



STORAGE DEVELOPER CONFERENCE

SNIA ■ SANTA CLARA, 2016

Overview of Swordfish: Scalable Storage Management

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Abstract



- The SNIA's Scalable Storage Management Technical Work Group (SSM TWG) is working to create and publish an open industry standard specification for storage management that defines a customer centric interface for the purpose of managing storage and related data services. This specification builds on the DMTF's Redfish specification using RESTful methods and JSON formatting.

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) are 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

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

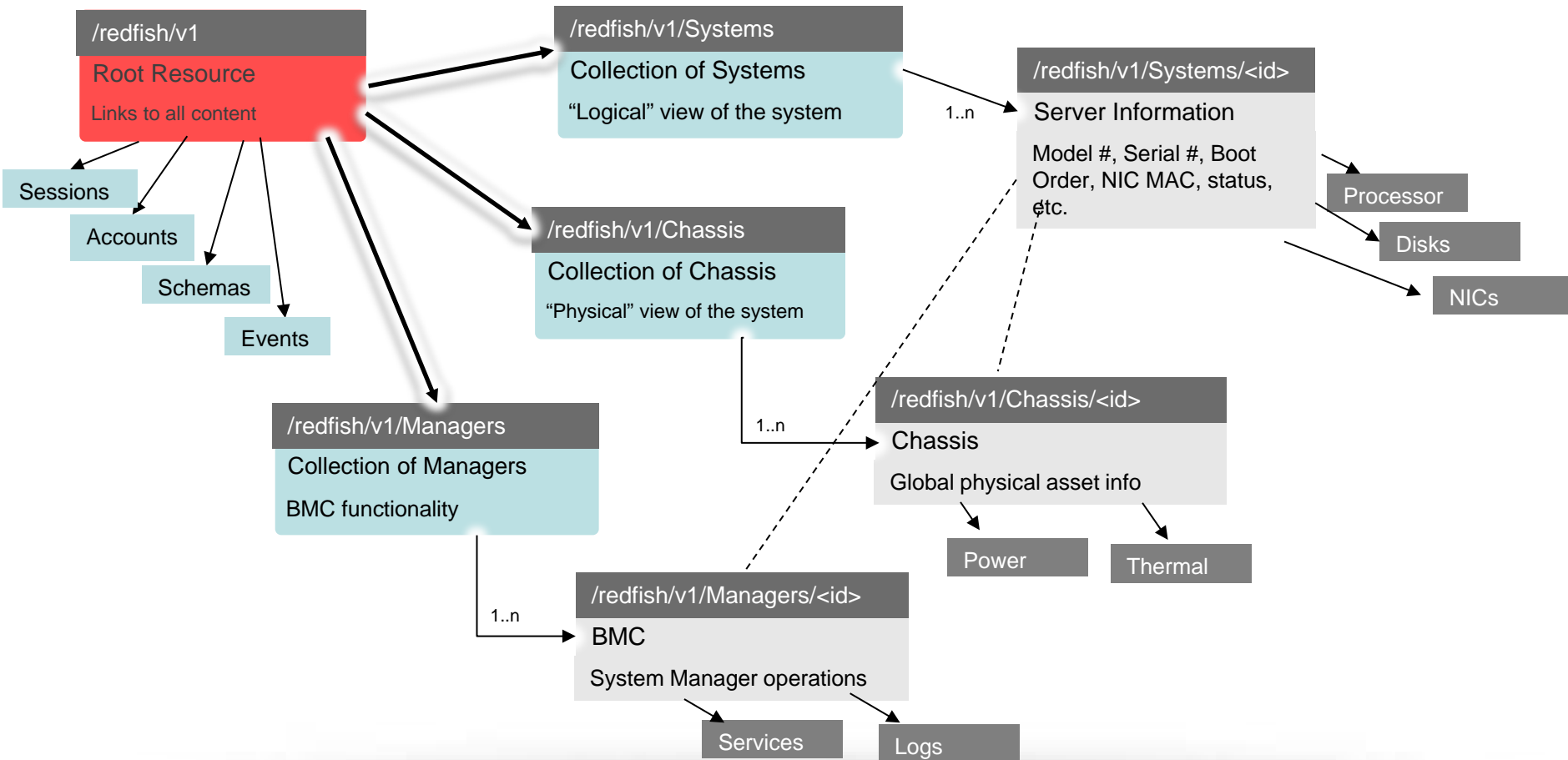
Functionality Included in the Swordfish v1.0 API Specification



