



1

2

3

4

Document Number: DSP1059

Date: 2009-07-15

Version: 1.0.0

5

Generic Device Resource Virtualization Profile

6

Document Type: Specification

7

Document Status: DMTF Standard

8

Document Language: E

9 Copyright Notice

10 Copyright © 2009 Distributed Management Task Force, Inc. (DMTF). All rights reserved.

11 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
12 management and interoperability. Members and non-members may reproduce DMTF specifications and
13 documents, provided that correct attribution is given. As DMTF specifications may be revised from time to
14 time, the particular version and release date should always be noted.

15 Implementation of certain elements of this standard or proposed standard may be subject to third party
16 patent rights, including provisional patent rights (herein "patent rights"). DMTF makes no representations
17 to users of the standard as to the existence of such rights, and is not responsible to recognize, disclose,
18 or identify any or all such third party patent right, owners or claimants, nor for any incomplete or
19 inaccurate identification or disclosure of such rights, owners or claimants. DMTF shall have no liability to
20 any party, in any manner or circumstance, under any legal theory whatsoever, for failure to recognize,
21 disclose, or identify any such third party patent rights, or for such party's reliance on the standard or
22 incorporation thereof in its product, protocols or testing procedures. DMTF shall have no liability to any
23 party implementing such standard, whether such implementation is foreseeable or not, nor to any patent
24 owner or claimant, and shall have no liability or responsibility for costs or losses incurred if a standard is
25 withdrawn or modified after publication, and shall be indemnified and held harmless by any party
26 implementing the standard from any and all claims of infringement by a patent owner for such
27 implementations.

28 For information about patents held by third-parties which have notified the DMTF that, in their opinion,
29 such patent may relate to or impact implementations of DMTF standards, visit
30 <http://www.dmtf.org/about/policies/disclosures.php>.

31

CONTENTS

32 Foreword 4
 33 Introduction 5
 34 1 Scope 7
 35 2 Normative References..... 7
 36 2.1 Approved References 7
 37 3 Terms and Definitions 7
 38 4 Symbols and Abbreviated Terms 9
 39 5 Synopsis..... 9
 40 6 Description 10
 41 6.1 Resource Allocation Profile and Allocation Capabilities Profile 11
 42 7 Implementation..... 12
 43 7.1 Resource Allocation Profile..... 12
 44 7.2 Allocation Capabilities Profile 12
 45 7.3 Resource Type..... 12
 46 8 Methods..... 12
 47 9 Use Cases 13
 48 9.1 Object Diagrams 13
 49 9.2 Determining Conforming Resource Types 13
 50 9.3 Determining Resource Capabilities 15
 51 10 CIM Elements 16
 52 10.1 CIM_AllocationCapabilities 17
 53 10.2 CIM_ElementCapabilities 17
 54 10.3 CIM_RegisteredProfile..... 17
 55 ANNEX A (informative) Change Log..... 18

56

57 Figures

58 Figure 1 – *Generic Device Resource Virtualization Profile*: Class Diagram 11
 59 Figure 2 – Simple Virtual Device Allocation 13
 60 Figure 3 – Profile Registration Using Central Class 14
 61 Figure 4 – Profile Registration Using Scoping Class 15
 62 Figure 5 – Determining Resource Capabilities 16

63

64 Tables

65 Table 1 – Related Profiles 9
 66 Table 2 – CIM Elements: Generic Device Resource Virtualization Profile 16
 67 Table 3 – Class: CIM_AllocationCapabilities 17
 68 Table 4 – Class: CIM_ElementCapabilities..... 17
 69 Table 5 – Class: CIM_RegisteredProfile 17

