ARRAY HARDWARE

Multiple Namespace Quick Start Guide

APRIL 20, 2023

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Version 2.0.0

QUICK START GUIDE FOR ARRAY HARDWARE INFORMATION

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Introduction

WHAT IS A MULTIPLE NAMESPACE SMI-S SERVER

CIM supports multiple namespaces (CIM_Namespace instances). Keys are unique within a namespace. Most SMI-S servers support multiple namespaces. One for the server infrastructure (the interop namespace) and one for the storage device supported. This allows separation of naming conventions between the server infrastructure and the device support. SMI-S implementations may actually have more than two namespaces. However, this guide only shows the two mentioned.

WHAT IS A QUICK START GUIDE?

SMI-S is 2516 pages of reading spread across 8 books, plus it references another 14 or so DMTF profiles which amount to another 660 pages of reading. So, the question is where do you start? We have come up with a series of Quick Start Guides that are designed to help you get started by illustrating how to find useful SMI-S information in mock servers (mock ups of SMI-S server implementations). The Quick Start Guides don't illustrate EVERYTHING in the 3176 pages, but they give you a head start at finding some important items in SMI-S.

We currently have quick start guides for:

1. The Interop Namespace - What is it and what does it tell us?
2. Performance Information - Where do I find performance information in an SMI-S Server?
3. Capacity Information - Where do I find storage capacity information in an SMI-S Server?
4. Hardware Information - Where do I find hardware information in an SMI-S Server?
5. Product Information - Where do I find product information in an SMI-S Server?
6. Software Information - Where do I find software information in an SMI-S Server?

TOOL USED FOR THE QUICK START GUIDE ILLUSTRATION

The tool used for illustrating how to find information in SMI-S is the pywbemcli (part of pywbemtools). It is a command line interface for accessing any WBEM Server. It uses pywbem, an interface for python program access to any WBEM Server. The pywbemtools (and the pywbemcli) and pywbem are python programs that use a set of python packages. Pywbem and the pywbemtools are actively being maintained and are available on Github.

We will be using the latest version of the pywbemcli in these guides. You can find documentation on the pywbemcli at the following website:

https://pywbemtools.readthedocs.io/en/latest/

THE MOCK IMPLEMENTATIONS

The mock implementations mock selected autonomous profiles and some of their component profiles in SMI-S 1.8.0.

We currently have mock ups for the following autonomous profiles:

1. The SNIA Server Profile
2. The DMTF WBEM Server Profile
3. The Array Profile
4. The NAS Head Profile

And we plan on doing a Fabric (and Switch) mock up.

We chose to do mock ups of the SMI-S 1.8.0 versions of these profiles to illustrate differences between 1.8.0 and 1.6.1. We don't mock everything that is new in 1.8.0, but we do highlight some key changes ... like the DMTF WBEM Server profile, new indications and Advance Metrics (performance) for Arrays.

HOW A GUIDE WORKS

The guide is a sequence of text explaining what we are looking for, followed by the command to obtain the information, followed by command output and then text that explains the output.

THE QUICK START GUIDE FOR ARRAY HARDWARE

In this guide we will be exploring hardware information provided by an SMI-S Server for an Array. The mock for the Array supports SMI-S 1.8.0.

This 7-page document highlights information that can be found in about 30 pages of SMI-S, the Physical Package in the Common Book and disk drive lite profile in the block book of SMI-S.

In this script we will be working with python 3.8 (or above), pywbem 1.6.1 and version 1.2.0 of pywbemtools (pywbemcli). It is important that you are running with pywbemtools 1.2.0. In developing these scripts, the pywbem team was asked to make enhancements for multiple namespace access. The enhancements are only available in version 1.2.0 and beyond.

So, let's begin. First, we go to our virtual environment for mocks:

```
C:\Users\FarmerMike>workon mocks
(mocks) c:\Users\FarmerMike\devenv>
```

We are now in our virtual environment for mocks.

We will be working with a mock server that supports an SMI-S 1.8.0 Array. So, we need to establish a connection to the Array mock up:

```
(mocks) c:\Users\FarmerMike\devenv> pywbemcli -o table -n ArrayMock --default-namespace device
Enter 'help' for help, <CTRL-D> or ':q' to exit pywbemcli or <CTRL-r> to search history,
pywbemcli>
```

In our command, I requested the default format of output to be in “table” format (-o table) and name the mock that I want (-n ArrayMock). The command worked and we get a pywbemcli prompt to start entering commands on the ArrayMock. We also asked that the default namespace be ‘device’. This tells our load program that we want two namespaces. The default namespace for the Array instances and the interop namespace for the infrastructure instances.

PHYSICAL PACKAGES

The elements that reports hardware information are instances of CIM_PhysicalPackage (and its subclasses).

So, we start by looking for classes that report hardware information (CIM_PhysicalPackage)

```
pywbemcli> instance enumerate CIM_PhysicalPackage --pl Tag,Manufacturer,Model -n interop,device
Instances: CIM_PhysicalPackage
+-----------+-----------------------------------------------------+--------------------------+-----------------------------------+
| namespace | Tag                                                 | Manufacturer             | Model                             |
|-----------+-----------------------------------------------------+--------------------------+-----------------------------------|
| device    | "ACME+CF2A5091300089"                               | "ACME Corporation"       | "ACME Array 101"                  |
| device    | "ACME+CF2A5091300089+0_0+"                          | "ACME Corporation"       | "Rack Mounted Disk Chassis"       |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_0"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_1"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_2"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_3"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_4"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_5"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_6"                | "ByteStor"               | "STE30065 ACME300"                |
| device    | "ACME+CF2A5091300089+0_0+ACME+0_0_7"                | "ByteStor"               | "STE30065 ACME300"                |
+-----------+-----------------------------------------------------+--------------------------+-----------------------------------+
pywbemcli>
```

There are 10 hardware packages in this Array. And the instances are in the device namespace. We can see the manufacturer and model, but it does not tell us what the hardware does or what it supports.

