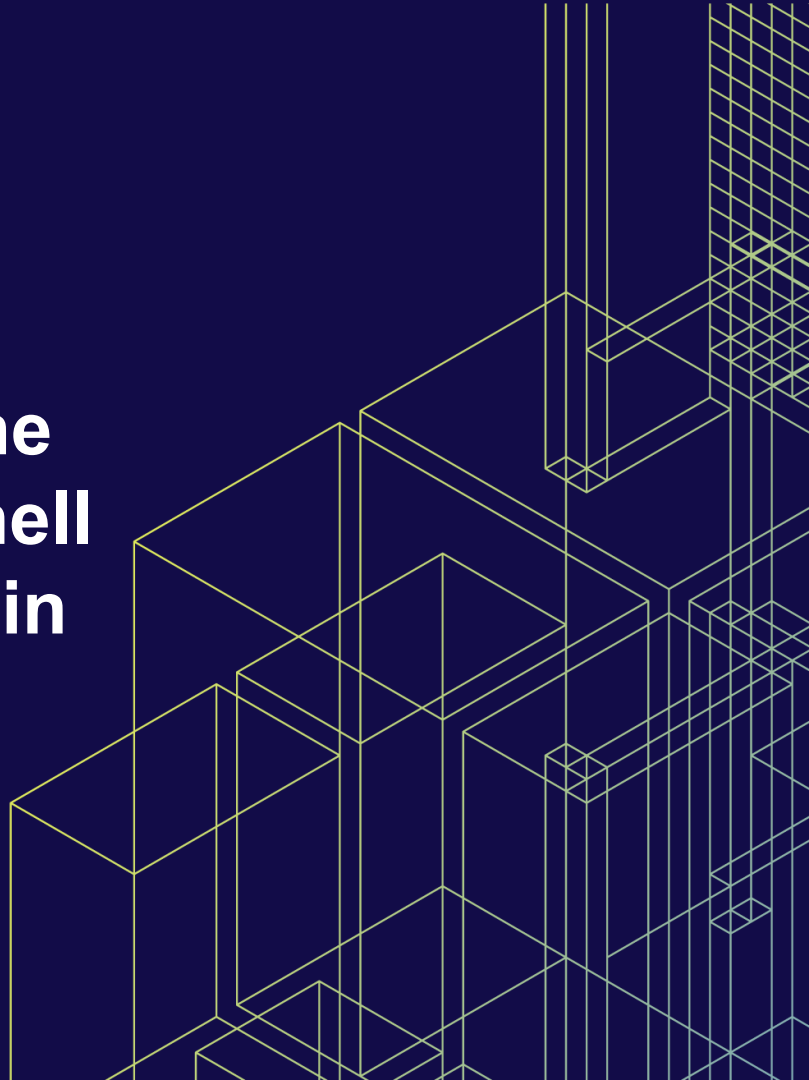
SDC 19

September 23-26, 2019
Santa Clara, CA

Accelerating Windows Integrations: Introducing the SNIA Swordfish™ PowerShell Tool Kit and Windows Admin Center Integration

Chris Lionetti
HPE

Barkz
Pure Storage



Agenda

- Overview of SwordFish™ PowerShell Toolkit
- Overview of Windows Admin Center (WAC)
- Building a WAC Gateway Extension

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Which Tools are right for you!

- Swordfish PowerShell Toolkit
- Swordfish to RestAPI Map
- Swordfish PowerShell Provider Framework
- Swordfish Emulator
- Swordfish Mockup website

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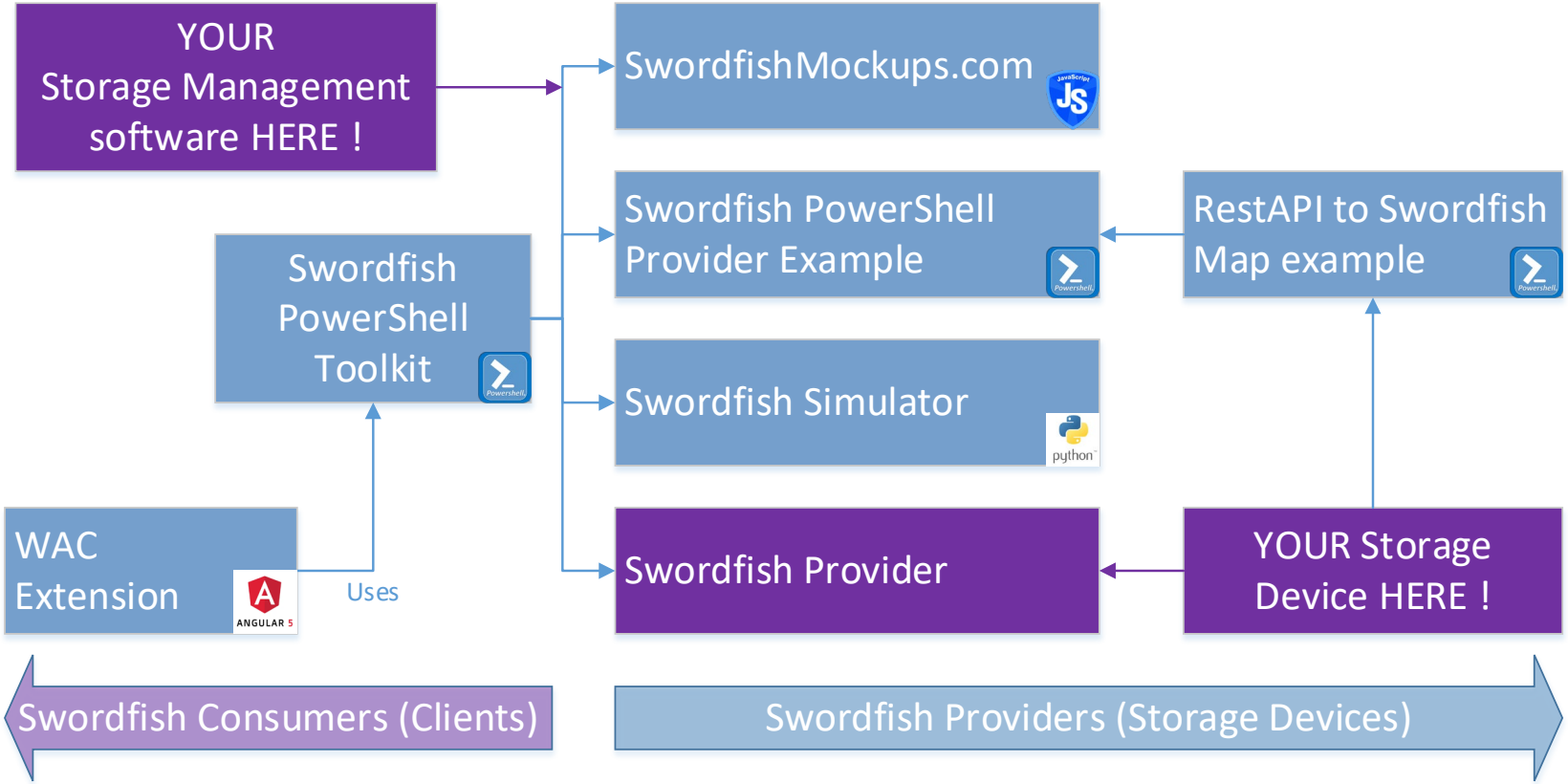
Which Tools are right for you!



