Document Number: DSP1059

Date: 2009-07-15

Version: 1.0.0

Generic Device Resource Virtualization Profile

Document Type: Specification

Document Status: DMTF Standard

Document Language: E

CONTENTS

Figures

Tables

Foreword

The *Generic Device Resource Virtualization Profile* (DSP1059) was prepared by the System Virtualization Partitioning and Clustering workgroup of the DMTF.

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability.

The authors wish to acknowledge the following people:

Editors:

- Michael Johanssen – IBM
- Ron Goering – IBM

Contributors:

- Gareth Bestor – IBM
- Ron Goering – IBM
- Daniel Hiltgen –VMware Inc.
- Ron Doyle – IBM
- Rene Schmidt – VMware Inc.
- Steffen Grarup – VMware Inc.
- Hemal Shah – Broadcom
- Fred Maciel – Hitachi Ltd.
- Lawrence Lamers – VMware Inc.
- Andreas Maier – IBM
- John Parchem – Microsoft Corporation
- George Ericson – EMC
- Oliver Benke – IBM
- John Leung – Intel Corporation
- James Fehlig – Novell
- Nihar Shah – Microsoft Corporation
- Shishir Pardikar – Citrix Systems Inc.
- Stephen Schmidt – IBM
- Mark Hapner – Sun Microsystems
- Dave Barrett – Emulex
- John Suit – Fortisphere
- Jeff Wheeler – Cisco
- Mark Johnson – IBM
- Carl Waldsburger – VMware Inc.

Introduction

The information in this specification should be sufficient for a provider or consumer of this data to identify unambiguously the classes, properties, methods, and values that shall be instantiated and manipulated to represent and manage a generic virtual device modeled using the DMTF Common Information Model (CIM) core and extended model definitions.

The target audience for this specification is implementers who are writing CIM-based providers or consumers of management interfaces that represent the component described in this document.

Generic Device Resource Virtualization Profile

1 Scope

The *Generic Device Resource Virtualization Profile* is a concrete component profile that specializes the abstract *Resource Allocation Profile* and the abstract *Allocation Capabilities Profile*.

The *Generic Device Resource Virtualization Profile* is intended for use when a more specific resource allocation profile (for example, the *Processor Resource Virtualization Profile*, *Memory Resource Virtualization Profile*, and so on) for common resource types has not yet been defined or approved, or when the device in question is an unusual device type for which no more specific profile exists.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 Approved References

DMTF DSP0004, *CIM Infrastructure Specification* 2.5
http://www.dmtf.org/standards/published_documents/DSP0004_2.5.pdf

DMTF DSP0200, *CIM Operations over HTTP* 1.3
http://www.dmtf.org/standards/published_documents/DSP0200_1.3.pdf

DMTF DSP1001, *Management Profile Specification Usage Guide* 1.0
http://www.dmtf.org/standards/published_documents/DSP1001_1.0.pdf

DMTF DSP1033, *Profile Registration Profile* 1.0
http://www.dmtf.org/standards/published_documents/DSP1033_1.0.pdf

DMTF DSP1041, *Resource Allocation Profile* 1.1
http://www.dmtf.org/standards/published_documents/DSP1041_1.1.pdf

DMTF DSP1043, *Allocation Capabilities Profile* 1.0
http://www.dmtf.org/standards/published_documents/DSP1043_1.0.pdf

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. For the purposes of this document, the terms and definitions given in DSP1033 and DSP1001 also apply.

3.1
can
used for statements of possibility and capability, whether material, physical, or causal

3.2
cannot
used for statements of possibility and capability, whether material, physical, or causal

3.3
conditional
indicates requirements to be followed strictly to conform to the document when the specified conditions are met

3.4
mandatory
indicates requirements to be followed strictly to conform to the document and from which no deviation is permitted

3.5
may
indicates a course of action permissible within the limits of the document

3.6
need not
indicates a course of action permissible within the limits of the document

3.7
optional
indicates a course of action permissible within the limits of the document

3.8
referencing profile
indicates a profile that owns the definition of this class and can include a reference to this profile in its "Referenced Profiles" table

3.9
shall
indicates requirements to be followed strictly to conform to the document and from which no deviation is permitted

3.10
shall not
indicates requirements to be followed strictly to conform to the document and from which no deviation is permitted

