



Introduction to Swordfish: Extending Redfish for Scalable Storage Management

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July 28, 2016

Disclaimer



- 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

What are the Drivers for Swordfish?



- Customers (and vendors) asking 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

The Swordfish Approach



- ***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

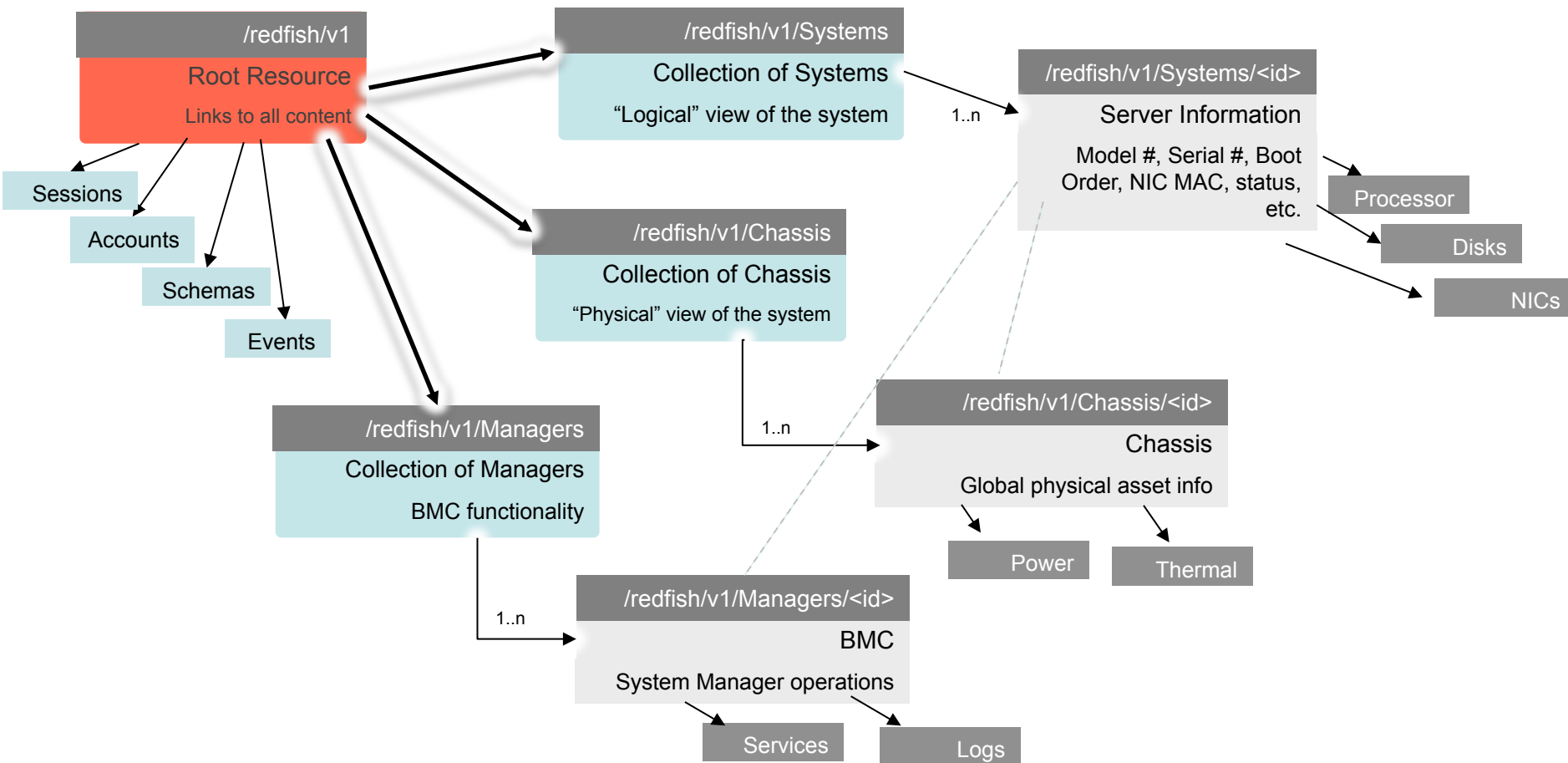
Functionality Targeted for the Swordfish v1.0 API Specification