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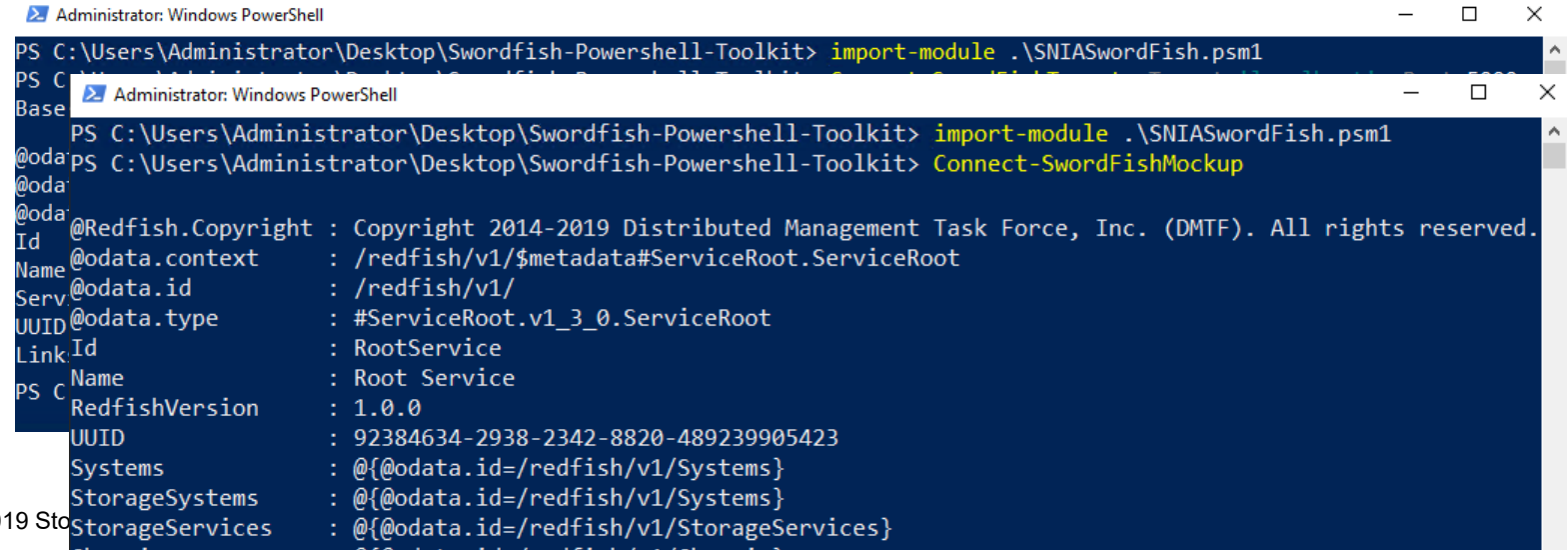
SNIA SWORDFISH™ POWERSHELL TOOLKIT

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 simulator, or even SwordFishMockup.com
- PowerShell wrapper for REST API calls to Redfish and Swordfish



PowerS

- Everything is returned
  - Cast to Variable
  - Can filter by prope
  - Can dig deeper in
  - And you can even

```
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":  "6545676545676100124407610012348 7"
                        }
                    ],
    "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; GuaranteedBytes=536
                                "ProvidingPools":  ""
                            }
                        ],
    "Capacity":  {
                     "Data":  {
                                  "ConsumedBytes":  0,
                                  "AllocatedBytes":  10737418240,
                                  "GuaranteedBytes":  536870912,
                                  "ProvisionedBytes":  1099511627776
```

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PowerShell Command Help

- Get a list of valid commands

```
Get-Command -Module SNIASwordFish
```

```
ume
ume -Examples
ume -Full
```

```
ose $true
```