70

71

Foreword

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

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

76 The authors wish to acknowledge the following people:

77 Editors:

- 78 • Michael Johanssen – IBM
- 79 • Ron Goering – IBM

80 Contributors:

- 81 • Gareth Bestor – IBM
- 82 • Ron Goering – IBM
- 83 • Daniel Hiltgen –VMware Inc.
- 84 • Ron Doyle – IBM
- 85 • Rene Schmidt – VMware Inc.
- 86 • Steffen Grarup – VMware Inc.
- 87 • Hemal Shah – Broadcom
- 88 • Fred Maciel – Hitachi Ltd.
- 89 • Lawrence Lamers – VMware Inc.
- 90 • Andreas Maier – IBM
- 91 • John Parchem – Microsoft Corporation
- 92 • George Ericson – EMC
- 93 • Oliver Benke – IBM
- 94 • John Leung – Intel Corporation
- 95 • James Fehlig – Novell
- 96 • Nihar Shah – Microsoft Corporation
- 97 • Shishir Pardikar – Citrix Systems Inc.
- 98 • Stephen Schmidt – IBM
- 99 • Mark Hapner – Sun Microsystems
- 100 • Dave Barrett – Emulex
- 101 • John Suit – Fortisphere
- 102 • Jeff Wheeler – Cisco
- 103 • Mark Johnson – IBM
- 104 • Carl Waldsburger – VMware Inc.

105

Introduction

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

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

112

Generic Device Resource Virtualization Profile

113 1 Scope

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

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

120 2 Normative References

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

124 2.1 Approved References

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

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

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

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

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

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

137 3 Terms and Definitions

138 For the purposes of this document, the following terms and definitions apply. For the purposes of this
139 document, the terms and definitions given in [DSP1033](#) and [DSP1001](#) also apply.

140 3.1

141 can

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

143 3.2

144 cannot

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

- 146 **3.3**
147 **conditional**
148 indicates requirements to be followed strictly to conform to the document when the specified conditions
149 are met
- 150 **3.4**
151 **mandatory**
152 indicates requirements to be followed strictly to conform to the document and from which no deviation is
153 permitted
- 154 **3.5**
155 **may**
156 indicates a course of action permissible within the limits of the document
- 157 **3.6**
158 **need not**
159 indicates a course of action permissible within the limits of the document
- 160 **3.7**
161 **optional**
162 indicates a course of action permissible within the limits of the document
- 163 **3.8**
164 **referencing profile**
165 indicates a profile that owns the definition of this class and can include a reference to this profile in its
166 "Referenced Profiles" table
- 167 **3.9**
168 **shall**
169 indicates requirements to be followed strictly to conform to the document and from which no deviation is
170 permitted
- 171 **3.10**
172 **shall not**
173 indicates requirements to be followed strictly to conform to the document and from which no deviation is
174 permitted
- 175 **3.11**
176 **should**
177 indicates that among several possibilities, one is recommended as particularly suitable, without
178 mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
- 179 **3.12**
180 **should not**
181 indicates that a certain possibility or course of action is deprecated but not prohibited
- 182 **3.13**
183 **unspecified**
184 indicates that this profile does not define any constraints for the referenced CIM element or operation
- 185 **3.14**
186 **allocated resource**
187 the partitioned or virtual resource that has been allocated to a consumer based on the associated
188 resource allocation

189 **3.15**
 190 **host resource**
 191 a device or computing resource contained by the host system that may be allocated with either exclusive
 192 or shared access through the host system to provide resources to a resource pool or consumer

193 **3.16**
 194 **host system**
 195 the scoping system containing resources that may be allocated and/or virtualized

196 **3.17**
 197 **virtual computer system**
 198 a virtual system as applied to a computer system
 199 Other common industry terms for such a system include virtual machine, hosted computer, child partition,
 200 logical partition, domain, guest, and container.