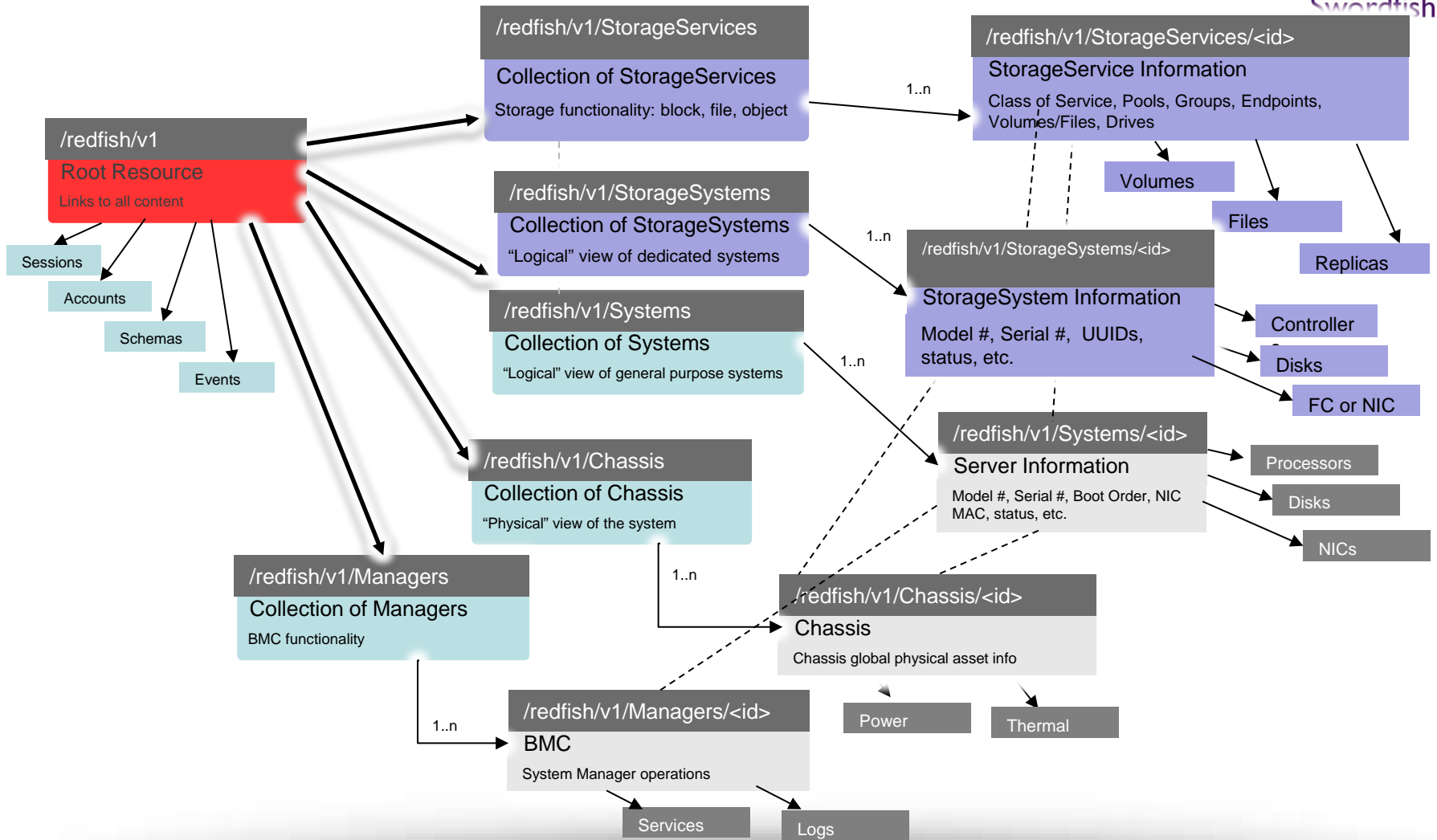
- Block storage
 - Provisioning with **class of service** control
 - Volume Mapping and Masking
 - Replication
 - Capacity and health metrics
- File system storage
 - Adds File System and File Share
 - Leverages all other concepts – provisioning with class of service, replication, ...
- Additional content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