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>] [<CommonParameters>]
DESCRIPTION
    This command will either return the a complete collection of Volumes that exist across all of
    the Storage Services, unless a  specific Storage Service ID is used to limit it, or a specific
    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 the command
        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
```

PowerShell Toolkit Work Items

The PowerShell Toolkit commands;

- Get-SwordFishChassis (+ Power, +Thermal)
- Get-SwordFishDrive
- Get-SwordFishEndpoint
- Get-SwordFishEndpointGroup
- Get-SwordFishStoragePool
- Get-SwordFishStorageService
- Get-SwordFishVolume
- Get-SwordFishClassOfService
- Connect-SwordFishTarget
- Connect-SwordfishMockup

Command sets that need to be written;

(in order of priority)

- New/Set/Remove-SwordFishEndpoint
- New/Set/Remove-SwordFishEndpointGroup
- New/Set/Remove-SwordFishStoragePool
- New/Set/Remove-SwordFishStorageGroup
- New/Set/Remove-SwordFishConsistencyGroup
- New/Set/Remove-SwordFishVolume
- Set-SwordFishStorageService
- Set-SwordFishChassis
- Get/New/Set/Remove-*LoS
- New/Set/Remove-SwordFishClassOfService

- Common Nomenclature
  - RestAPI vs PowerShell. Create = New, Read = Get, Update = Set, Delete = Remove
- All Commands must have inline help before being checked into the build
- All Commands must work against BOTH the Swordfish Targets (directly) and SwordFishMockups.com
- All Commands are open source, no compiled code or external DLL dependancies

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RestAPI to SWORDFISH™ Mapping

- RestAPI
- PowerSh
- Basic Pow

Steps

1. Retrieve t
2. Hold it sic
3. Look for M similaritie
   i.e. You Bytes. relevan
4. Go throug using you

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":  "002b4bd8361b856bbc0000000000000000000000001",
    "parent_vol_id":  "",
    "parent_vol_name":  "",
    "perfpolicy_id":  "032b4bd8361b856bbc0000000000000000000000010",
    "perfpolicy_name":  "Other Workloads",
    "pinned_cache_size":  0,
    "pool_id":  "0a2b4bd8361b856bbc0000000000000000000000001",
    "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

SEE HTTPS://GITHUB.COM/CHRIS-LIONETTI/SWORDFISHMOCKUP

- 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";
```

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SWORDFISH™ PowerShell Provider Example

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DEMO

SNIA Swordfish™ PowerShell Toolkiit

Developing a Windows Admin Center Gateway for SwordFish™

EXTENSION TYPES

- WAC context is based on a Tool or Solution Extension
- Tool Extensions
  - Executes either WMI calls or PowerShell scripts
  - Side load extension for debugging

```
MsftSme.sideLoad("http://localhost:4201")
```

- Solution extensions are based on a Connection Context
  - Servers
  - Computers
  - Hyper-Converged
  - Failover Clustering
  - Solution Extensions (3rd Party)

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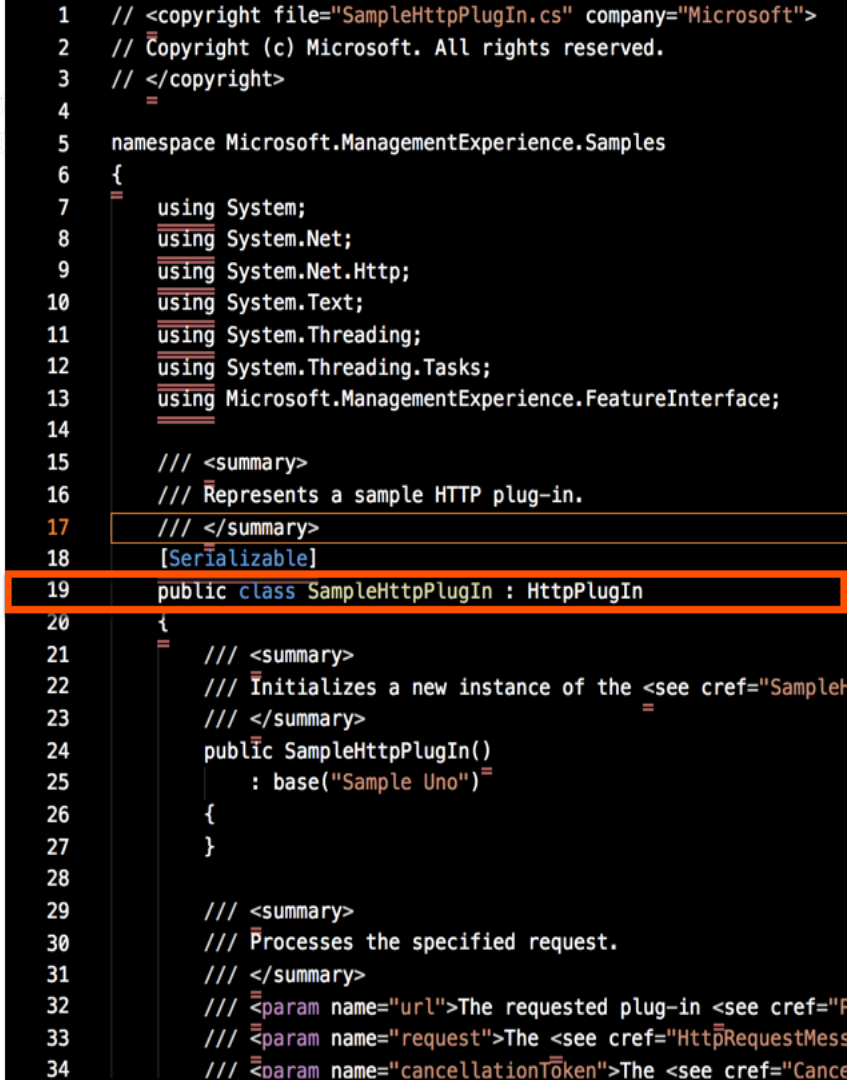
WAC SDK 1.0