201 **3.18**
 202 **virtual resource**
 203 the instantiation of the allocated resource that is exposed to a consumer through a logical device

204 **4 Symbols and Abbreviated Terms**

205 The following abbreviations are used in this document.

206 **4.1**
 207 **RASD**
 208 CIM_ResourceAllocationSettingData

209 **5 Synopsis**

210 **Profile Name:** *Generic Device Resource Virtualization*
 211 **Version:** 1.0.0
 212 **Organization:** DMTF
 213 **CIM Schema Version:** 2.22
 214 **Specializes:** *Resource Allocation Profile* and *Allocation Capabilities Profile*
 215 **Central Class:** CIM_ResourcePool
 216 **Scoping Class:** CIM_System

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

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

221 **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

222 6 Description

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

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

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

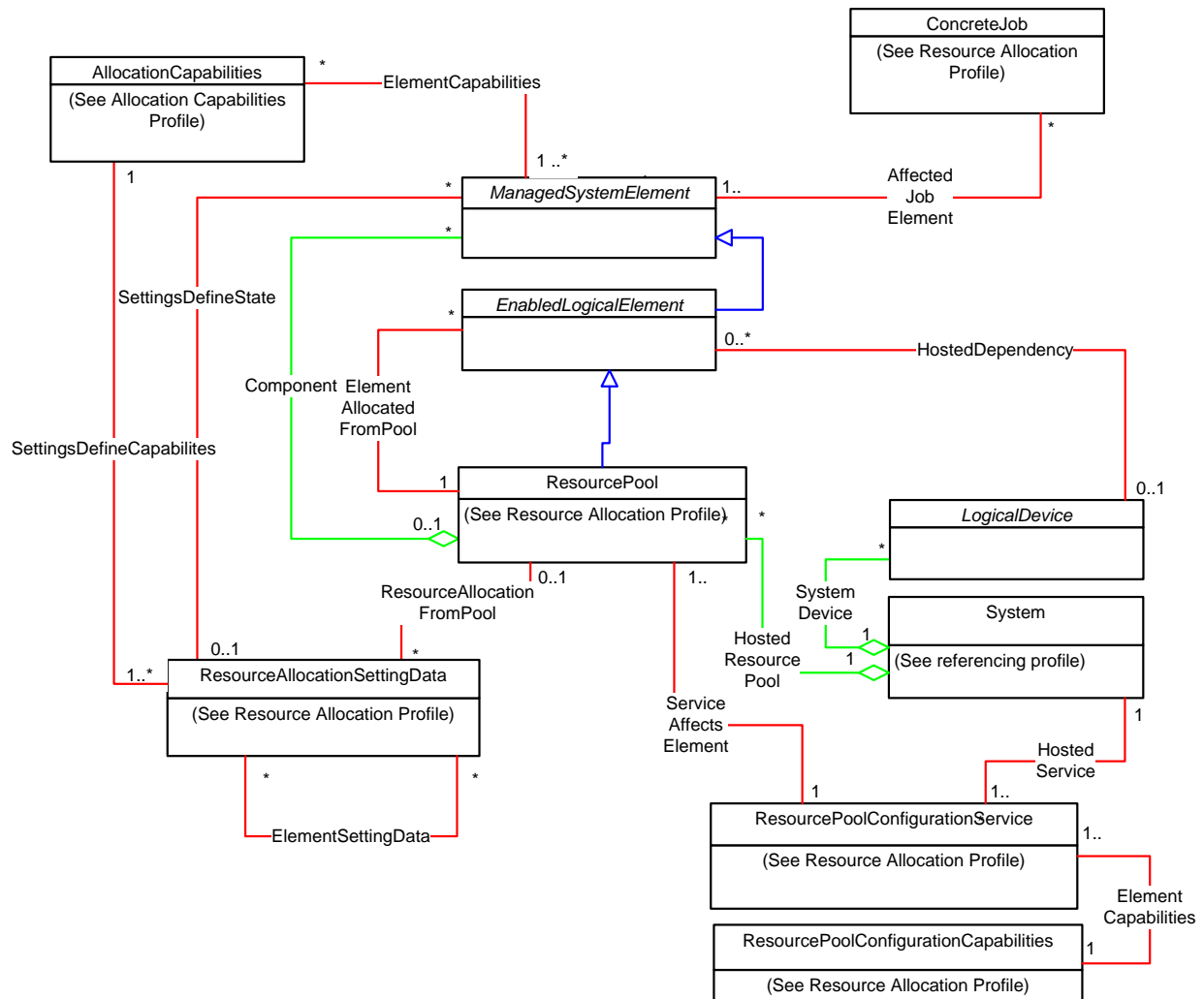


Figure 1 – Generic Device Resource Virtualization Profile: Class Diagram

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.

