

STORAGE DEVELOPER CONFERENCE



BY Developers FOR Developers

Virtual Conference
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A SNIA[®] Event

Swordfish Practical Implementation

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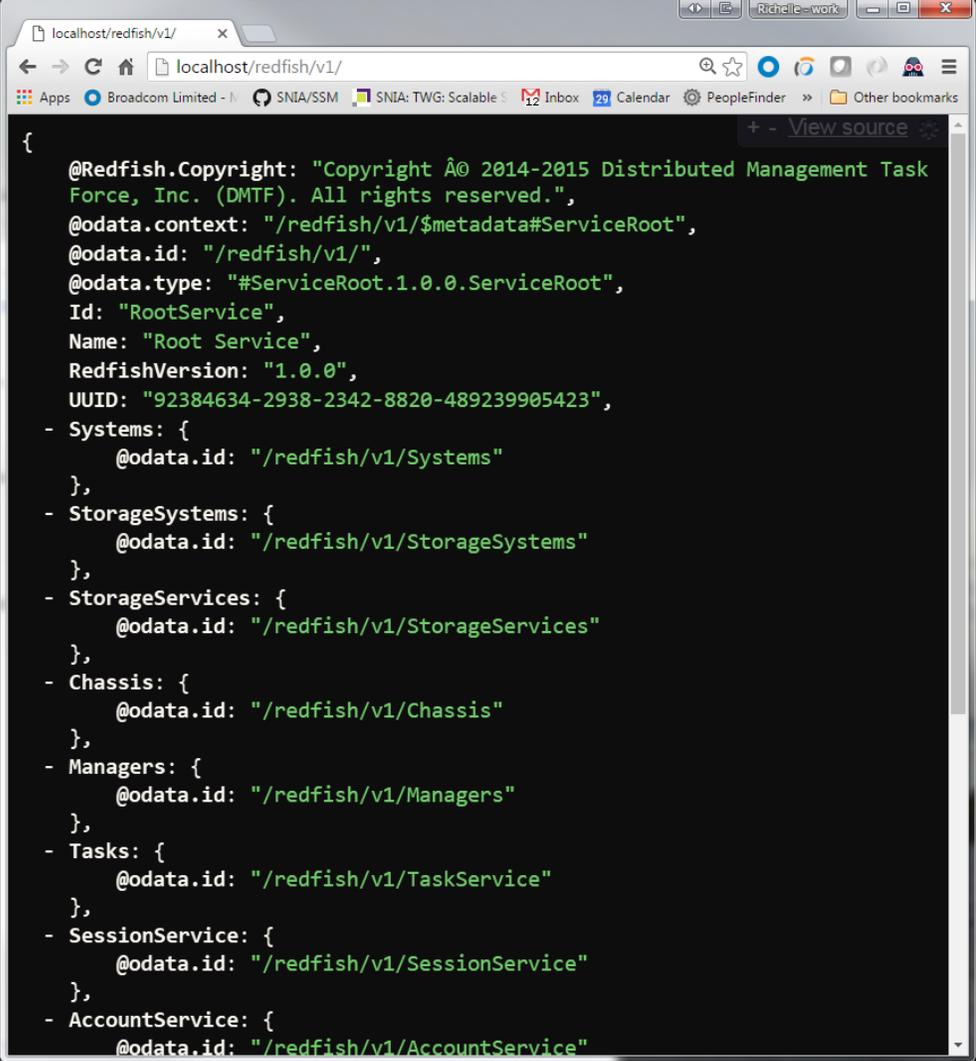
The SNIA Swordfish™ Approach

- Develop the management model
 - point-of-view of what a client needs to accomplish
 - provide information that the client needs
- Covers far more than just block and relevant virtualization and mapping operations
- Traditional storage domain coverage & converged environments
 - covering servers, storage and fabric together
- Implement the Swordfish API as an **extension** of the Redfish API
 - Built using DMTF's Redfish technologies
 - Lightweight RESTful interface over HTTPS using JSON



