STORAGE DEVELOPER CONFERENCE
SDC 21
BY Developers FOR Developers

Virtual Conference
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A SNIA Event

Swordfish Practical Implementation

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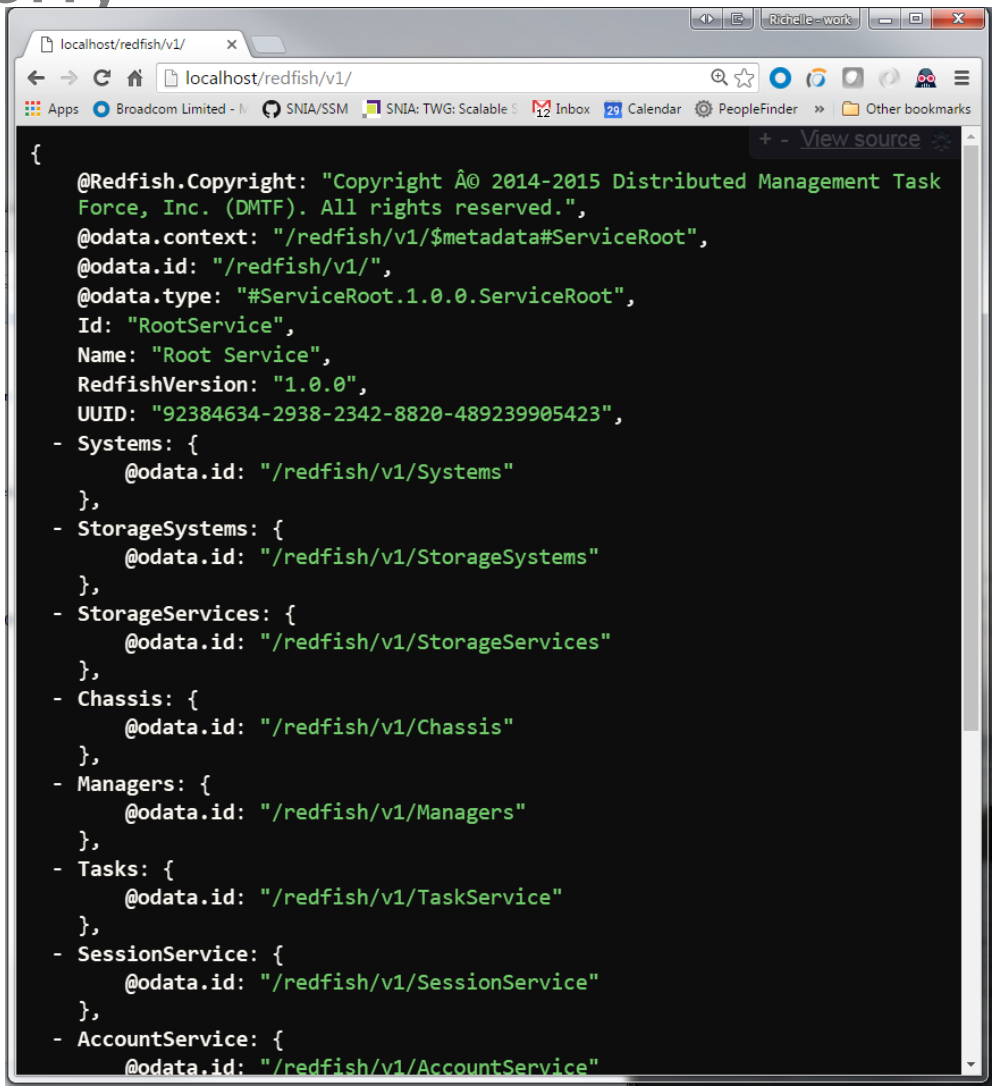
The SNIA Swordfish™ Approach