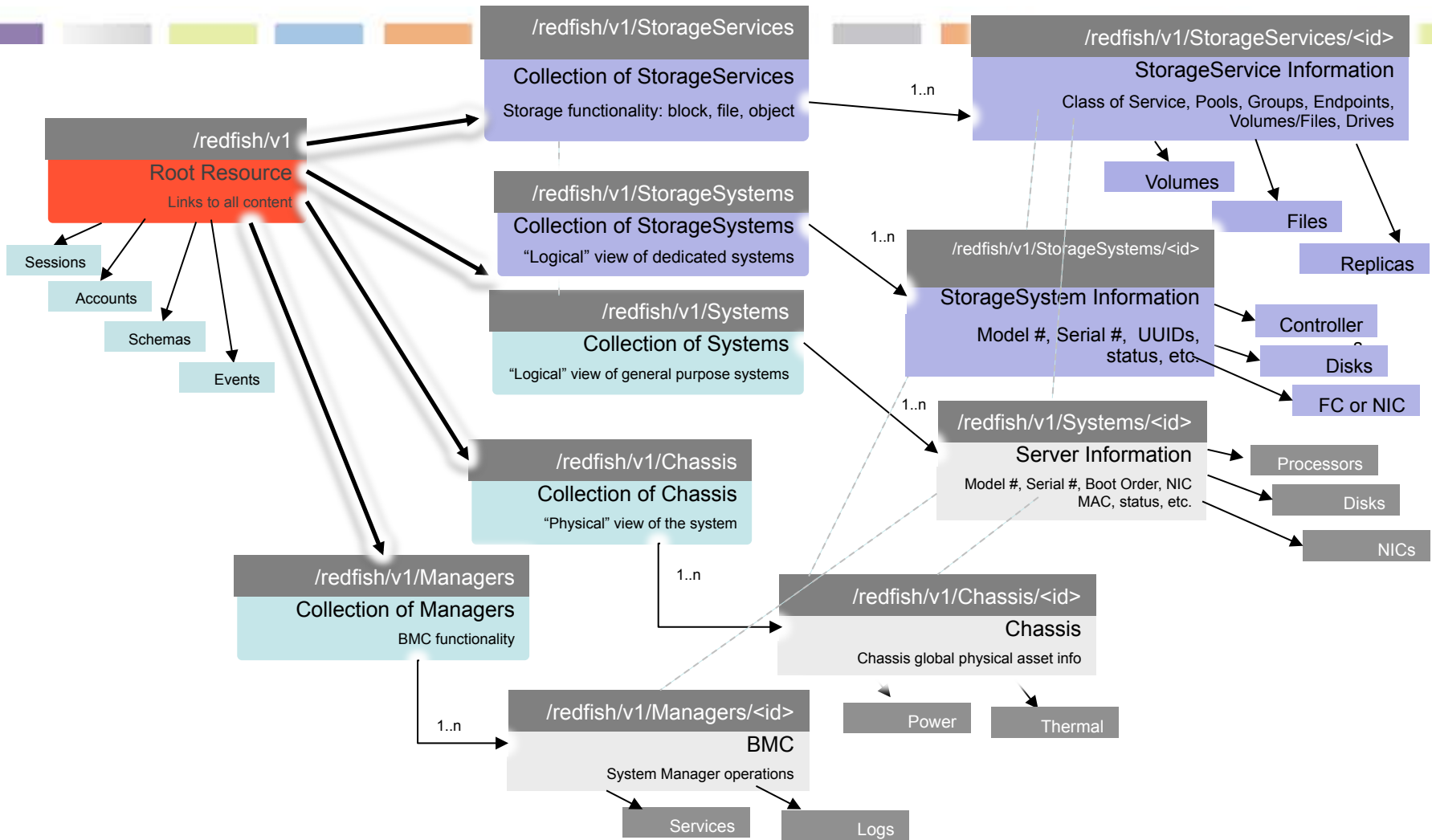
- **Block storage**
 - Provisioning with **class of service** control
 - Volume Mapping and Masking
 - Replication
 - Capacity and health metrics
- **File system storage**
- **Additional content**
 - Object drive storage