Overview of Swordfish Hierarchy

- Explore the Swordfish data model to see potential / typical implementation
- Navigate the model to learn about, and see, various resources
- SNIA mockups show 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

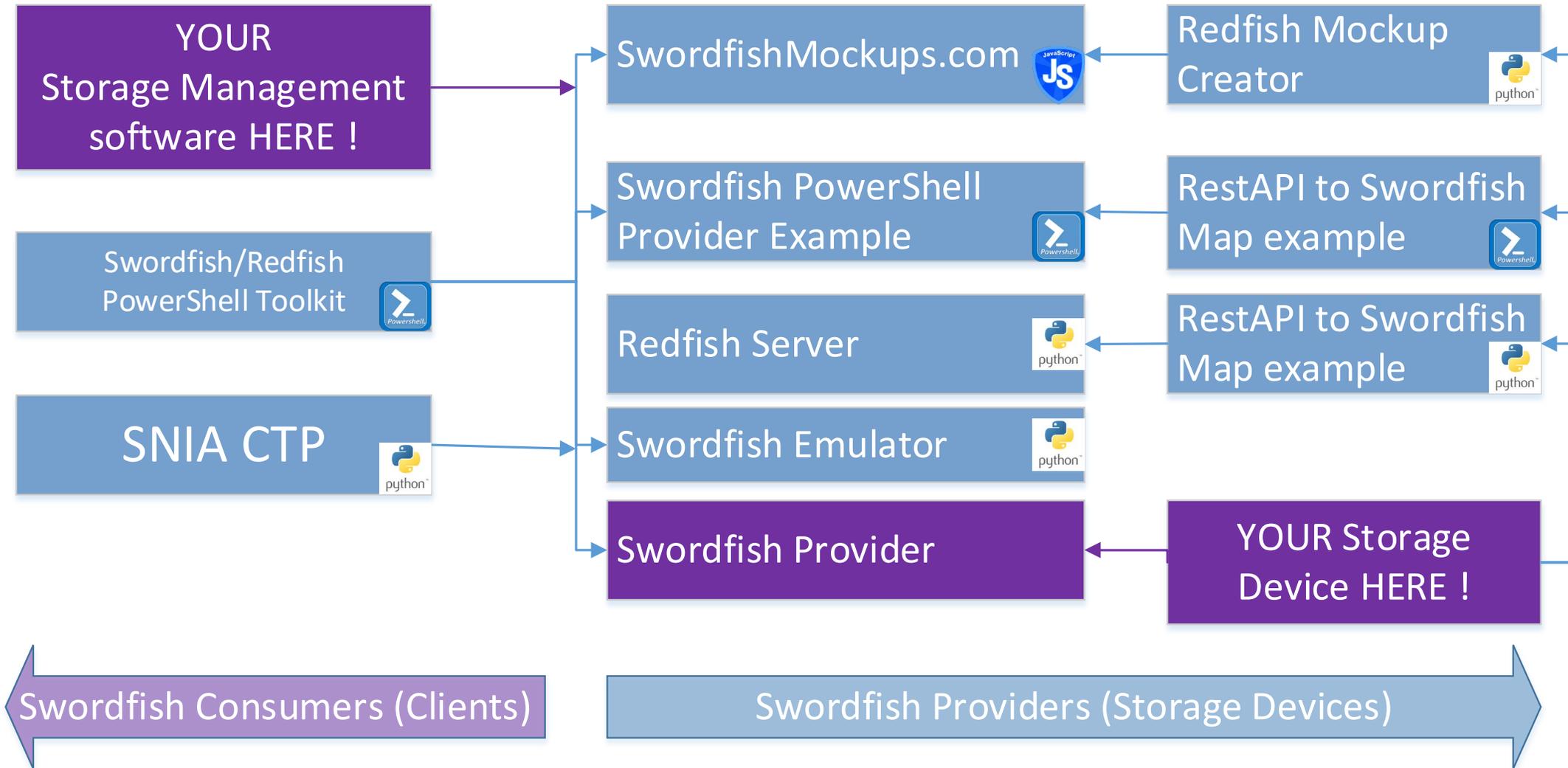


```
{
  @Redfish.Copyright: "Copyright © 2014-2015 Distributed Management Task Force, Inc. (DMTF). All rights reserved.",
  @odata.context: "/redfish/v1/$metadata#ServiceRoot",
  @odata.id: "/redfish/v1/",
  @odata.type: "#ServiceRoot.1.0.0.ServiceRoot",
  Id: "RootService",
  Name: "Root Service",
  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"
  }
}
```