Starting with Redfish: An Overview

Redfish Resource Map



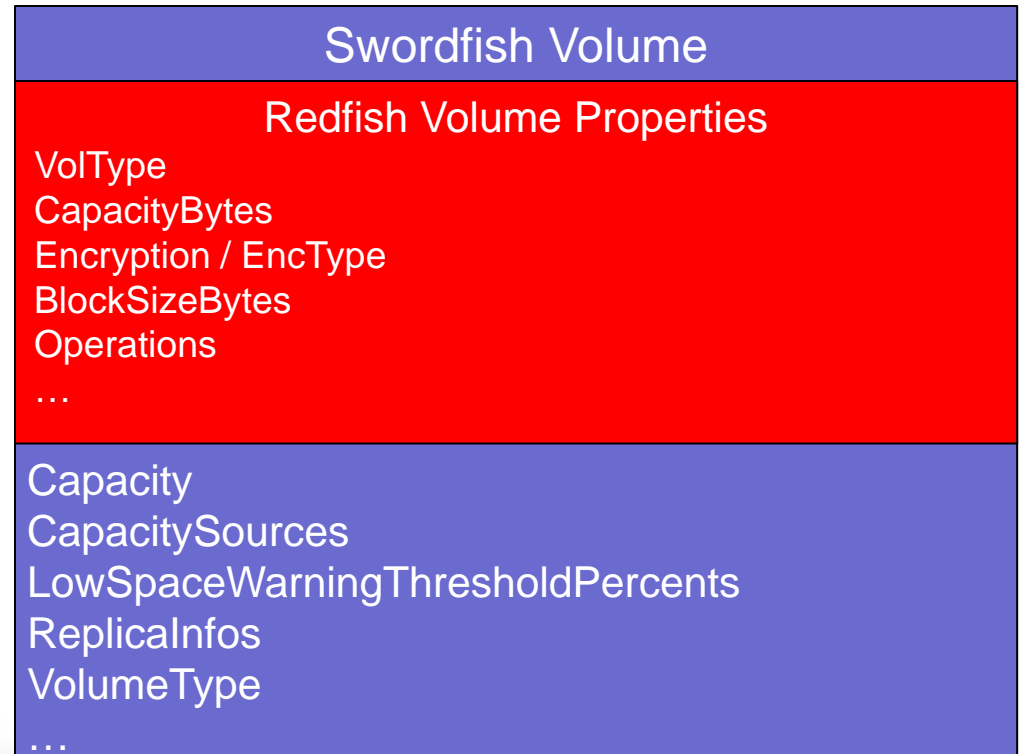
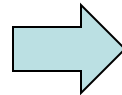
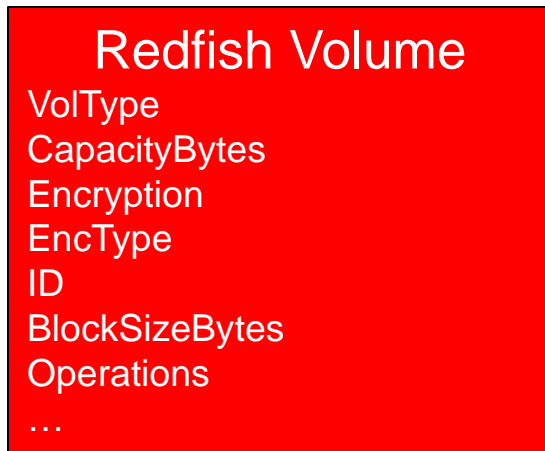
Adding Storage to Redfish...