Starting with Redfish: An Overview

Redfish Resource Map

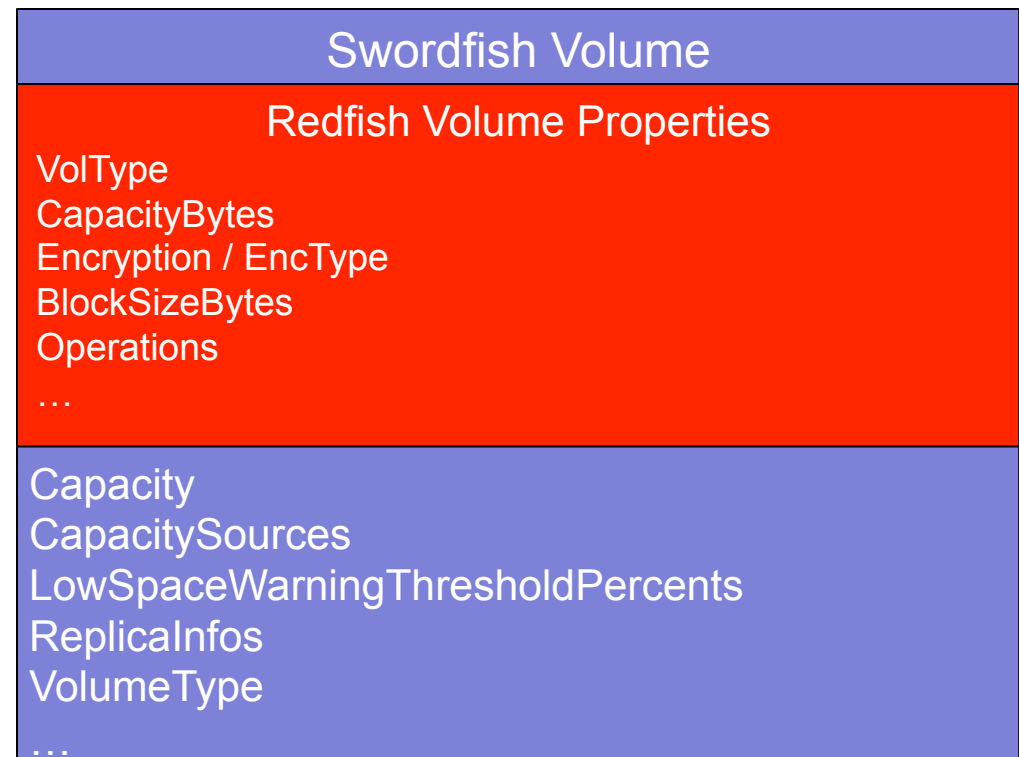
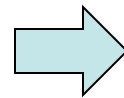


Adding Storage to Redfish: Swordfish



Seamless Extension of Redfish

- Make Swordfish a seamless extension of Redfish local storage schema
- Example: Volume