3.11
should
indicates that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.12
should not
indicates that a certain possibility or course of action is deprecated but not prohibited

3.13
unspecified
indicates that this profile does not define any constraints for the referenced CIM element or operation

3.14
allocated resource
the partitioned or virtual resource that has been allocated to a consumer based on the associated resource allocation

3.15
host resource
a device or computing resource contained by the host system that may be allocated with either exclusive or shared access through the host system to provide resources to a resource pool or consumer

3.16
host system
the scoping system containing resources that may be allocated and/or virtualized

3.17
virtual computer system
a virtual system as applied to a computer system
Other common industry terms for such a system include virtual machine, hosted computer, child partition, logical partition, domain, guest, and container.

3.18
virtual resource
the instantiation of the allocated resource that is exposed to a consumer through a logical device

4 Symbols and Abbreviated Terms

The following abbreviations are used in this document.

4.1
RASD
CIM_ResourceAllocationSettingData

5 Synopsis

Profile Name: *Generic Device Resource Virtualization*
Version: 1.0.0
Organization: DMTF
CIM Schema Version: 2.22
Specializes: *Resource Allocation Profile* and *Allocation Capabilities Profile*
Central Class: CIM_ResourcePool
Scoping Class: CIM_System

The *Generic Device Resource Virtualization Profile* is a component profile that provides the capability to manage a virtual device.

The Central Class of the *Generic Device Resource Virtualization Profile* shall be CIM_ResourcePool. The Scoping Class shall be CIM_System. Table 1 lists profiles upon which this profile has a dependency.

Table 1 – Related Profiles

Profile Name	Organization	Version	Relationship	Description
Resource Allocation	DMTF	1.1	Specializes	The abstract profile that describes the virtualization of resources See 7.2.
Allocation Capabilities	DMTF	1.0	Specializes	The abstract profile that describes capabilities for resource allocation

Profile Name	Organization	Version	Relationship	Description
				See 7.3.
Profile Registration	DMTF	1.0	Mandatory	The profile that specifies registered profiles

6 Description

The *Generic Device Resource Virtualization Profile* is a component profile that defines basic implementation for a virtual device including resource allocation from a resource pool as specified in the abstract *Resource Allocation Profile* and specification of resource capabilities as specified in the abstract *Allocation Capabilities Profile*.

Figure 1 presents the class schema for the *Generic Device Resource Virtualization Profile*. The prefix CIM_ has been removed from the names of the classes.

Note that most of the behavioral constraints for many of the classes identified are inherited from the abstract *Resource Allocation Profile* and *Allocation Capabilities Profile*. Therefore, although they are shown, they are not referenced in this specification.