- SDK versions
  - `.latest` – The latest SDK for production development/deployment

    `"@microsoft/windows-admin-center-sdk": "latest",`
  - `.insider` – Insider SDK which is the latest build for development
  - `.next` – vNext SDK (future)
- Plugin types
  - WMI Gateway or PowerShell Gateway
- HttpsPlugin interface (C#) – IPlugIn deprecated
- Publish through NuGet (v2 API) feed
  - Microsoft Extension Gallery
  - https://aka.ms/sme-extension-feed



```
1  // <copyright file="SampleHttpPlugIn.cs" company="Microsoft">
2  // Copyright (c) Microsoft. All rights reserved.
3  // </copyright>
4
5  namespace Microsoft.ManagementExperience.Samples
6  {
7      using System;
8      using System.Net;
9      using System.Net.Http;
10     using System.Text;
11     using System.Threading;
12     using System.Threading.Tasks;
13     using Microsoft.ManagementExperience.FeatureInterface;
14
15     /// <summary>
16     /// Represents a sample HTTP plug-in.
17     /// </summary>
18     [Serializable]
19     public class SampleHttpPlugIn : HttpPlugIn
20     {
21         /// <summary>
22         /// Initializes a new instance of the <see cref="SampleH
23         /// </summary>
24         public SampleHttpPlugIn()
25             : base("Sample Uno")
26         {
27         }
28
29         /// <summary>
30         /// Processes the specified request.
31         /// </summary>
32         /// <param name="url">The requested plug-in <see cref="P
33         /// <param name="request">The <see cref="HttpRequestMess
34         /// <param name="cancellationToken">The <see cref="Cance
```