Overview of Swordfish Mockups



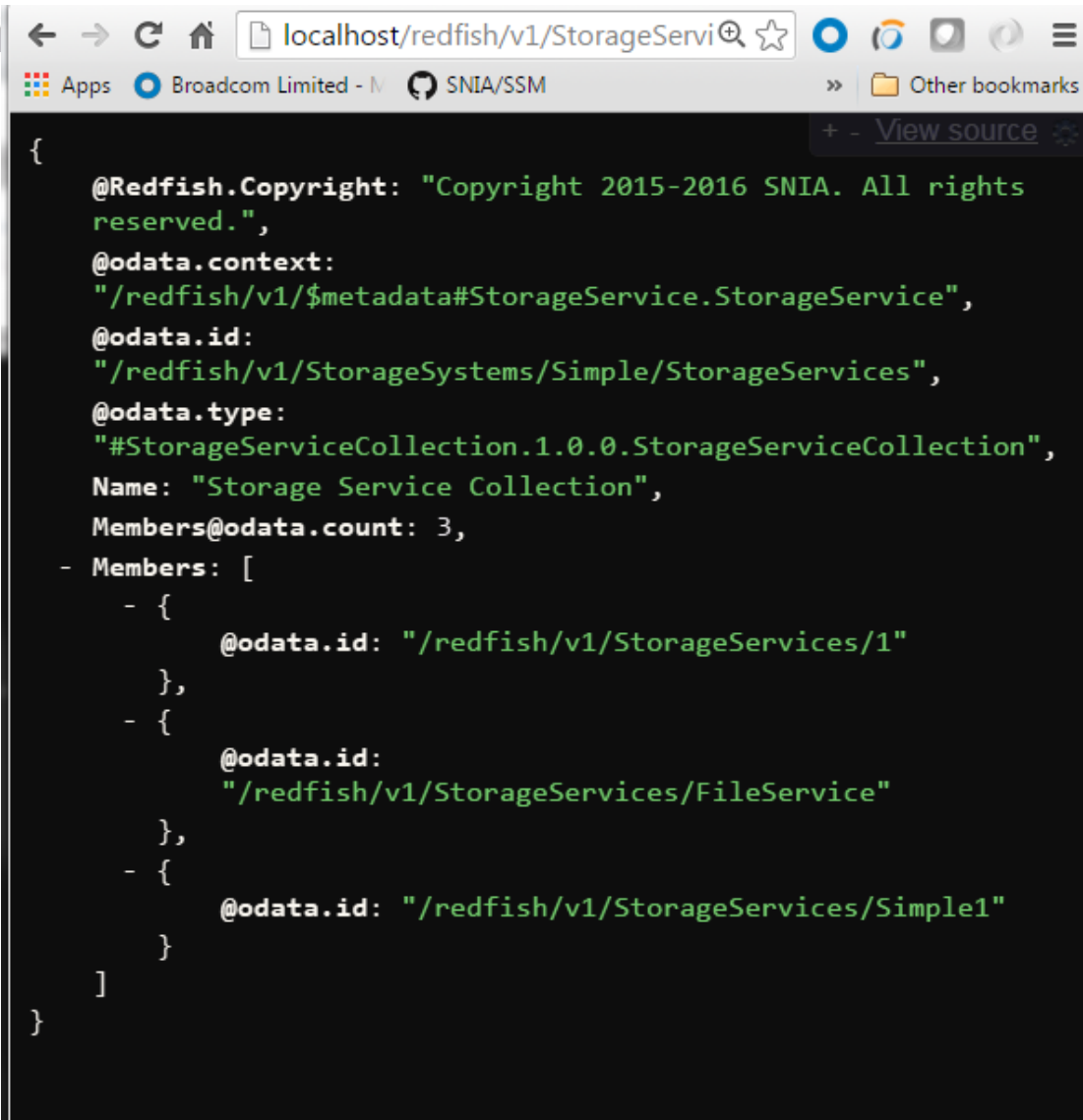
- Explore “mockups” of the Swordfish data model in a typical implementation
- Navigate via links through the model to various resources
- SNIA mockups show two examples of block storage systems
 - Simple: A small external array
 - Complex: all of the elements in the block storage model, with remote replication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

A screenshot of a web browser window showing a JSON API response. The browser's address bar displays "localhost/redfish/v1/". The page content is a JSON object representing a Redfish service root. The JSON is displayed in a dark-themed editor with syntax highlighting. The response includes metadata such as copyright information, context, ID, type, name, version, and UUID, as well as a list of resource links for Systems, StorageSystems, StorageServices, Chassis, Managers, Tasks, SessionService, and AccountService.

```
{
  @Redfish.Copyright: "Copyright © 2014-2015 Distributed Management Task Force, Inc. (DMTF). All rights reserved.",
  @odata.context: "/redfish/v1/$metadata#ServiceRoot",
  @odata.id: "/redfish/v1/",
  @odata.type: "#ServiceRoot.1.0.0.ServiceRoot",
  Id: "RootService",
  Name: "Root Service",
  RedfishVersion: "1.0.0",
  UUID: "92384634-2938-2342-8820-489239905423",
  - Systems: {
    @odata.id: "/redfish/v1/Systems"
  },
  - StorageSystems: {
    @odata.id: "/redfish/v1/StorageSystems"
  },
  - StorageServices: {
    @odata.id: "/redfish/v1/StorageServices"
  },
  - Chassis: {
    @odata.id: "/redfish/v1/Chassis"
  },
  - Managers: {
    @odata.id: "/redfish/v1/Managers"
  },
  - Tasks: {
    @odata.id: "/redfish/v1/TaskService"
  },
  - SessionService: {
    @odata.id: "/redfish/v1/SessionService"
  },
  - AccountService: {
    @odata.id: "/redfish/v1/AccountService"
  }
}
```

Navigating through the Mockups...