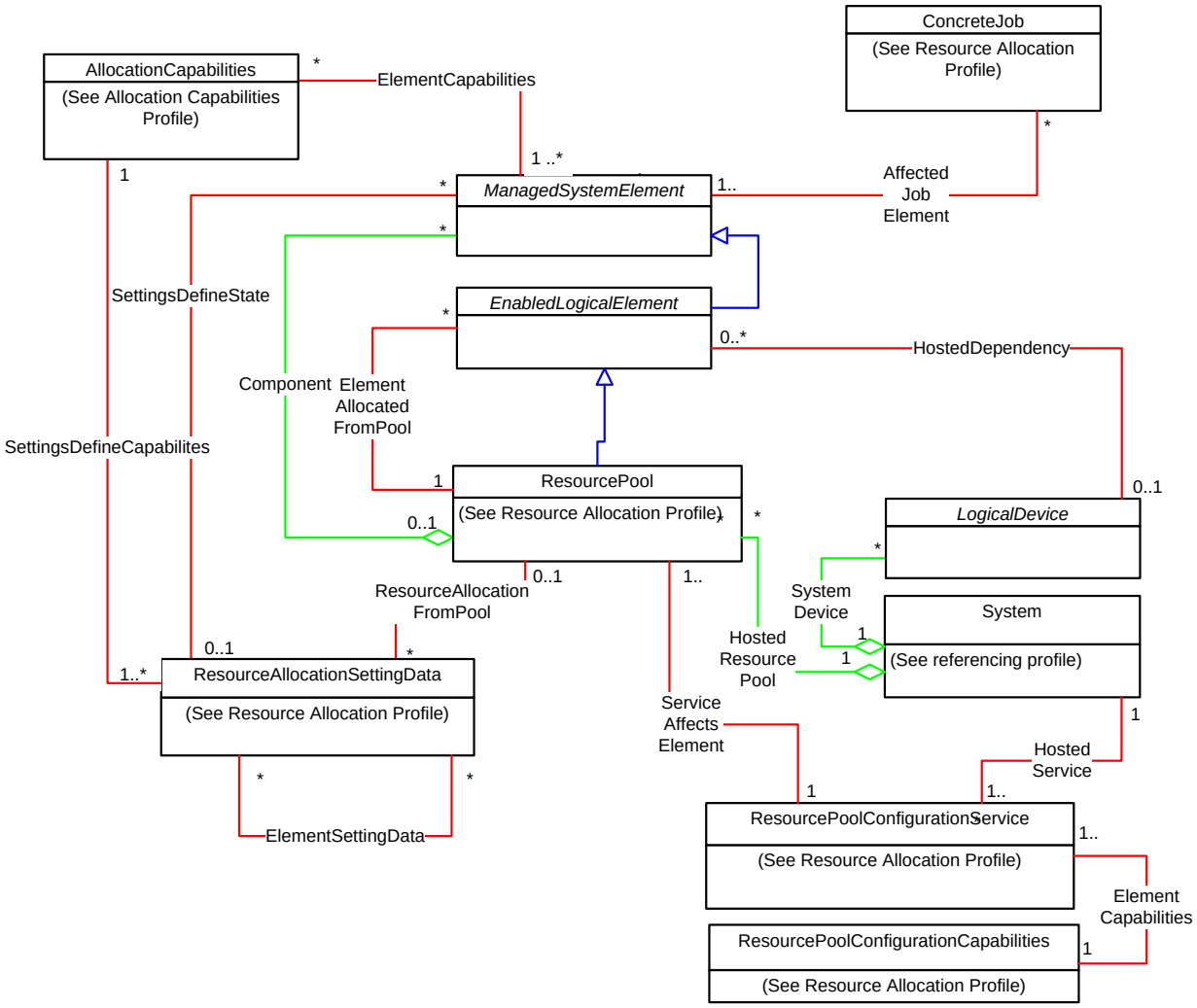

Figure 1 – *Generic Device Resource Virtualization Profile*: Class Diagram

6.1 Resource Allocation Profile and Allocation Capabilities Profile

Implementations of the *Generic Device Resource Virtualization Profile* will conform to the *Resource Allocation Profile* and to the *Allocation Capabilities Profile*. This profile does not further constrain the flexibility stated in these profiles subject to the constraint described in “Virtual Resource Allocation,” clause 7.2, of the *Resource Allocation Profile).* For example, allocations may occur from the primordial pool or pool hierarchies, active pool management may be implemented, and the allocation capabilities pattern may be used to help the management client understand valid attribute values.

7 Implementation

This section details the requirements related to the arrangement of instances and their properties for implementations of this profile.

7.1 Resource Allocation Profile

The *Resource Allocation Profile* specifies two alternatives for modeling resource allocation. Implementations conforming to this profile shall implement the normative content in “Virtual Resource Allocation” (clause 7.2) in the *Resource Allocation Profile*.

7.2 Allocation Capabilities Profile

The *Allocation Capabilities Profile* specifies ways for an implementation to use instances of CIM_AllocationCapabilities and the CIM_SettingsDefineCapabilities association for a set of CIM_ResourceAllocationSettingData instances to describe the default property values, supported property values, and range of property values for a resource allocation request.

An instance of the CIM_AllocationCapabilities class shall be used to represent the allocation capabilities of a conformant resource pool. That instance shall be associated with the instance of the CIM_ResourcePool class that represents the conformant resource pool through the CIM_ElementCapabilities association.

Instances of the CIM_ResourceAllocationSettingData class shall be used to represent defaults and supported property values and ranges of the allocation capabilities of conformant resource pools. These instances shall be associated with the instance of the CIM_AllocationCapabilities class that represents the allocation capabilities of a conformant resource pool through the CIM_SettingsDefineCapabilities association.