241 7 Implementation

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

244 7.1 Resource Allocation Profile

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

248 7.2 Allocation Capabilities Profile

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

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

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

262 7.3 Resource Type

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

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

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

271 8 Methods

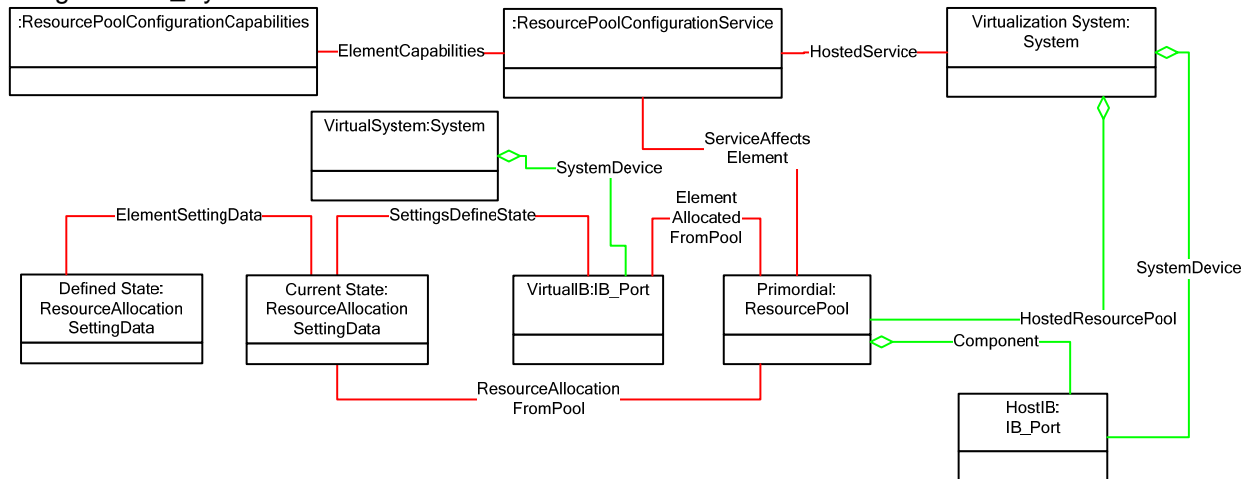
272 The requirements for operations and methods are defined in the *Resource Allocation Profile* and the
273 *Allocation Capabilities Profile*.

274 **9 Use Cases**

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

277 **9.1 Object Diagrams**

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



281

282

Figure 2 – Simple Virtual Device Allocation

283 **9.2 Determining Conforming Resource Types**

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

286 **9.2.1 Determining Resource Types in Implementations Using Central Class Registration
 287 Methodology**