- Select the [.../redfish/v1/Storage/Services](#) 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

A screenshot of a web browser window displaying JSON data. The browser's address bar shows the URL "localhost/redfish/v1/StorageServi". The page content is a JSON object representing a Storage Service Collection. The JSON includes metadata such as copyright information, OData context, ID, and type, as well as a list of members. The members list contains three entries, each with an OData ID pointing to a specific storage service mockup: "/redfish/v1/StorageServices/1", "/redfish/v1/StorageServices/FileService", and "/redfish/v1/StorageServices/Simple1".

```
{
  "@Redfish.Copyright": "Copyright 2015-2016 SNIA. All rights reserved.",
  "@odata.context": "/redfish/v1/$metadata#StorageService.StorageService",
  "@odata.id": "/redfish/v1/StorageSystems/Simple/StorageServices",
  "@odata.type": "#StorageServiceCollection.1.0.0.StorageServiceCollection",
  Name: "Storage Service Collection",
  Members@odata.count: 3,
  - Members: [
    - {
      @odata.id: "/redfish/v1/StorageServices/1"
    },
    - {
      @odata.id: "/redfish/v1/StorageServices/FileService"
    },
    - {
      @odata.id: "/redfish/v1/StorageServices/Simple1"
    }
  ]
}
```

What's in a Storage Service? (Block)

- Available Classes Of Service
- Volumes
- Pools
- Groups
- Endpoints
- ...
- Pointer to resources (system, chassis, drives)



```
{
  @Redfish.Copyright: "Copyright 2014-2016 SNIA. All rights reserved.",
  @odata.context:
    "/redfish/v1/$metadata#StorageService.StorageService",
  @odata.id: "/redfish/v1/StorageServices/1",
  @odata.type: "#StorageService.1.0.0.StorageService",
  Id: "1",
  Name: "My Storage Service",
  Description: "Description of storage",
  - Status: {
    State: "Enabled",
    Health: "OK"
  },
  - ClassesOfService: {
    @odata.id: "/redfish/v1/StorageServices/1/ClassesOfService"
  },
  - StorageServiceCapabilities: {
    @odata.id:
      "/redfish/v1/StorageServices/1/StorageServiceCapabilities"
  },
  - StorageMedia: {
    @odata.id: "/redfish/v1/StorageServices/1/StorageMedia"
  },
  - InitiatorEndpointGroups: {
    @odata.id:
      "/redfish/v1/StorageServices/1/InitiatorEndpointGroups"
  },
  - TargetEndpointGroups: {
    @odata.id: "/redfish/v1/StorageServices/1/TargetEndpointGroups"
  },
  - Endpoints: {
    @odata.id: "/redfish/v1/StorageServices/1/Endpoints"
  },
  - StorageGroups: {
    @odata.id: "/redfish/v1/StorageServices/1/StorageGroups"
  },
  - StoragePools: {
    @odata.id: "/redfish/v1/StorageServices/1/StoragePools"
  },
  - Volumes: {
    @odata.id: "/redfish/v1/StorageServices/1/Volumes"
  }
}
```

What's in a Storage Service? (File)

Same structure:

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

```
localhost/redfish/v1/Storage
Apps Broadcom Limited - SNIA/SSM
Click to go back, hold to see history
+ - View source

{
  @Redfish.Copyright: "Copyright 2014-2016 SNIA. All rights reserved.",
  @odata.context: "/redfish/v1/$metadata#StorageService.StorageService",
  @odata.id: "/redfish/v1/StorageServices/FileService",
  @odata.type: "#StorageService.1.0.0.StorageService",
  Id: "1",
  Name: "My Storage Service",
  Description: "Description of storage",
  - Status: {
    State: "Enabled",
    Health: "OK"
  },
  - ClassesOfService: {
    @odata.id: "/redfish/v1/StorageServices/FileService/ClassesOfService"
  },
  - FileSystems: {
    @odata.id: "/redfish/v1/StorageServices/FileService/FileSystems"
  },
  - StorageServiceCapabilities: {
    @odata.id: "/redfish/v1/StorageServices/FileService/StorageServiceCapabilities"
  },
  - StorageGroups: {
    @odata.id: "/redfish/v1/StorageServices/FileService/StorageGroups"
  },
  - StoragePools: {
    @odata.id: "/redfish/v1/StorageServices/FileService/StoragePools"
  },
  - Links: {
    - Enclosures: {
      @odata.id: "/redfish/v1/Chassis/1"
    }
  }
}
```

Discovery...

Let's discover something:

Do I have space to...?

Check the capacity in a storage pool

Navigate down into one of the storage pools and check its remaining capacity

```
localhost/redfish/v1/StorageServices/1/StoragePool:
{
  @SSM.Copyright: "Copyright © 2014-2016 SNIA. All rights reserved.",
  @odata.context: "/redfish/v1/$metadata#StoragePool.StoragePool",
  @odata.id: "/redfish/v1/StorageServices/1/StoragePools/SpecialPool",
  @odata.type: "#StoragePool_1_0_0.StoragePool",
  Id: "SpecialPool",
  Name: "SpecialPool",
  Description: "Special storage pool",
  BlockSizeBytes: 8192,
  - Capacity: {
    - Data: {
      ConsumedBytes: 549755813888,
      AllocatedBytes: 1099511627776,
      GuaranteedBytes: 70368744177664,
      ProvisionedBytes: 140737488355328
    },
    Metadata: null,
    Snapshot: null
  },
  - CapacitySources: [
    - {
      - ProvidedCapacity: {
        ConsumedBytes: 70368744177664,
        AllocatedBytes: 140737488355328,
        GuaranteedBytes: 175921860444416,
        ProvisionedBytes: 562949953421312
      },
      - Links: {
        - ClassOfService: {
          @odata.id: "/redfish/v1/StorageServices/1/ClassesOfService/GoldBoston"
        },
        - ProvidingPool: {
          @odata.id: "/redfish/v1/StorageServices/1/StoragePools/BasePool"
        },
        ProvidingVolume: null
      }
    }
  ],
  - LowSpaceWarningThresholdPercent: [
```

Progress towards the Swordfish v1.0 Release



- v0.5 Work in Progress released March 2016
 - Initial WIP release
- v0.6 Work in Progress released May 2016
 - **Completed Block and start documentation:**
 - Extension of Redfish simple storage
- v0.8 Work in Progress (July 2016)
 - **Seamless alignment with Redfish:** integration with Redfish schema: ServiceRoot, ComputerSystem, Storage / StorageService
 - File Systems, Object Drive (Chassis Type)
 - Capacity and Health Metrics (in progress)
- V0.9 Work in Progress (August 2016)
 - First draft of Specification and User's Guide
- v1.0 Specification (September 2016)
 - **Send Final Specification to SNIA Technical Council**

Who is Developing Swordfish?



- **SNIA Scalable Storage Management Technical Work Group (SSM TWG)**
 - SSM is the group, Swordfish is the Spec
 - Provisional TWG formed in October 2015 to investigate / scope work
 - Scalable Storage Management (SSM) TWG chartered in December 2015
- **Companies Engaged in Technical Development:**
 - **Broadcom**, Brocade, Compellent / **Dell**, **EMC**, Fujitsu, **HPE**, Huawei, IBM, **Inova**, **Intel**, **Microsoft**, NEC, **NetApp**, **Nimble Storage**, Pure Storage, RedHat, SK Hynix, Tintri, Toshiba, VMTurbo, **VMware**, WD

How to Participate



- Download the latest “Work in Progress” from the SNIA site:
 - http://www.snia.org/tech_activities/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>

