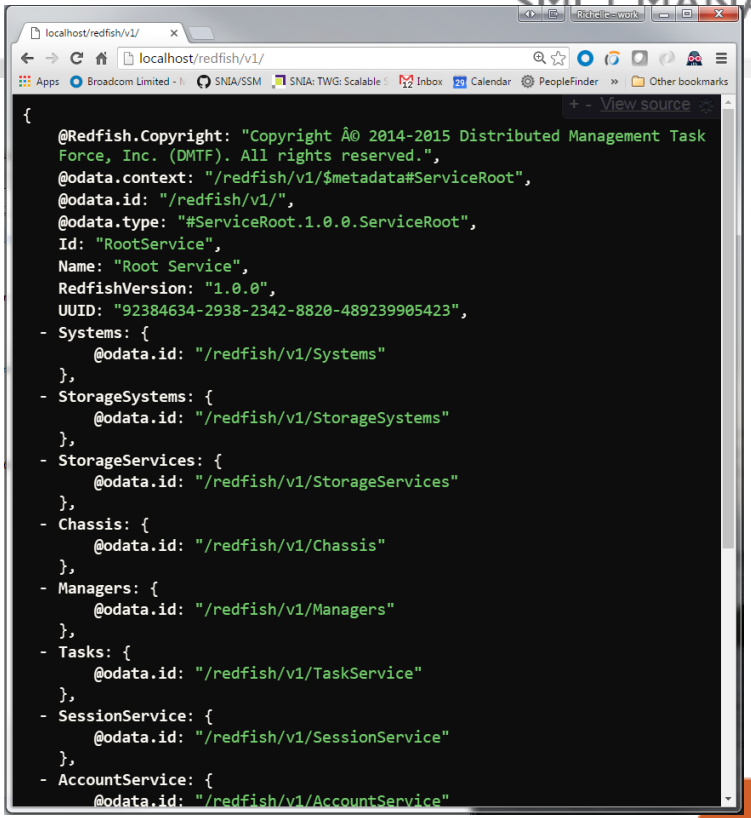
- As a work tool, the Technical Work Group (TWG) works with “mockups” (snapshots of a state in time) of different types of systems
- Published at http://swordfishmockups.com (/redfish/v1/)

Note: Mockups are representations of implementations, not normative

Overview of Swordfish

- Explore the Swordfish data model to see potential / typical implementation
- Navigate through the model to learn about and see various resources
- SNIA mockups show two examples of block storage systems
  - Simple: A small external array
  - Complex: all of the elements in the block storage model, with remote replication
- .. and an example of a file server with multiple file shares

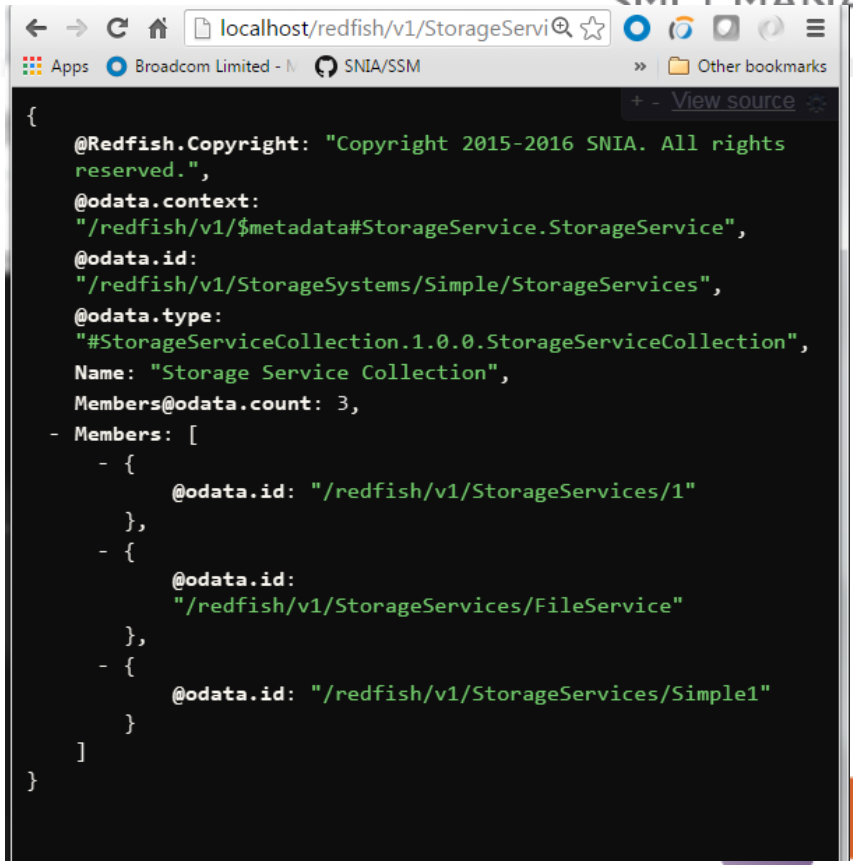


Navigating through the Mockups…

- Select the …./redfish/v1/StorageServices link to see the “Collection” of Storage Services
- Click the “…/StorageServices/Simple” link to see the details of the Simple mockup or …