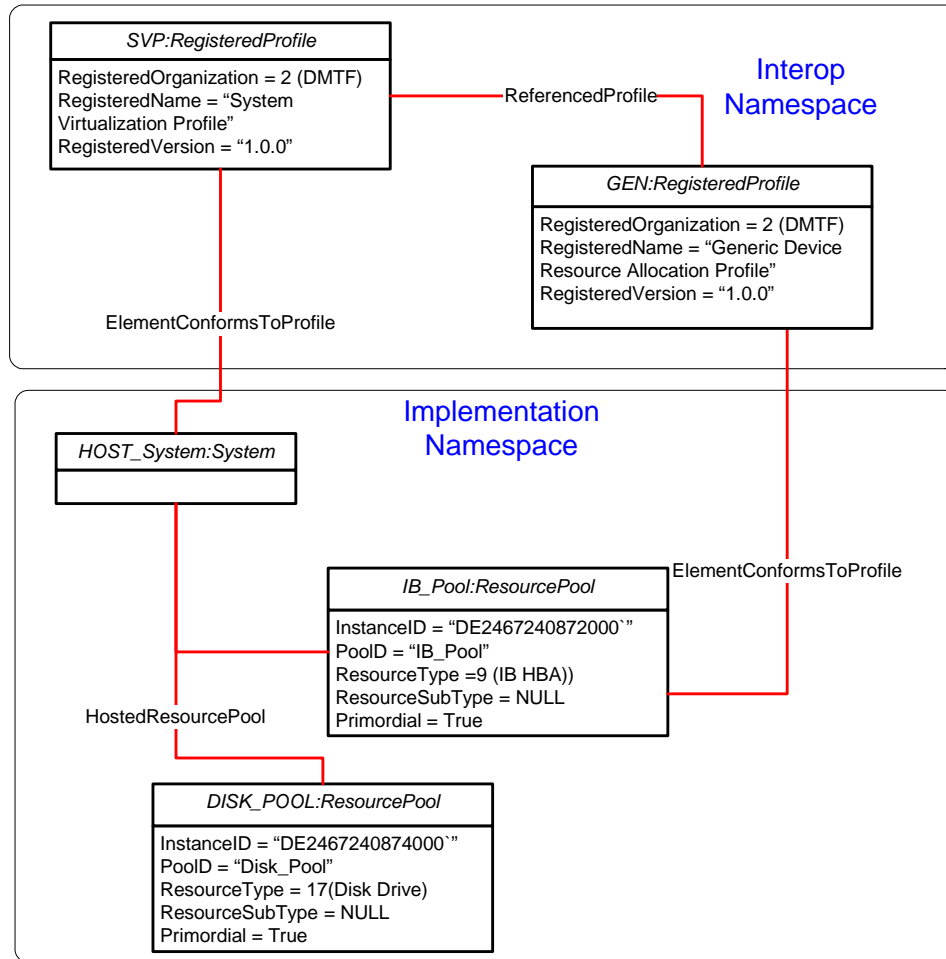
288 This use case assumes that the client knows the reference that refers to an instance of the
 289 CIM_RegisteredProfile class, which represents an implementation of this profile.

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

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

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

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



300

301

Figure 3 – Profile Registration Using Central Class

302 9.2.2 Determining Resource Types in Implementations Using Scoping Class 303 Registration Methodology

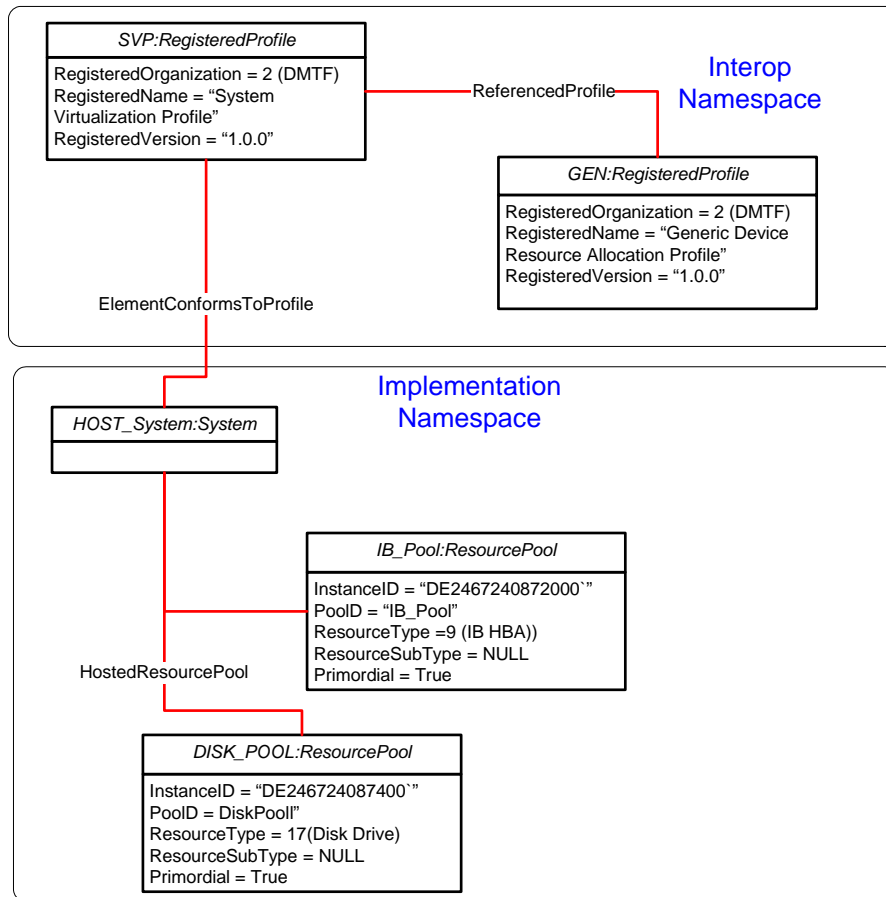
304 This use case assumes that the client knows the reference that refers to an instance of the
305 CIM_RegisteredProfile class that represents an implementation of this profile. There are no
306 CIM_ElementConformsToProfile associations from this instance of CIM_RegisteredProfile.