Which Tools are right for you!

- Swordfish Conformance Testing Program
- Swordfish/Redfish PowerShell Toolkit
- Swordfish/Redfish Emulator
- Swordfish Mockup website
- Redfish Mockup Creator
- Swordfish PowerShell Provider Framework

Which Tools are right for you!



WHAT IS THE POWERSHELL TOOLKIT?

- Open source project between HPE and Pure Storage
 - <https://github.com/SNIA/Swordfish-Powershell-Toolkit>
- Supported on Windows Server, Linux and macOS
 - Can query a Swordfish Target, a Redfish Server, or a Swordfish/Redfish simulator
- PowerShell wrapper for REST API calls to Redfish and Swordfish

```
Administrator: Windows PowerShell
PS C:\Users\Administrator\Desktop\Swordfish-Powershell-Toolkit> import-module .\SNIASwordFish.psm1
PS C:\Users\Administrator\Desktop\Swordfish-Powershell-Toolkit> Connect-SwordFishTarget -Target 'localhost' -Port 5000
Base URI = http://localhost:5000/redfish/v1/

@odata.context : /redfish/v1/$metadata#ServiceRoot
@odata.type     : #ServiceRoot.1.0.0.ServiceRoot
@odata.id      : /redfish/v1/
Id             : RootService
Name           : Root Service
ServiceVersion : 1.0.0
UUID          : 427b01db-06bd-4f53-9ecc-4cbc48a8e635
Links         : @{Chassis=; Managers=; TaskService=; SessionService=; StorageServices=; StorageSystems=; AccountService=; }
PS C:\Users\Administrator\Desktop\Swordfish-Powershell-Toolkit>
```

PowerShell Toolkit - C

- Everything is returned as object
 - Cast to Variable `$MyVols`
 - Can filter by properties, or `$MyVols`
`$MyVols`
 - Can dig deeper into single
 - And you can even cast the

```
PS C:\> $MyVols[4] | convertto-json
{
  "@Redfish.Copyright": "Copyright 2014-2019 SNIA. All rights reserved.",
  "@odata.context": "/redfish/v1/$metadata#Volume.Volume",
  "@odata.id": "/redfish/v1/StorageServices/1/Volumes/5",
  "@odata.type": "#Volume.v1_4_0.Volume",
  "Name": "Volume 5",
  "Id": "5",
  "Description": "Volume 5.",
  "Identifiers": [
    {
      "DurableNameFormat": "NAA",
      "DurableName": "65456765456761001244076100123487"
    }
  ],
  "Manufacturer": "SuperDuperSSD",
  "Model": "Drive Model string",
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "AccessCapabilities": [
    "Read",
    "Write",
    "Append",
    "Streaming"
  ],
  "BlockSizeBytes": 512,
  "CapacitySources": [
    {
      "@odata.id": "/redfish/v1/StorageServices/1/Volumes/5#/CapacitySources/0",
      "MemberId": "0",
      "ProvidedCapacity": "@{ConsumedBytes=0; AllocatedBytes=10737418240; Guarant",
      "ProvidingPools": ""
    }
  ],
  "Capacity": {
    "Data": {
      "ConsumedBytes": 0,
      "AllocatedBytes": 10737418240,
      "GuaranteedBytes": 536870912,
      "ProvisionedBytes": 109951162776
    }
  }
}
```