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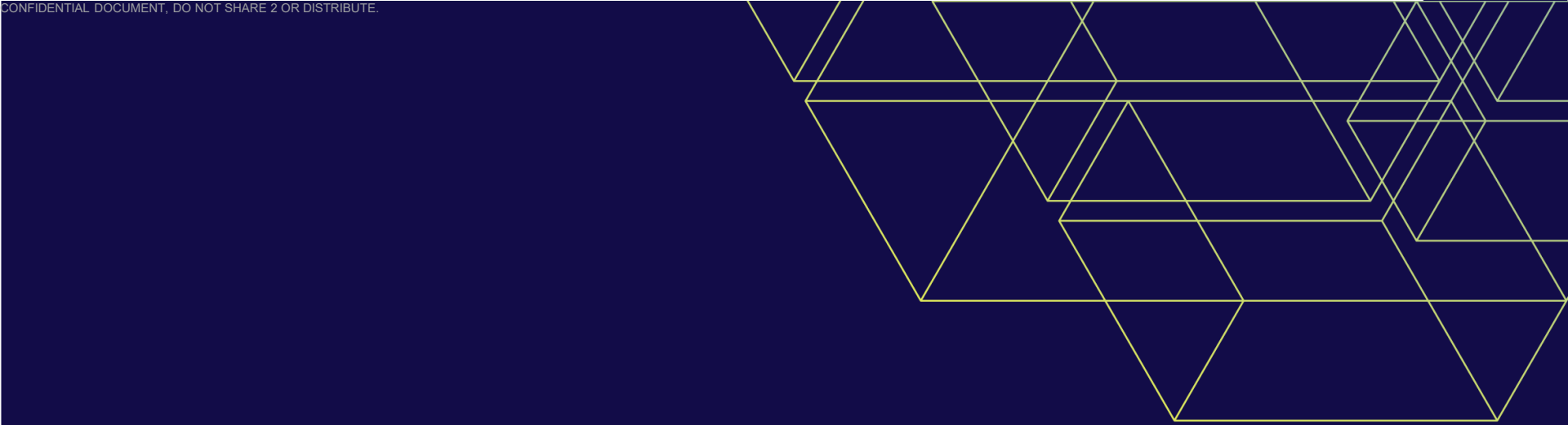
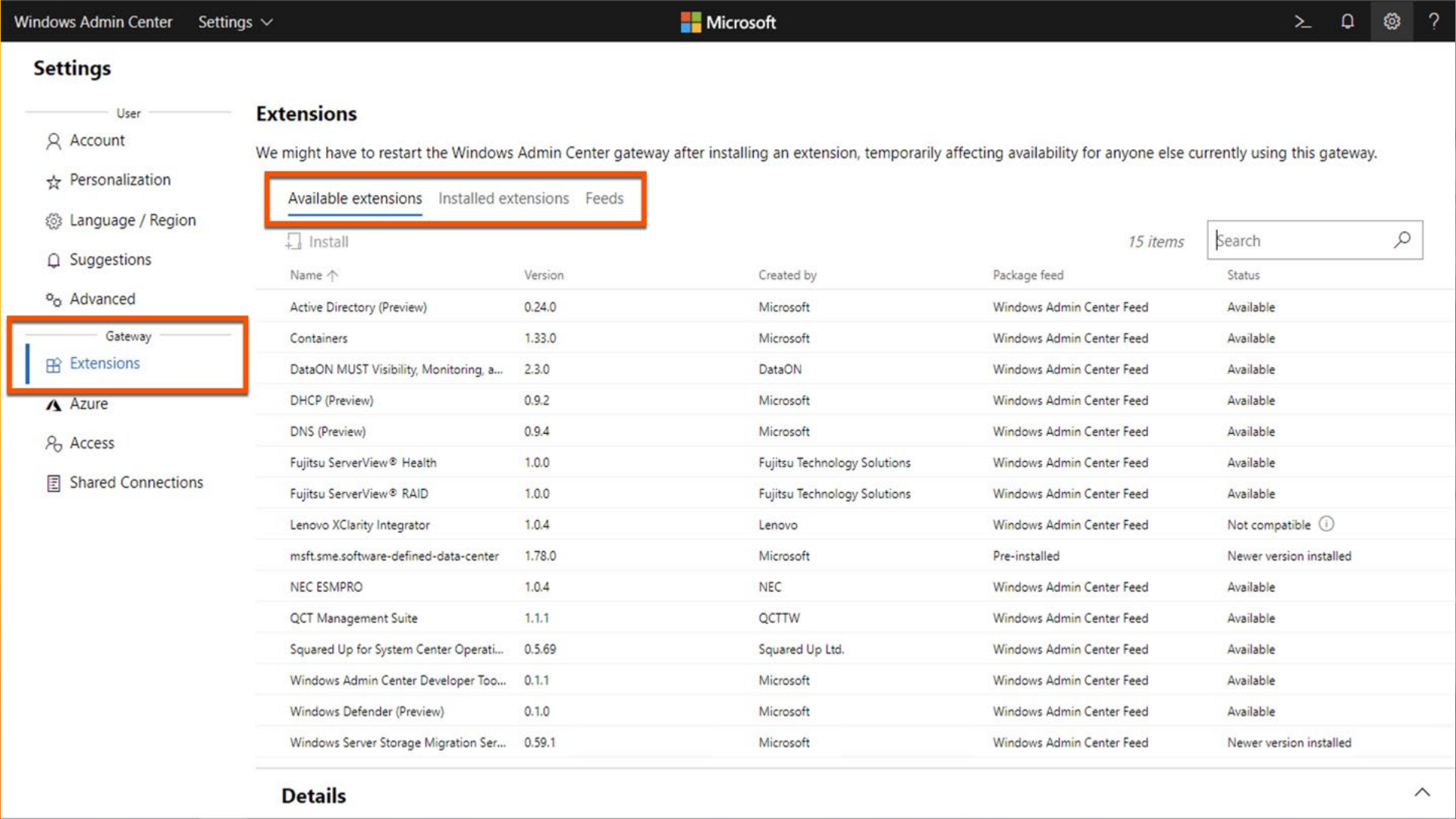
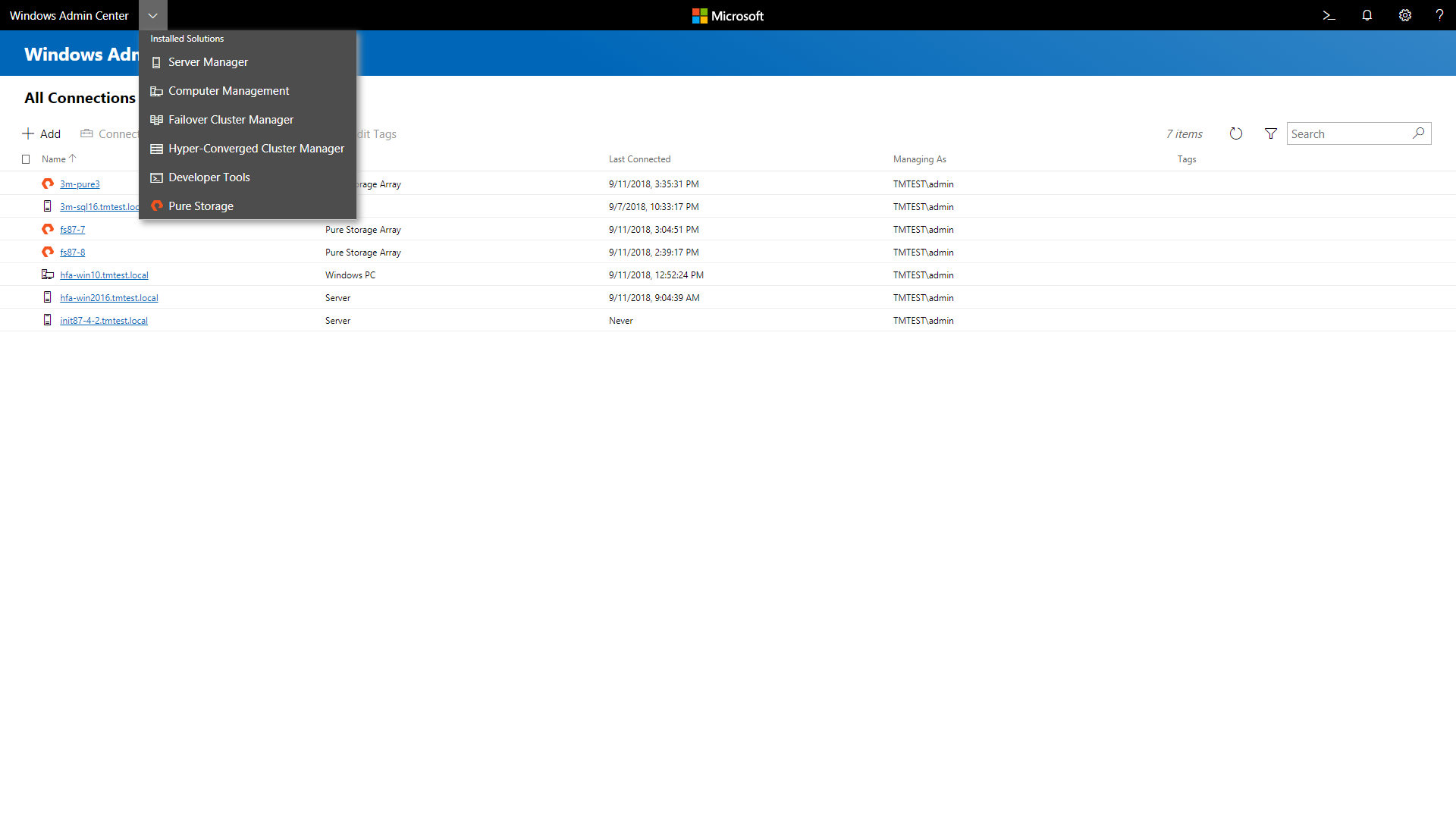