Seamless Extension of Redfish to Swordfish



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



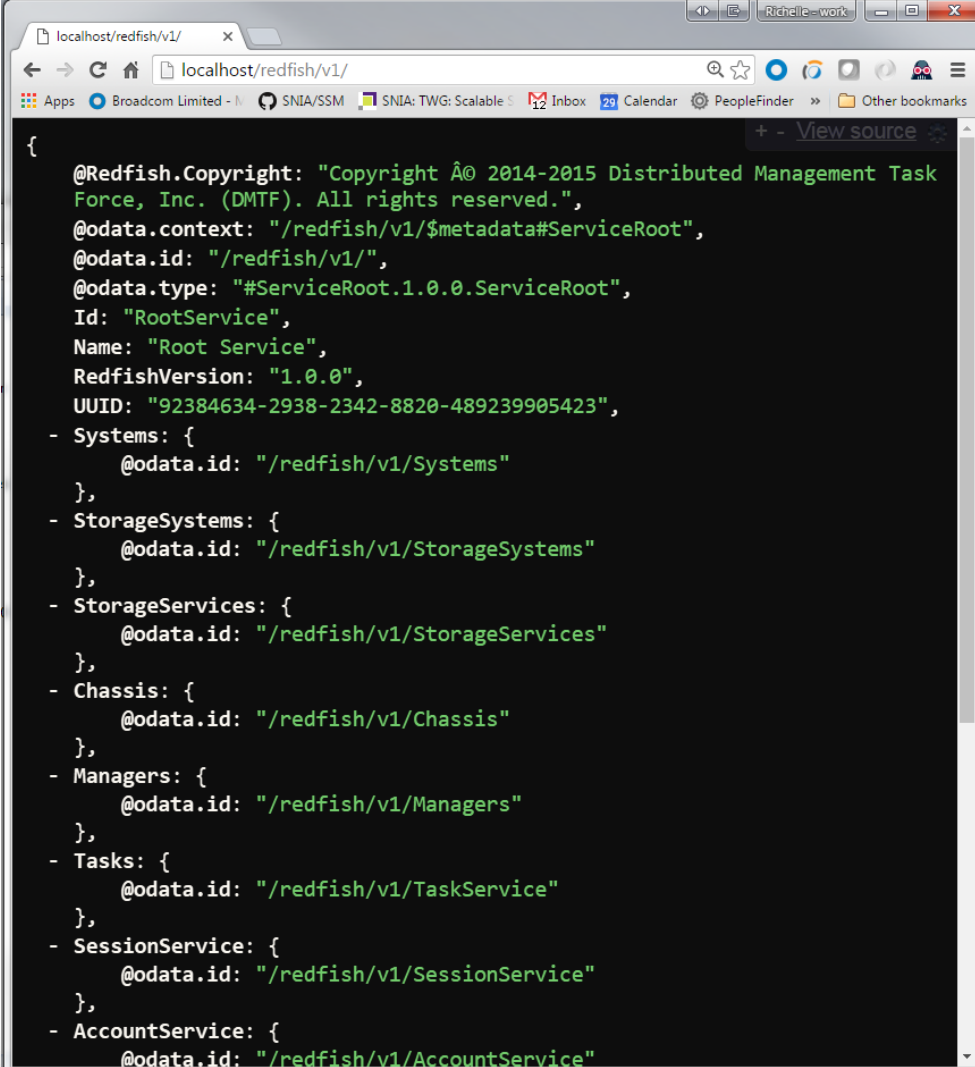
Can I See What a Swordfish-based System Will Look Like?