- 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

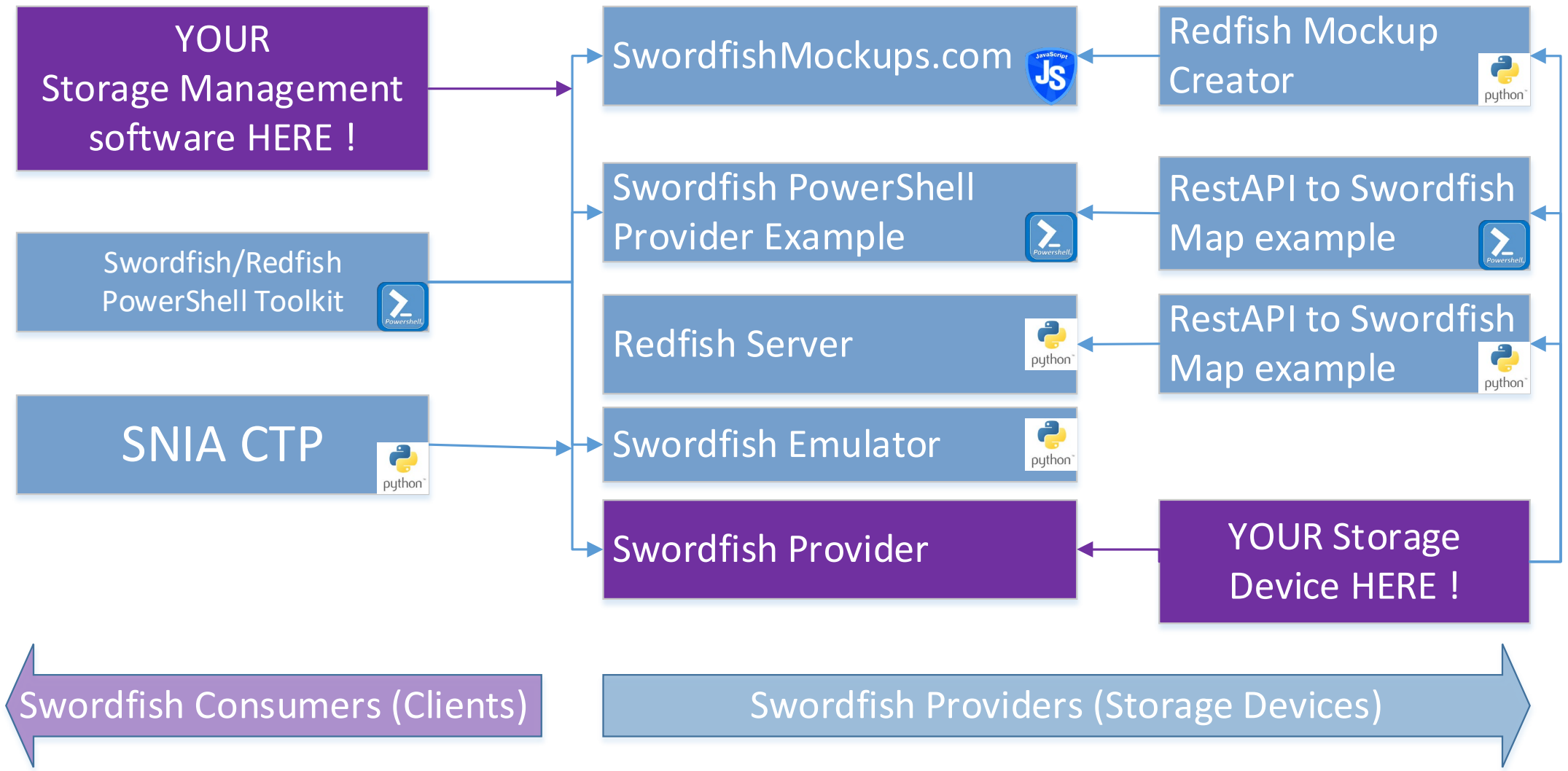
- Explore the Swordfish data model to see potential / typical implementation
- Navigate the model to learn about, and see, various resources
- SNIA mockups show examples of block storage systems
  - Simple: A small external array
  - Complex: all of the elements in the block storage model, with remote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



Which Tools are right for you!

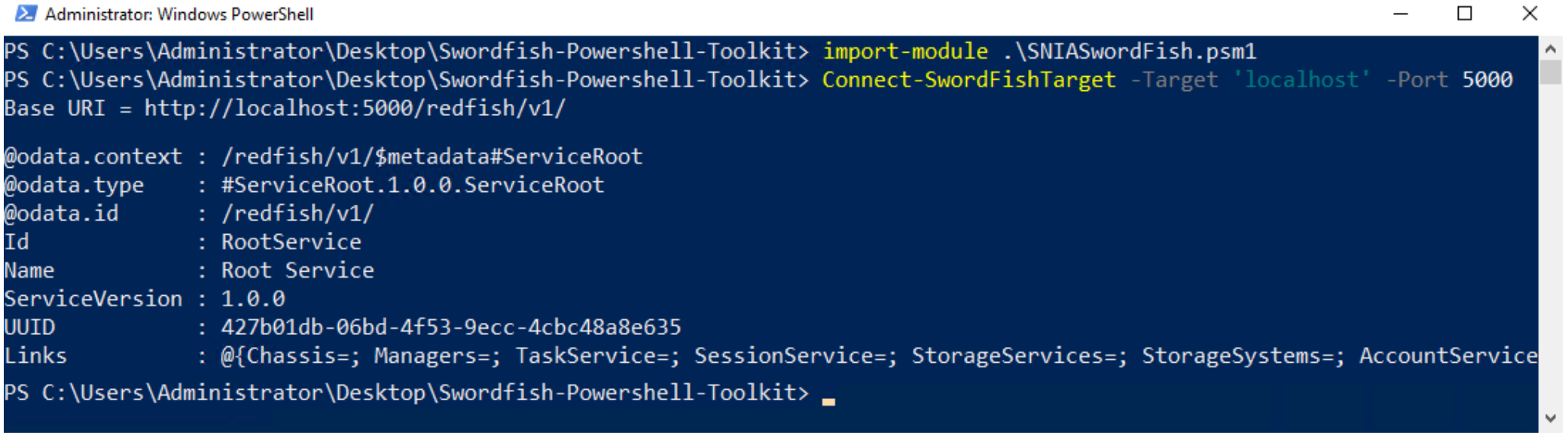
- Swordfish Conformance Testing Program
- Swordfish/Redfish PowerShell Toolkit
- Swordfish/Redfish Emulator
- Swordfish Mockup website
- Redfish Mockup Creator
- Swordfish PowerShell Provider Framework