Example Solution Extension


Windows Admin Center
Settings
Microsoft
Settings
User
Account
Personalization
Language / Region
Suggestions
Advanced
Gateway
Extensions
Azure
Access
Shared Connections
Extensions
We might have to restart the Windows Admin Center gateway after installing an extension, temporarily affecting availability for anyone else currently using this gateway.
Available extensions
Installed extensions
Feeds
Install
15 items
Search
Name
Version
Created by
Package feed
Status
Active Directory (Preview) 0.24.0 Microsoft Windows Admin Center Feed Available
Containers 1.33.0 Microsoft Windows Admin Center Feed Available
DataON MUST Visibility, Monitoring, a... 2.3.0 DataON Windows Admin Center Feed Available
DHCP (Preview) 0.9.2 Microsoft Windows Admin Center Feed Available
DNS (Preview) 0.9.4 Microsoft Windows Admin Center Feed Available
Fujitsu ServerView® Health 1.0.0 Fujitsu Technology Solutions Windows Admin Center Feed Available
Fujitsu ServerView® RAID 1.0.0 Fujitsu Technology Solutions Windows Admin Center Feed Available
Lenovo XClarity Integrator 1.0.4 Lenovo Windows Admin Center Feed Not compatible
msft.sme.software-defined-data-center 1.78.0 Microsoft Pre-installed Newer version installed
NEC ESMPRO 1.0.4 NEC Windows Admin Center Feed Available
QCT Management Suite 1.1.1 QCTTW Windows Admin Center Feed Available
Squared Up for System Center Operati... 0.5.69 Squared Up Ltd. Windows Admin Center Feed Available
Windows Admin Center Developer Too... 0.1.1 Microsoft Windows Admin Center Feed Available
Windows Defender (Preview) 0.1.0 Microsoft Windows Admin Center Feed Available
Windows Server Storage Migration Ser... 0.59.1 Microsoft Windows Admin Center Feed Newer version installed
Details


Windows Admin Center
Microsoft
Installed Solutions
Server Manager
Computer Management
Failover Cluster Manager
Hyper-Converged Cluster Manager
Developer Tools
Pure Storage
Windows Adm
All Connections
Add
Connect
dit Tags
7 items
Search
Name
Last Connected
Managing As
Tags
3m-pure3
orage Array
9/11/2018, 3:35:31 PM
TMTEST\admin
3m-sql16.tmtest.loc
9/7/2018, 10:33:17 PM
TMTEST\admin
fs87-7
Pure Storage Array
9/11/2018, 3:04:51 PM
TMTEST\admin
fs87-8
Pure Storage Array
9/11/2018, 2:39:17 PM
TMTEST\admin
hfa-win10.tmtest.local
Windows PC
9/11/2018, 12:52:24 PM
TMTEST\admin
hfa-win2016.tmtest.local
Server
9/11/2018, 9:04:39 AM
TMTEST\admin
init87-4-2.tmtest.local
Server
Never
TMTEST\admin

Windows Admin Center

All Connections

Add | Connect | Manage As | Remove | Edit Tags

7 items | Search

Name	Type	Last Connected	Managing As	Tags
3m-pure3	Pure Storage Array	9/11/2018, 3:35:31 PM	TMTEST\admin	
3m-sql16.tmtest.local	Server	9/7/2018, 10:33:17 PM	TMTEST\admin	
fs87-7	Pure Storage Array	9/11/2018, 3:04:51 PM	TMTEST\admin	
fs87-8	Pure Storage Array	9/11/2018, 2:39:17 PM	TMTEST\admin	
hfa-win10.tmtest.local	Windows PC	9/11/2018, 12:52:24 PM	TMTEST\admin	
hfa-win2016.tmtest.local	Server	9/11/2018, 9:04:39 AM	TMTEST\admin	
init87-4-2.tmtest.local	Server	Never	TMTEST\admin	

fs87-7

Tools

Search Tools

- Overview

EXTENSIONS

- Host Groups
- Hosts
- Initiators
- Volumes

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Capacity

Used (0.2%)

0.2%
space used

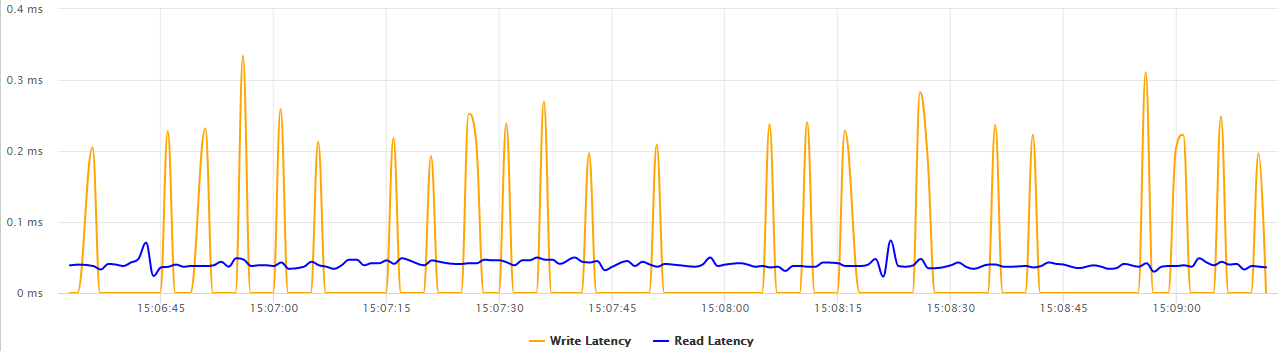
Volumes	4.62 GB
Snapshots	148 MB
Shared	135 MB
System	0 B
Empty	2.79 TB