- **Yes!**
- What? (How? Why? Where? When?)
 - As a work tool, the Technical Work Group (TWG) has developed “mockups” (snapshots of a state in time) of different types of systems
 - These are available as part of the WIP releases and will be published on an ongoing basis as new functionality is added to show samples to supplement documentation

Overview of Swordfish Mockups

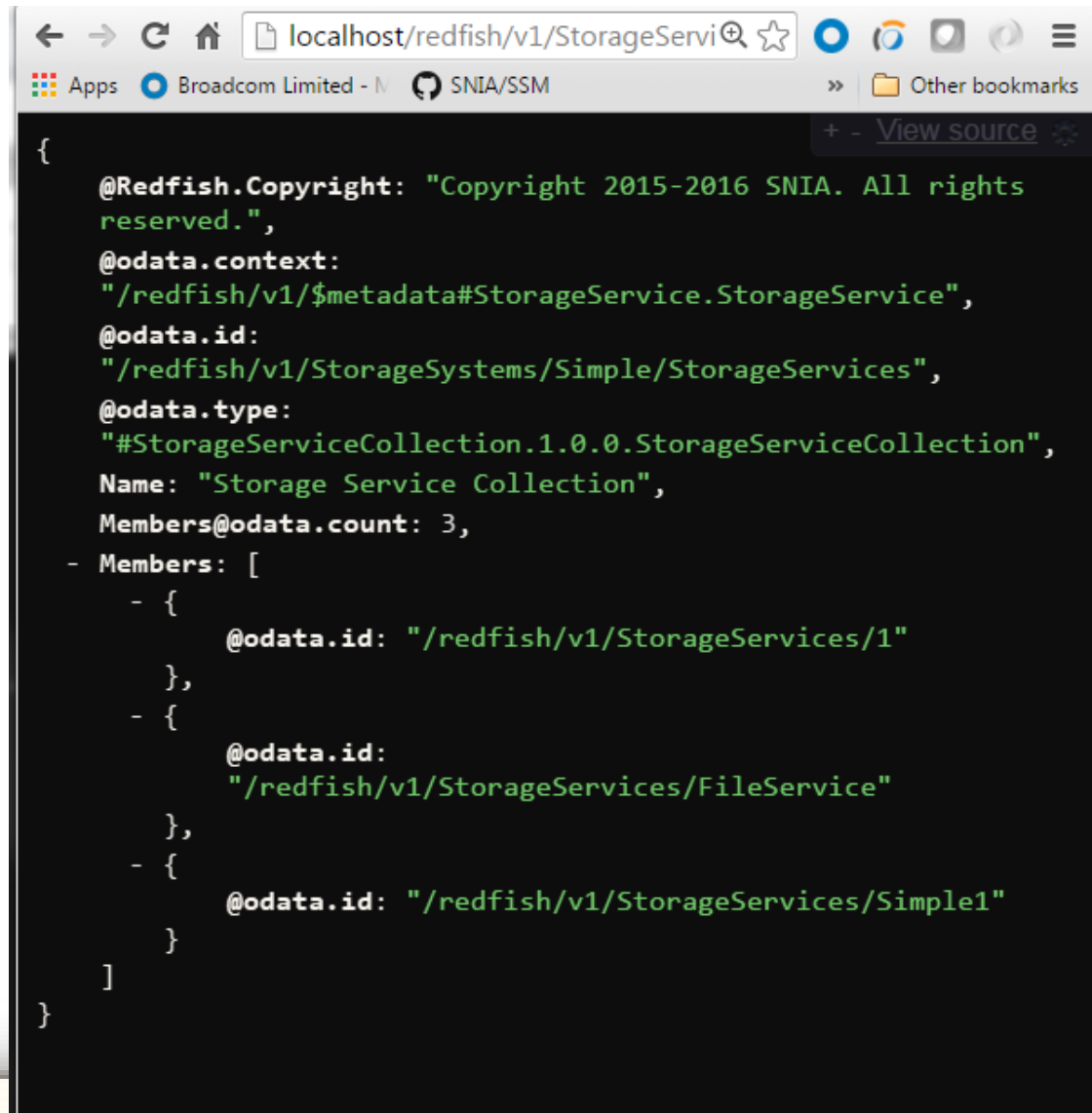
- Explore “mockups” of the Swordfish data model in a typical implementation
- Navigate via links through the model to various resources
- SNIA mockups show two examples of block storage systems
 - Simple: A small external array
 - Complex: all of the elements in the block storage model, with remote replication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



```
{
  @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/Service](#) 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