7.3 Resource Type

If the virtual device is one of the types specified in the CIM_ResourceAllocationSettingData MOF (and the CIM_AllocationCapabilities and CIM_ResourcePool MOFs), then the type field should be set accordingly. If there is no appropriate type value, the type field shall be set to 1 (Other) and the OtherResourceType attribute shall be set to a short string specifying the type.

For a specific resource type the type attribute value in the associated CIM_ResourceAllocationSettingData, CIM_AllocationCapabilities, and CIM_ResourcePool instances shall all be set to the same value.

The ResourceSubType attribute may be set to specify an implementation-specific sub-type.

8 Methods

The requirements for operations and methods are defined in the *Resource Allocation Profile* and the *Allocation Capabilities Profile*.

9 Use Cases

The following object diagrams and use cases are based on the implementation conforming to the DMTF *Generic Device Resource Virtualization Profile*.

9.1 Object Diagrams

Figure 2 shows a single resource pool aggregating host logical devices (in this example, an Infiniband Port) and allocating virtual devices. The allocated virtual device is associated to an owning virtual system using the CIM_SystemDevice association.

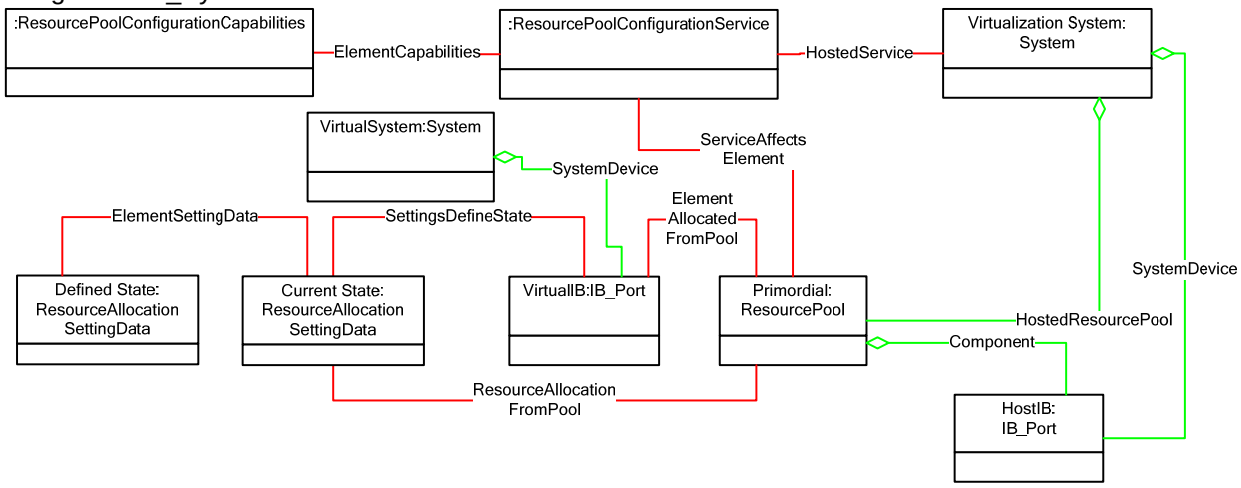

Figure 2 – Simple Virtual Device Allocation

9.2 Determining Conforming Resource Types

Two scenarios for determining which resource types this profile applies to are described in the following sections.

9.2.1 Determining Resource Types in Implementations Using Central Class Registration Methodology

This use case assumes that the client knows the reference that refers to an instance of the CIM_RegisteredProfile class, which represents an implementation of this profile.

A client can determine which resource types this profile applies to as follows:

1) The client follows the CIM_ElementConformsToProfile association from an instance of CIM_RegisteredProfile to all instances of ResourcePool that conform to this profile.
2) For each of the associated instances of the CIM_ResourcePool class, the value of the ResourceType property designates the resource type conforming to this profile.

The result is a set of references that refer to conforming resource pools and the resource types for those pools.

In the example shown in Figure 3 one resource pool is associated with the subject profile by the CIM_ElementConformsToProfile association. By following this association it is apparent that type 9 (IB HBA) conforms to this profile.