WHAT THE HARDWARE SUPPORTS

The next question to answer is what part of the Array does the hardware support.

We will determine this by iterating on the following command to determine logical elements supported by the hardware.

```
pywbemcli> -o mof instance shrub CIM_PhysicalPackage.? -n device
```

```
Pick Instance name to process
0: device:CIM_PhysicalPackage.CreationClassName="CIM_Chassis",Tag="ACME+CF2A5091300089"
1: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+"
2: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_0"
3: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_1"
4: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_2"
5: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_3"
6: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_4"
7: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_5"
8: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_6"
9: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_7"
Input integer between 0 and 9 or Ctrl-C to exit selection:
```

We will start with the first one (selection 0):

```
Input integer between 0 and 9 or Ctrl-C to exit selection: 0
CIM_PhysicalPackage.CreationClassName="CIM_Chassis",Tag="ACME+CF2A5091300089"
 +-- GroupComponent(Role)
 |   +-- CIM_Container(AssocClass)
 |      +-- PartComponent(ResultRole)
 |         +-- CIM_PhysicalPackage(ResultClass)(1 insts)
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+"
 +-- PartComponent(Role)
 |   +-- CIM_ProductPhysicalComponent(AssocClass)
 |      +-- GroupComponent(ResultRole)
 |         +-- CIM_Product(ResultClass)(1 insts)
 |            +-- /:CIM_Product.IdentifyingNumber="ACME+CF2A5091300089",Name="ACME",Vendor="ACME Corporation
 +-- Antecedent(Role)
    +-- CIM_SystemPackaging(AssocClass)
       +-- Dependent(ResultRole)
          +-- CIM_ComputerSystem(ResultClass)(1 insts)
             +-- /:CIM_ComputerSystem.~,Name="ACME+CF2A5091300089"
pywbemcli>
```

The first two associations will be talked about later. The third association (CIM_SystemPackaging) links the physical package to the Array System. Also notice that the CreationClassName is a CIM_Chassis. CIM_Chassis is a subclass of CIM_PhysicalPackage.

Now let's run the same command and select the second item in the list:

```
pywbemcli> -o mof instance shrub CIM_PhysicalPackage.? -n device
Pick Instance name to process
0: device:CIM_PhysicalPackage.CreationClassName="CIM_Chassis",Tag="ACME+CF2A5091300089"
1: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+"
2: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_0"
3: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_1"
4: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_2"
5: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_3"
6: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_4"
```

```
7: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_5"
8: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_6"
9:  device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_7"  Input integer between 0 and 9 or Ctrl-C to exit selection:
```

And we select item 1:

```
 Input integer between 0 and 9 or Ctrl-C to exit selection: 1
CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+"
 +-- GroupComponent(Role)
 |   +-- CIM_Container(AssocClass)
 |      +-- PartComponent(ResultRole)
 |         +-- CIM_PhysicalPackage(ResultClass)(8 insts)
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_0"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_1"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_2"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_3"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_4"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_5"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_6"
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+ACME+0_0_7"
 +-- PartComponent(Role)
    +-- CIM_Container(AssocClass)
       +-- GroupComponent(ResultRole)
          +-- CIM_PhysicalPackage(ResultClass)(1 insts)
             +-- /:CIM_PhysicalPackage.CreationClassName="CIM_Chassis",Tag="ACME+CF2A5091300089"
pywbemcli>
```

In this case the physical package shrub ONLY includes the CIM_Container association. The thing it represents is a rack (the GroupComponent in the first Container association) for a set of packages (the PartComponents) and the rack itself is contained in the Chassis for the Array.

Now we will at the shrub for the third physical package.

```
pywbemcli> -o mof instance shrub CIM_PhysicalPackage.? -n device
Pick Instance name to process
0: device:CIM_PhysicalPackage.CreationClassName="CIM_Chassis",Tag="ACME+CF2A5091300089"
1: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+"
2: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_0"
3: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_1"
4: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_2"
5: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_3"
6: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_4"
7: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_5"
8: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_6"
9: device:CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_0+ACME+0_0_7"
Input integer between 0 and 9 or Ctrl-C to exit selection:
```

So, we will select item 2:

```
  Input integer between 0 and 9 or Ctrl-C to exit selection: 2
CIM_PhysicalPackage.CreationClassName="CIM_PhysicalPackage",Tag="ACME+CF2A5091300089+0_
0+ACME+0_0_0"
 +-- PartComponent(Role)
 |   +-- CIM_Container(AssocClass)
 |      +-- GroupComponent(ResultRole)
 |         +-- CIM_PhysicalPackage(ResultClass)(1 insts)
 |            +-- /:CIM_PhysicalPackage.~,Tag="ACME+CF2A5091300089+0_0+"
 +-- Antecedent(Role)
    +-- CIM_Realizes(AssocClass)
       +-- Dependent(ResultRole)
          +-- CIM_DiskDrive(ResultClass)(1 insts)
             +-- /:CIM_DiskDrive.~,DeviceID="ACME+0_0_0",~,~
pywbemcli>
```

The first association (CIM_Container) says the package is contained in the rack. The second association (CIM_Realizes) links the physical package to a Disk Drive. So, the package is a Disk Drive. And it appears the same is true for the next 7 packages.

CHANGE LOG

1.0.1	10/19/2020	The initial version based on pywbem defaults
1.1.0	11/07/2021	Changed the default namespace to ‘interop’
2.0.0	4/20/2023	Updated for a multiple namespace mock