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



PowerShell Toolkit - C

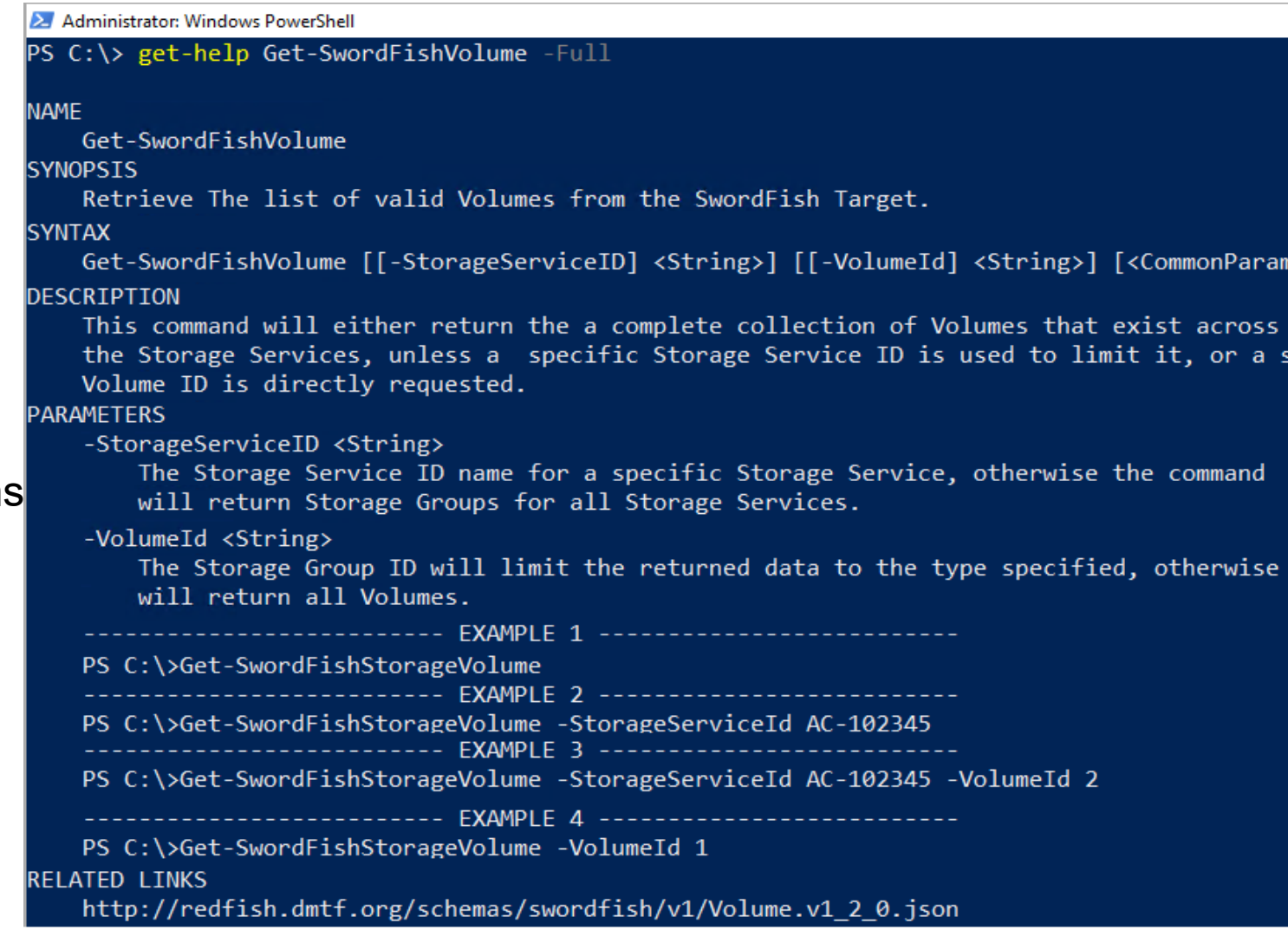
- Everything is returned as objec
  - Cast to Variable
  - Can filter by properties, or
  - Can dig deeper into single
  - And you can even cast the

```
$MyVols
$MyVols
$MyVols
```

```
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; Guara
                                "ProvidingPools":  ""
                            }
                        ],
    "Capacity":  {
                     "Data":  {
                                  "ConsumedBytes":  0,
                                  "AllocatedBytes":  10737418240,
                                  "GuaranteedBytes":  536870912,
                                  "ProvisionedBytes":  1099511627776
```