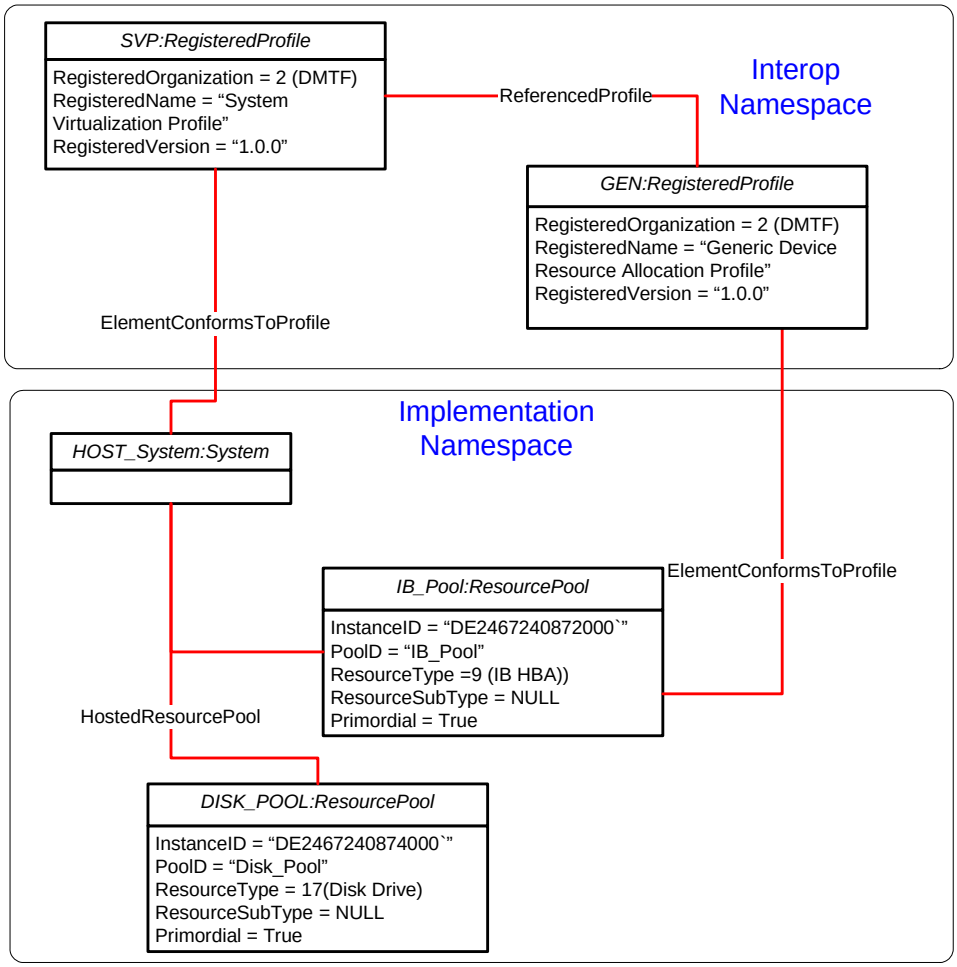

Figure 3 – Profile Registration Using Central Class

9.2.2 Determining Resource Types in Implementations Using Scoping Class Registration Methodology

This use case assumes that the client knows the reference that refers to an instance of the CIM_RegisteredProfile class that represents an implementation of this profile. There are no CIM_ElementConformsToProfile associations from this instance of CIM_RegisteredProfile.

A client can determine which resource types this profile applies to as follows:

1) The client determines the scoping profile by following the CIM_ReferenceProfile association.
2) The client determines the scoping class by following the CIM_ElementConformsToProfile association from the scoping CIM_RegisteredProfile instance to the scoping CIM_System instance.
3) The client determines all instances of CIM_ResourcePool that are associated by CIM_HostedResourcePool to the scoping class.
4) For each instance of CIM_ResourcePool discovered in the previous step, the client checks whether the CIM_ElementConformsToProfile association is present for that pool.
5) For each of the associated CIM_ResourcePool instances that do not have the CIM_ElementConformsToProfile association the client obtains the ResourceType field, indicating that the resource type conforms to this profile.

The result is a list of resource types that conform to this profile.

In the example shown in Figure 4 there are no CIM_ElementConformsToProfile associations from the instance of CIM_RegisteredProfile representing this profile that the client could traverse to the scoping class, HOST_System. This instance of CIM_System "hosts" two resource pools, neither of which have a CIM_ElementConformsToProfile association. The client can then determine the types of these pools: 9 (IB HBA) and 17 (Disk Drive). These resource types conform to the *Generic Device Resource Virtualization Profile*.