```
{
  @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,..)



```
{
  @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: {...},
  + ClassesOfService: [...],
  - Drives: {
    @odata.id: "/redfish/v1/Chassis/StorageEnclosure1/Drives"
  },
  + InitiatorEndpointGroups: [...],
  + TargetEndpointGroups: [...],
  + Endpoints: {...},
  + StorageGroups: [...],
  - StoragePools: {
    @odata.id: "/redfish/v1/StorageServices/1/StoragePools"
  },
  - Volumes: {
    @odata.id: "/redfish/v1/StorageServices/1/Volumes"
  },
  - Links: {
    - Enclosures: {
      @odata.id: "/redfish/v1/Chassis/1"
    },
    - HostingSystem: {
      @odata.id: "/redfish/v1/StorageSystems/Complex"
    },
    - DataProtectionLoSCapabilities: {
      @odata.id:
        "/redfish/v1/StorageServices/1/DataProtectionLoSCapabilities"
    },
    - DataSecurityLoSCapabilities: {
      @odata.id:
        "/redfish/v1/StorageServices/1/DataSecurityLoSCapabilities"
    }
  }
}
```

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)



```
{
  @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: [...],
  - FileSystems: {
    @odata.id: "/redfish/v1/StorageServices/FileService/FileSystems"
  },
  - StorageServiceCapabilities: {
    @odata.id: "/redfish/v1/StorageServices/FileService/StorageServiceCapabilities"
  },
  + StorageGroups: [...],
  + StoragePools: {...},
  - Links: {
    - Enclosures: {
      @odata.id: "/redfish/v1/Chassis/1"
    },
    - HostingSystem: {
      @odata.id: "/redfish/v1/StorageSystems/FileServer"
    }
  },
  Oem: { }
}
```

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



The screenshot shows a web browser window with the address bar displaying 'localhost/redfish/v1/StorageServ'. The main content area shows a JSON response from a REST API. The response is a JSON object with the following structure:

```
{
  @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: 17592186044416,
        ProvisionedBytes: 562949953421312
      },
      Links: {
        ClassOfService: {
          @odata.id: "/redfish/v1/StorageServices/1/ClassesOfService/Gold
        },
        ProvidingPool: {
          @odata.id: "/redfish/v1/StorageServices/1/StoragePools/BasePool
        }
      }
    }
  ]
}
```




Progress throughout 2016...

- v0.5 Work in Progress released March 2016
 - Initial WIP release
 - v0.6 Work in Progress released May 2016
 - First draft Block storage schema
 - v0.8 Work in Progress (July 2016)
 - Seamless alignment with Redfish
 - File Systems, Object Drive (Chassis Type)
 - v0.9 Work in Progress (August 2016)
 - First draft of Specification and User's Guide
 - **v1.0 Specification (September 2016)**
 - **Sent Final Specification to SNIA Technical Council***
- * Publicly available after SNIA IP review process complete*

How to Participate: Shaping the Standard



- 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>

End-User Engagement



- Get more information about applying for a select position on the newly forming SNIA Executive Storage Management Customer Panel
 - Email storagemanagement@snia.org for more information

SNIA Swordfish™



- Enter to win a Phantom 3 Drone
 - Fill out entry form, return to Storage Management Initiative (SMI) table
- Look for winner beginning 9/26 at <http://www.snia.org/swordfish>
- Visit SNIA SMI at Microsoft Ignite Booth #2371, 9/26 – 9/30, Atlanta



SwordfishTM

THANK YOU