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



What you w

- RestAPI Documentation to y
- PowerShell Toolkit that expo
- Basic PowerShell knowledg

Steps

1. Retrieve the Volume O
2. Hold it side-by-side to a
3. Look for Matches and c similarities

   i.e. You may show the sp need to know to multiply

4. Go through the rest of t 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":  "002b4bd8361b856bbc000000000000000000000001",
    "parent_vol_id":  "",
    "parent_vol_name":  "",
    "perfpolicy_id":  "032b4bd8361b856bbc000000000000000000000010",
    "perfpolicy_name":  "Other Workloads",
    "pinned_cache_size":  0,
    "pool_id":  "0a2b4bd8361b856bbc000000000000000000000001",
    "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

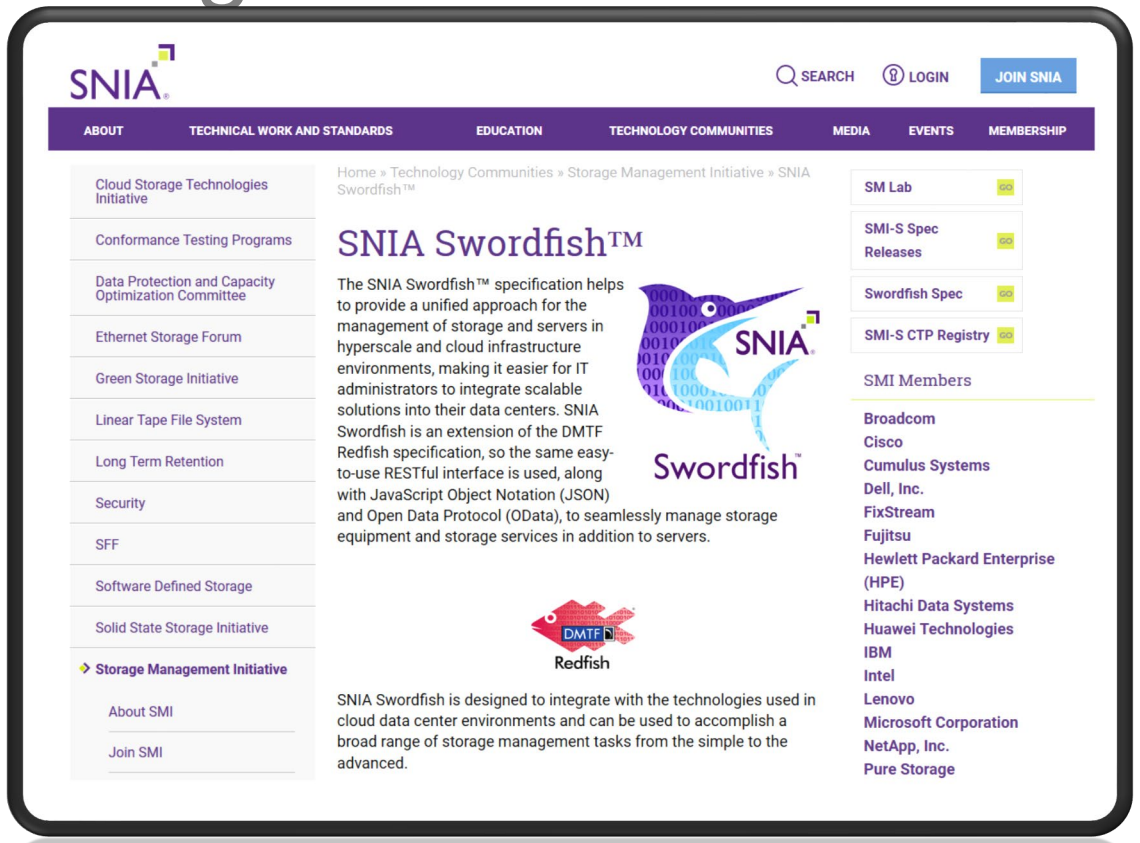
How to Serve Swordfish…It's a Cookbook!

- 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



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, NVMExpress/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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