PowerShell Command Help

- Get a list of valid commands
- Get Help on a specific command
 - Option to show examples
 - Option to show All
- Verbose option to see raw transactions

```
Administrator: Windows PowerShell
PS C:\> get-help Get-SwordFishVolume -Full

NAME
    Get-SwordFishVolume
SYNOPSIS
    Retrieve The list of valid Volumes from the SwordFish Target.
SYNTAX
    Get-SwordFishVolume [[-StorageServiceID] <String>] [[-VolumeId] <String>] [<CommonParam
DESCRIPTION
    This command will either return the a complete collection of Volumes that exist across
    the Storage Services, unless a specific Storage Service ID is used to limit it, or a s
    Volume ID is directly requested.
PARAMETERS
    -StorageServiceID <String>
        The Storage Service ID name for a specific Storage Service, otherwise the command
        will return Storage Groups for all Storage Services.
    -VolumeId <String>
        The Storage Group ID will limit the returned data to the type specified, otherwise
        will return all Volumes.
----- EXAMPLE 1 -----
PS C:\>Get-SwordFishStorageVolume
----- EXAMPLE 2 -----
PS C:\>Get-SwordFishStorageVolume -StorageServiceId AC-102345
----- EXAMPLE 3 -----
PS C:\>Get-SwordFishStorageVolume -StorageServiceId AC-102345 -VolumeId 2
----- EXAMPLE 4 -----
PS C:\>Get-SwordFishStorageVolume -VolumeId 1
RELATED LINKS
    http://redfish.dmtf.org/schemas/swordfish/v1/Volume.v1_2_0.json
```

What you want

- RestAPI Documentation to use
- PowerShell Toolkit that exports
- Basic PowerShell knowledge

Steps

1. Retrieve the Volume Objects
2. Hold it side-by-side to a
3. Look for Matches and compare similarities
i.e. You may show the similarities
need to know to multiply
4. Go through the rest of the data
using your results.

```
Administrator: Windows PowerShell
PS C:\> Get-NSVolume -name SCSCOM2019 | convertto-json
{
  "agent_type": "none",
  "app_category": "Other",
  "app_uuid": "",
  "avg_stats_last_5mins": {
    "combined_iops": 0,
    "combined_latency": 66,
    "combined_throughput": 692,
    "read_iops": 0,
    "read_latency": 0,
    "read_throughput": 0,
    "write_iops": 0,
    "write_latency": 66,
    "write_throughput": 692
  },
  "base_snap_id": "",
  "base_snap_name": "",
  "block_size": 4096,
  "cache_needed_for_pin": 107374182400,
  "cache_pinned": false,
  "cache_policy": "normal",
  "caching_enabled": true,
  "cksum_last_verified": 0,
  "clone": false,
  "content_repl_errors_found": false,
  "creation_time": 1559321039,
  "dedupe_enabled": false,
  "description": "Data Volume for SCOM 2019",
  "multi_initiator": false,
  "name": "SCSCOM2019",
  "needs_content_repl": false,
  "num_connections": 2,
  "num_fc_connections": 0,
  "num_iscsi_connections": 2,
  "num_snaps": 69,
  "offline_reason": null,
  "online": true,
  "online_snaps": null,
  "owned_by_group": "Firefly",
  "owned_by_group_id": "002b4bd8361b856bbc00000000000000000000000000000001",
  "parent_vol_id": "",
  "parent_vol_name": "",
  "perfpolicy_id": "032b4bd8361b856bbc0000000000000000000000000000010",
  "perfpolicy_name": "Other Workloads",
  "pinned_cache_size": 0,
  "pool_id": "0a2b4bd8361b856bbc00000000000000000000000000000001",
  "pool_name": "default",
  "previously_deduped": false,
  "...
```

```
JSON Raw Data Headers
swordfishmockups.com/redfish/v1/StorageServices/ISC/Volumes/1/
{
  "@Redfish.Copyright": "Copyright 2015-2019 SNIA. All rights reserved.",
  "@odata.context": "/redfish/v1/$metadata#Volume.Volume",
  "@odata.id": "/redfish/v1/StorageServices/ISC/Volumes/1",
  "@odata.type": "#Volume.v1_2_1.Volume",
  "Id": "1",
  "Name": "Logical Disk 1",
  "Identifiers": [{
    "DurableNameFormat": "UUID",
    "DurableName": "123e4567-a12b-12a3-a123-123456789000"
  }],
  "Manufacturer": "BEST ChipCo",
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "BlockSizeBytes": 512,
  "VolumeType": "Mirrored",
  "Capacity": {
    "Data": {
      "ConsumedBytes": 1099511627776,
      "AllocatedBytes": 1198027440128
    }
  },
  "CapacitySources": [{
    "@odata.id": "/redfish/v1/StorageServices/ISC/Volumes/1#/CapacitySources/0",
    "MemberId": "0",
    "ProvidedCapacity": {
      "AllocatedBytes": 1198027440128,
      "ConsumedBytes": 1198027440128
    }
  }],
  "ProvidingPools": [{
    "@odata.id": "/redfish/v1/StorageServices/ISC/StoragePools/SASPool"
  }]
}
```