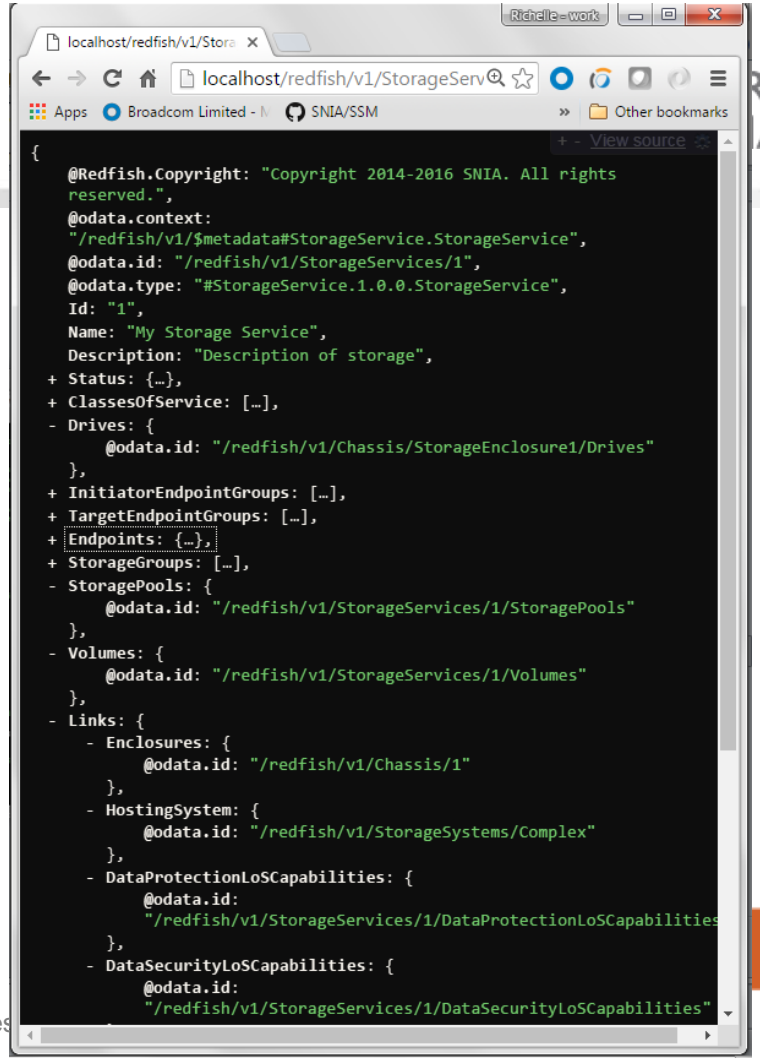
“…/StorageServices/1” to see the details of the complex storage service mockup

“…/StorageServices/FileService” to see the filesystem mockup



What's in a Storage Service? (Block)

- Available Classes Of Service
  - Lines of Service that are used to compose the Classes of Service
- Volumes
- Pools
- Groups
- Endpoints
- …
- Pointer to related resources (system, chassis,..)



What's in a Storage Service? (File)

Same structure:

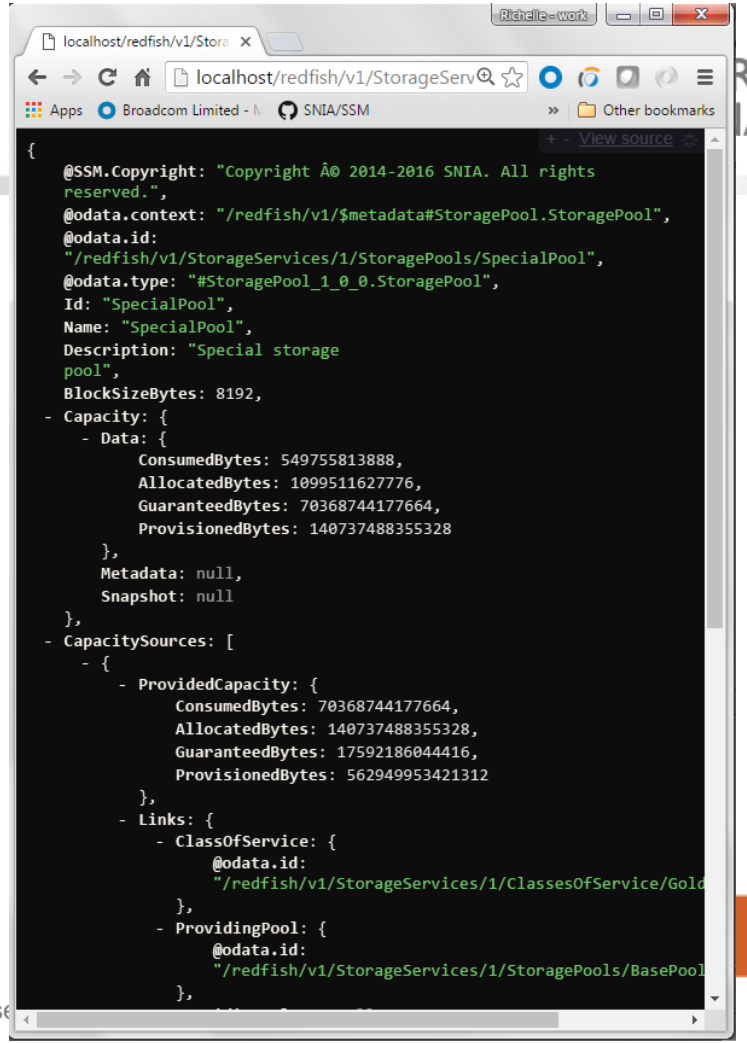
- Available Classes Of Service
- ***File systems***
- Pools
- Groups
- Endpoints
- …
- Pointer to related resources (system, chassis, **block service** or drives)