3 to 1
Data Reduction

Used	Total
4.9 GB	2.79 TB

346 to 1
Total Reduction

Latency



IOPS

fs87-7

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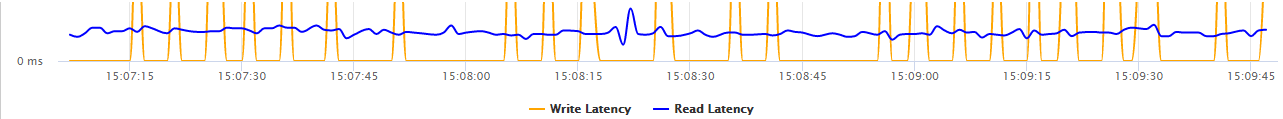
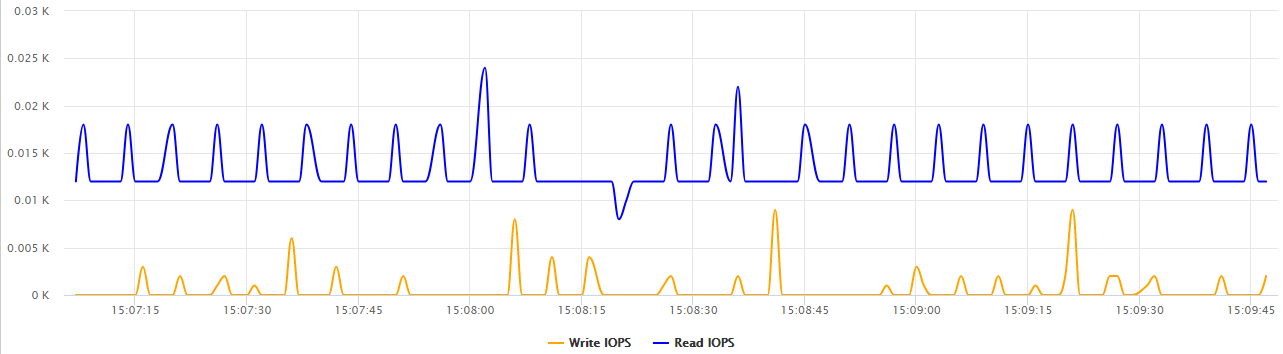
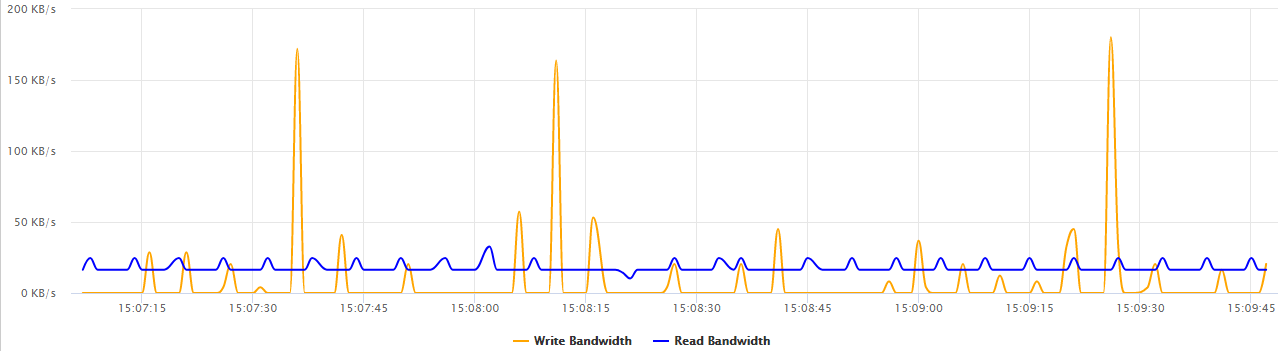