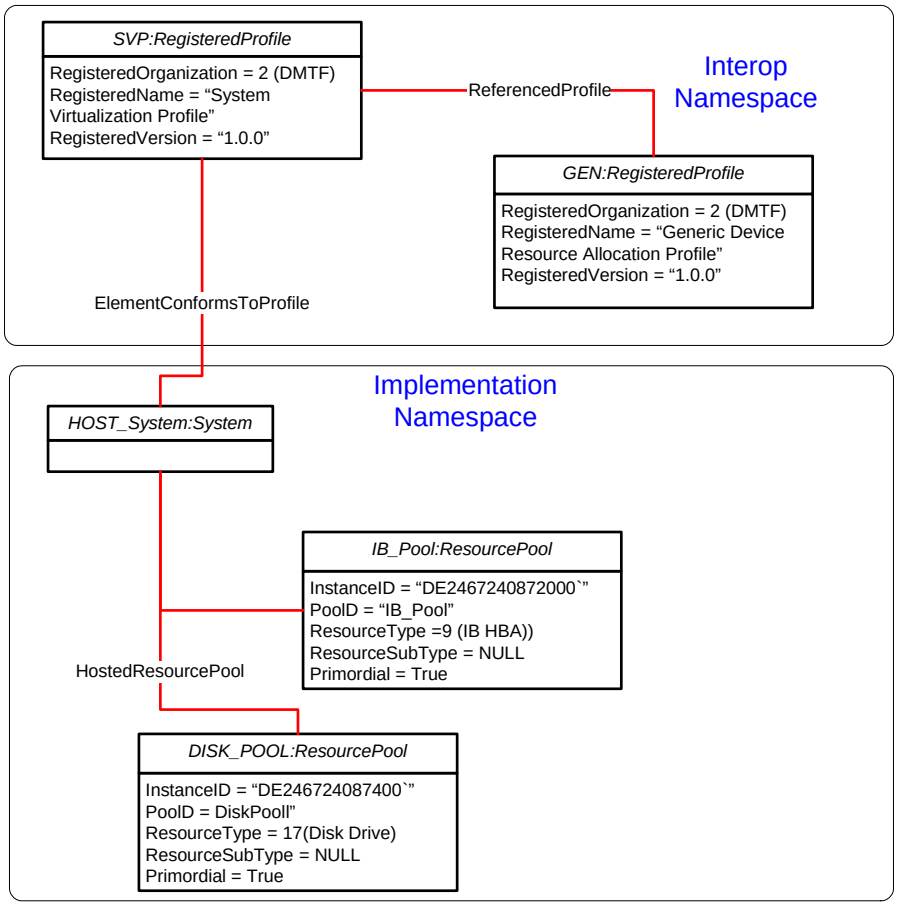

Figure 4 – Profile Registration Using Scoping Class

9.3 Determining Resource Capabilities

Once the client has found a resource pool for the desired resource it can determine the possible values to be used in an allocation request as follows:

1) From the CIM_ResourcePool select all of the instances of CIM_AllocationCapabilities associated with the CIM_ElementCapabilities association. Each of these CIM_AllocationCapabilities instances describes a possible set of allocation request values. (Typically there would only be one.)

2) From the selected CIM_AllocationCapabilities instance follow the CIM_SettingsDefineCapabilities with the ValueRole property set to 0 (Default) to find the default CIM_ResourceAllocationSetting instance values. (The example in Figure 5 shows a hypothetical PortSpeed property whose default value is 200.)

3) In a similar fashion, follow the CIM_SettingsDefineCapabilities with the ValueRange property set to Maximum, Minimum and Increments to find these values. (In the example the minimum PortSpeed is 100, Maximum is 1000, and requests must be made in increments of 100.)