Discovery…

Let's discover something:

Do I have space to…?

1. Check the capacity in a storage pool that I have permission to allocate storage from.
2. Navigate down into "SpecialPool" and check its remaining capacity



How Do Clients Determine Swordfish Implementations They Can Support?

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- Profiles define sets of required functionality to support:
  - Basic Swordfish support
    - Integrated service configuration
    - Hosted service configuration
  - Add-on functionality:
    - Local replication
    - Remote replication
  - Certification / Conformance Requirements
    - (Planned) EnergyStar Requirements: Orthogonal to functionality profiles
      - Energy and power metrics
      - Controls for on-demand instrumentation

Swordfish Specs and Technical Content... In 2018

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- v1.0.6 (WIP) Release in February 2018
  - Introduction of two StorageSystem models
  - Schema updates, Spec section additions, User's guide updates: new use cases for on-demand replicas
  - *Pending release as SNIA Technical Position*
- Work-in-progress:
  - Profile Development: Basic Swordfish Support
- Future Functionality
  - Storage-specific security roles
  - Enhanced Class of Service capabilities for Spare management, rebuild management
  - Enhanced profiles for SNIA Alliance partner organizations
  - Functionality alignment across DMTF, NVMExpress/NVMe-MI and SNIA
  - Object Storage

Swordfish Growth

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- SNIA Scalable Storage Management Technical Work Group (SSM TWG)
  - (SSM is the group, Swordfish is the Spec)
  - Scalable Storage Management (SSM) TWG chartered in December 2015
  - v1.0 Spec Released September 2016
- 2017 Focus: validating spec, initial POC implementations
  - Swordfish Functionality Enhancements: Specification and Technical Content
    - Releases / Work in progress
  - Documentation and Supporting Materials
  - Open Source Tools and Infrastructure Development
  - Implementation Support
    - Plugfests: https://www.snia.org/forums/smi/tech_programs/lab_program

Documentation and Supporting Materials

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- Online Practical Guide
  - SNIA Swordfish Practical Guide
- NEW! Swordfish School:
  - Swordfish School Playlist (YouTube)
- Swordfish API Specification
- Webcasts

http://github.com/snia

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Pinned repositories

Swordfish-API-Emulator

The Swordfish API Emulator can emulate a Swordfish-based system statically or dynamically. Starting from an initial state described by mock-ups, the emulator can be used to emulate a Swordfish syst...

Python ★ 3 3

Swordfish-basic-web-client

The Swordfish Basic Web Client can connect to one or more Swordfish services (including the Swordfish emulator), and present in a web UI frame the entire Swordfish hierarchy. The basic web client a...

TypeScript ★ 2

CDMI

The Reference Implementation for the SNIA Cloud Data Management Interface (CDMI) an ISO standard

Java 9

Swordfish-datadog-sample-dashboard-integration

The Swordfish datadog sample dashboard integration provides a sample dashboard for the datadog monitoring service that can connect to a Swordfish services (including the Swordfish emulator), and pr...

★ 1

Swordfish-powerBI-sample-dashboard-integration

The Swordfish PowerBI sample dashboard integration provides a sample dashboard for the PowerBI data center monitoring system that can connect to a Swordfish service (including the Swordfish emulato...

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OSL

Open Source Liaison – A multi-vendor collaborative group for aligning open source projects with standards

★ 1

How to Participate: Shaping the Standard

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- Find pointers to the latest technical content:
  - http://snia.org/swordfish
  - http://www.snia.org/publicreview#swordfish
- Join the SSM TWG
  - By Joining the SNIA and SSM TWG, you can shape the standard: https://members.snia.org/apps/org/workgroup/ssmtwg
- Through the SNIA feedback portal, providing feedback on "Work In Progress"
  - As the group produces "Works In Progress", you can provide feedback at http://www.snia.org/feedback

THANK YOU