Some values are hardcoded per spec

Other values are partially hardcoded with known values added

Create a File Structure to match Swordfish

- Using PowerShell you can create a function for each thing you wish to express in SwordFish.
- Make a master script that runs you function against all things in your device.
- Create PowerShell Objects that can be converted to JSON as saved as Index.json files.
- In example to right, Variables all start with '\$' and constants are shown in brown.

```
$VolObj =@{'@Redfish.Copyright' = $RedfishCopyright;  
 '@odata.context' = '/redfish/v1/$metadata#Volumes/'+$NimbleSerial+'/Volumes/'+$Snapshot.name;  
 '@odata.id' = '/redfish/v1/$metadata#Volumes/'+$NimbleSerial+'/Volumes/'+$Snapshot.name;  
 '@odata.type' = '#Volumes_1_4_0.Volume';  
 Id = $Snapshot.id;  
 Name = $Snapshot.name;  
 Description = $Snapshot.description;  
 Capacity = @{ AllocatedBytes = ($Snapshot.Size * 1024)  
 };  
 Status = @{ State = $SnapStatus_state;  
 Health = $SnapStatus_health;  
 };  
 BlockSizeBytes = $Volume.block_size;  
 MaxBlockSizeBytes = $Volume.block_size;  
 OptimumIOSizeBytes = $Volume.block_size;  
 Manufacturer = 'HPENimbleStorage';  
 Encrypted = $Vol_Encryption;  
 EncryptionTypes = 'ControllerAssisted';  
 ProvisioningPolicy = 'thin';  
 Compressed = 'true';  
 Deduplicated = $Volume.dedupe_enabled;  
 DisplayName = $Volume.Full_name+'+'+$Snap.name;  
 LowSpaceWarningThresholdPercents = $Volume.warn_level;  
 VolumeType = 'Snapshot';  
 VolumeUsageType = "Data";  
 ReadCachePolicyType = $Vol_CachePolicy;  
 WriteCacheState = 'Enabled'  
 WriteCachePolicyType = "ProtectedWriteBack";  
 WriteCacheStateType = "Protected";  
 WriteHoleProtectionPolicyType = "Journaling";
```

SEE [HTTPS://GITHUB.COM/CHRIS-LIONETTI/SWORDFISHMOCKUP](https://github.com/Chris-Lionetti/SwordfishMockup)

How to Serve Swordfish...It's a Cookbook!