IOPS



Bandwidth



Go to fs87-7 web management interface

fs87-7

Tools

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- Volumes

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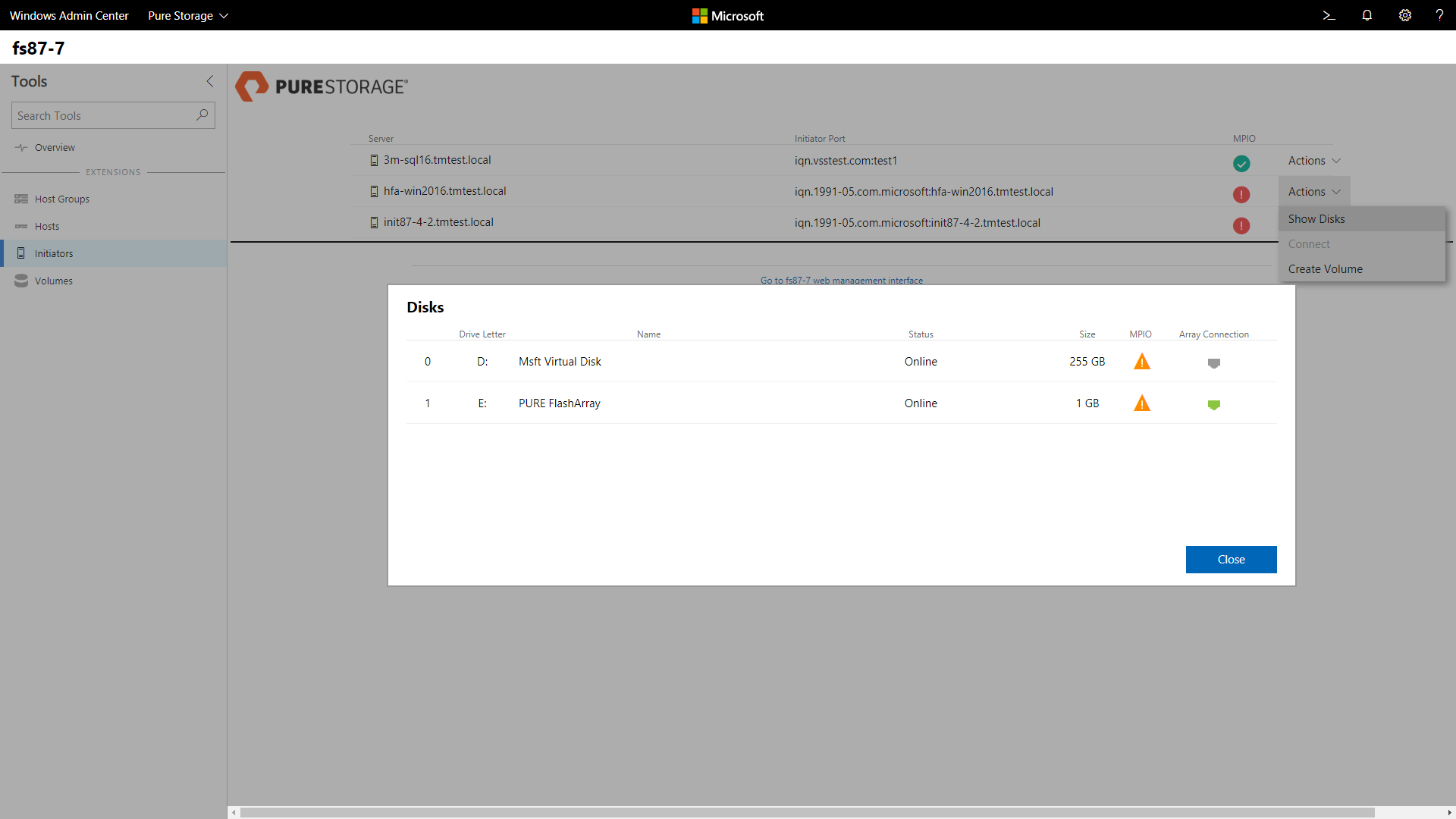
Server	Initiator Port	MPIO	
3m-sql16.tmtest.local	iqn.vsstest.com:test1	✓	Actions
hfa-win2016.tmtest.local	iqn.1991-05.com.microsoft:hfa-win2016.tmtest.local	!	Actions
init87-4-2.tmtest.local	iqn.1991-05.com.microsoft:init87-4-2.tmtest.local	!	

Actions menu:
- Show Disks
- Connect
- Create Volume

Go to fs87-7 web management interface


Windows Admin Center
Pure Storage
Microsoft
fs87-7
Tools
Search Tools
Overview
EXTENSIONS
Host Groups
Hosts
Initiators
Volumes
PURESTORAGE
Server
Initiator Port
MPIO
3m-sql16.tmtest.local
iqn.vsstest.com:test1
Actions
hfa-win2016.tmtest.local
iqn.1991-05.com.microsoft:hfa-win2016.tmtest.local
Actions
init87-4-2.tmtest.local
iqn.1991-05.com.microsoft:init87-4-2.tmtest.local
Show Disks
Connect
Create Volume
Go to fs87-7 web management interface
Disks
Drive Letter
Name
Status
Size
MPIO
Array Connection
0
D:
Msft Virtual Disk
Online
255 GB
1
E:
PURE FlashArray
Online
1 GB
Close

fs87-7

Tools

Search Tools

- Overview

EXTENSIONS

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- Initiators
- Volumes

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+ Create Volume

Name	Size	
NO-DELETE-init87-7-vol1	1 TB	Actions
@offloadnfs_boot	64 GB	Actions
vssdev-vol1	1 GB	Actions
vol2	2 GB	Actions
vss-demo-con	220 MB	
sql-demo-con	440 MB	
sql-demo-vol1	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011432	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011438	2.5 GB	Actions
vol3-async	200 MB	Actions
indtest	1 GB	Actions
vol7	1 GB	Actions
VSS-3B05F2E3B81F4E0200011445	2.5 GB	Actions
VSS-3B05F2E3B81F4E020001144A	2.5 GB	Actions
vol9	1 GB	Actions
VSS-3B05F2E3B81F4E020001146B	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011470	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011473	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011485	2.5 GB	Actions
VSS-3B05F2E3B81F4E02000114A0	2.5 GB	Actions
VSS-3B05F2E3B81F4E0200011494	2.5 GB	Actions

Edit Connections
Destroy

NEXT STEPS

- Swordfish + Windows Admin Center gateway extension
- https://github.com/SNIA/Swordfish-Extension-to-Windows-Admin-Center
  - Leverages https://github.com/SNIA/Swordfish-Powershell-Toolkit
- Update Repo
- Actively working with the WAC Engineering Team
  - Credential Management
  - Use new SDK 1.0 vs old SDK 0.1
  - Gateway extension implementation strategy based on new SDK 1.0 features
- Attend the SwordFish™ Workshop
  - Sept 24, 5-7pm

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Resources

- SwordFish™ PowerShell Toolkit
- Windows Center Admin Overview
- Windows Admin Center Docs
- Getting started
  1. Download
  2. Install
  3. Get started
- https://github.com/SNIA/Swordfish-Extension-to-Windows-Admin-Center

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Q&A