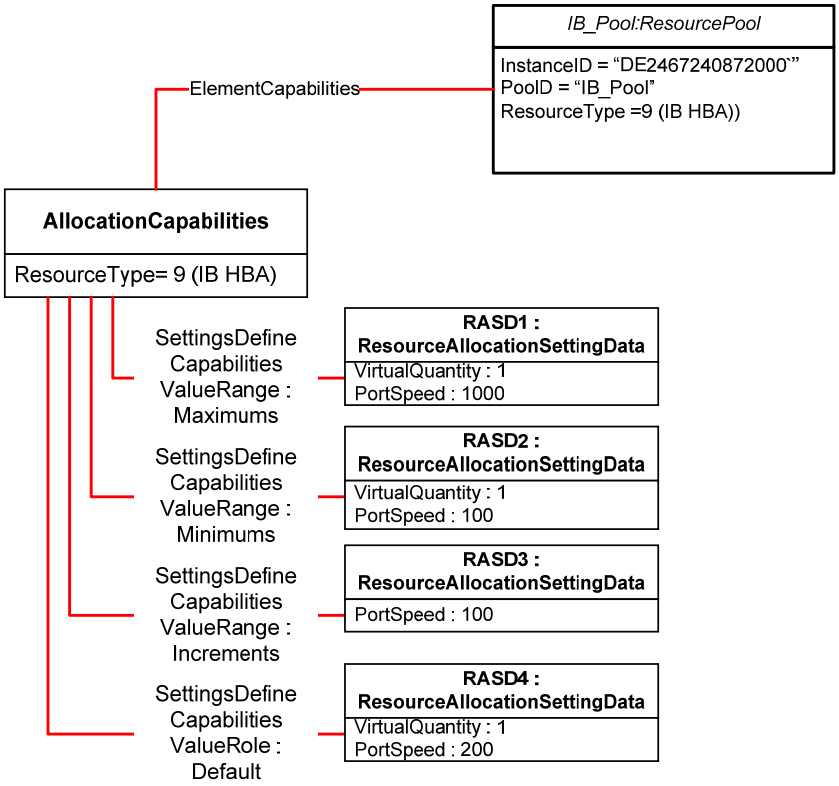

Figure 5 – Determining Resource Capabilities

10 CIM Elements

All CIM element requirements specified by the *Resource Allocation Profile* and the *Allocation Capabilities Profile* are required by the *Generic Device Resource Virtualization Profile*. This clause specifies additional requirements that modify or extend those of the *Resource Allocation Profile* and the *Allocation Capabilities Profile*.

Table 2 shows the instances of CIM elements for this profile. Instances of the CIM elements shall be implemented as described in Table 2. Sections 7 ("Implementation") and 8 ("Methods") may impose additional requirements on these elements.

Table 2 – CIM Elements: Generic Device Resource Virtualization Profile

Element Name	Requirement	Description
Classes		
CIM_AllocationCapabilities	Mandatory	See 10.1.
CIM_ElementCapabilities	Mandatory	See 10.2.
CIM_RegisteredProfile	Mandatory	See 10.3.
Indications		
None defined in this profile		

10.1 CIM_AllocationCapabilities

CIM_AllocationCapabilities represents the allocation capabilities of a resource pool.

Table 3 provides information about the properties of CIM_AllocationCapabilities.

Table 3 – Class: CIM_AllocationCapabilities

Elements	Requirement	Notes
InstanceID	Mandatory	**Key**
ResourceType	Mandatory	See 7.3.
OtherResourceType	Conditional	This property shall be used if ResourceType matches 1 (Other).
RequestTypesSupported	Mandatory	None
SharingMode	Mandatory	None

10.2 CIM_ElementCapabilities

CIM_ElementCapabilities associates an instance of CIM_AllocationCapabilities with CIM_ResourcePool.

Table 4 defines the properties of CIM_ElementCapabilities.

Table 4 – Class: CIM_ElementCapabilities

Properties	Requirement	Notes
ManagedElement	Mandatory	**Key** Cardinality 1..*
Capabilities	Mandatory	**Key** This property shall be a reference to the CIM_AllocationCapabilities instance. Cardinality *
Characteristics	Mandatory	

10.3 CIM_RegisteredProfile

An implementation shall use an instance of class CIM_RegisteredProfile to represent an implementation of this profile. With the exception of the mandatory values specified for the properties in Table 5, the behavior of the CIM_RegisteredProfile instance is in accordance with the *Profile Registration Profile*.

Table 5 – Class: CIM_RegisteredProfile

Elements	Requirement	Notes
RegisteredName	Mandatory	This property shall have a value of "Generic Device Resource Virtualization".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of 2 (DMTF).

(informative)

Change Log

Version	Date	Description
1.0.0	2009-07-15	DMTF Standard Release