- Codebase Assumes that you have created a Mockup that runs against the output of that mockup.
 - The Mockup can be directed to pull live information for each Swordfish request.
- Code is hidden command in the Mockup called 'Listener.ps1'



```
# Create a listener on port 5000
$listener = New-Object System.Net.HttpListener
$listener.Prefixes.Add('http://+:5000/')
$listener.Start()
write-host 'Listening ...To end this session connect to the IP Address with the action end'
# Run until you send a GET request to /end
```

Swordfish Info: www.snia.org/swordfish



- Resources
 - Specifications
 - User's Guide
 - GitHub for Swordfish Tools
 - Practical Guide
 - Other Documentation
- Swordfish Mockups Site
 - ISC and HSC configurations
 - Block vs file configurations
 - Small and large configurations
- Education/Community
 - Whitepapers, Presentations
 - YouTube shorts & Webinars
- Participate
 - Join SNIA and the SSM TWG Implement

Home » Technology Communities » Storage Management Initiative » SNIA Swordfish™

SNIA Swordfish™

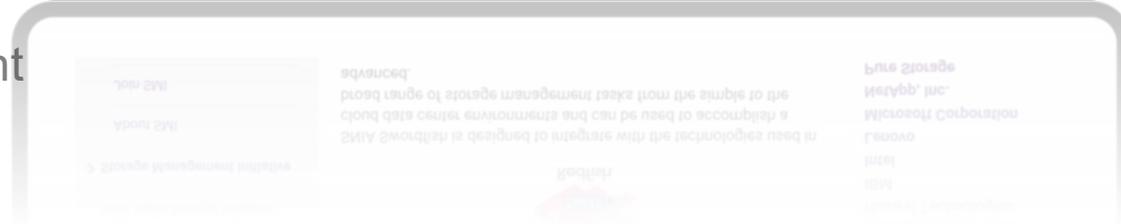
The SNIA Swordfish™ specification helps to provide a unified approach for the management of storage and servers in hyperscale and cloud infrastructure environments, making it easier for IT administrators to integrate scalable solutions into their data centers. SNIA Swordfish is an extension of the DMTF Redfish specification, so the same easy-to-use RESTful interface is used, along with JavaScript Object Notation (JSON) and Open Data Protocol (OData), to seamlessly manage storage equipment and storage services in addition to servers.

Redfish

SNIA Swordfish is designed to integrate with the technologies used in cloud data center environments and can be used to accomplish a broad range of storage management tasks from the simple to the advanced.

SMI Members

- Broadcom
- Cisco
- Cumulus Systems
- Dell, Inc.
- FixStream
- Fujitsu
- Hewlett Packard Enterprise (HPE)
- Hitachi Data Systems
- Huawei Technologies
- IBM
- Intel
- Lenovo
- Microsoft Corporation
- NetApp, Inc.
- Pure Storage



Next Steps

- Develop a Swordfish Mockup of your own & submit it to the Swordfish TWG;
 - Feedback on spec adherence to validate your mockup.
 - Can be posted as an additional example (your discretion) in the SwordfishMockups.com.
- Submit a Storage Device for testing to the CTP
- Join SNIA and the SSM TWG & help define the Schema;
 - Ensure the Schema is defined sufficiently to represent your desired implementation
 - WE ARE ALWAYS LOOKING FOR FEEDBACK REGARDING YOUR IMPLEMENTATION MAPING TO SWORDFISH !
 - Full NVMe Enablement: Functionality alignment across DMTF, NVMeExpress/NVMe-MI and SNIA for NVMe use cases
 - Enhanced profile support for SNIA Alliance partner organizations
- Help define the future of this Swordfish Consumer.
 - [SwordFish™ PowerShell Toolkit](#) and follow-on Windows Admin Client Module.
 - notable projects; Swordfish DataDog implementation & PowerBI
 - A GoLang Client library called [GoFish](#); An [EmberJS](#) Client
 - Looking for more integration points (what can you come up with)

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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