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

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

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

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



326

327

Figure 4 – Profile Registration Using Scoping Class

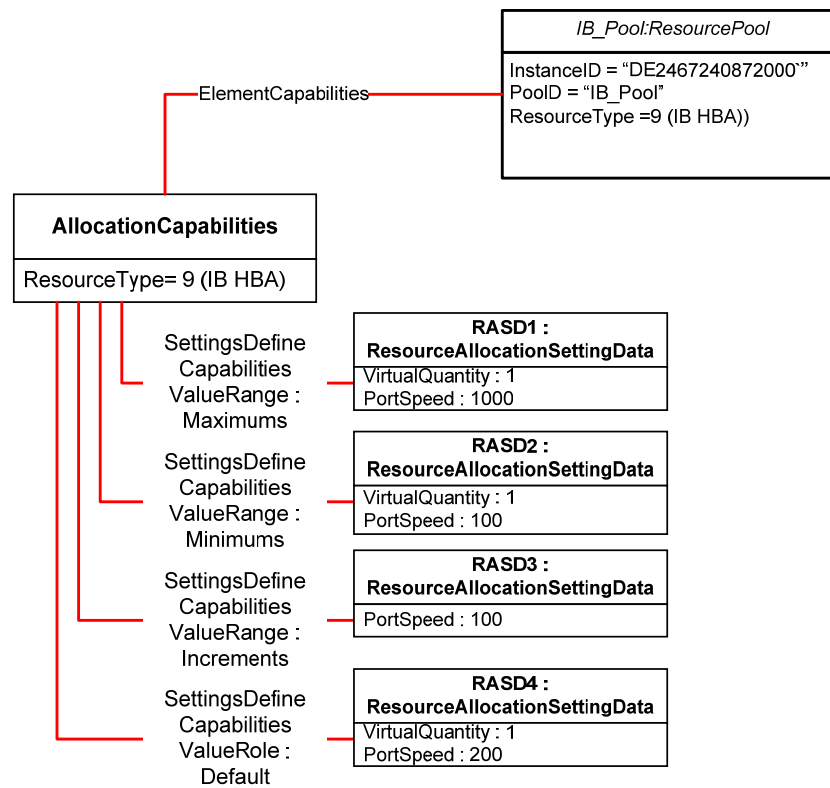
328 **9.3 Determining Resource Capabilities**

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

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

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

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



342

343

Figure 5 – Determining Resource Capabilities

344 10 CIM Elements

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

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

352

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		

353 **10.1 CIM_AllocationCapabilities**

354 CIM_AllocationCapabilities represents the allocation capabilities of a resource pool.

355 Table 3 provides information about the properties of CIM_AllocationCapabilities.

356 **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

357 **10.2 CIM_ElementCapabilities**

358 CIM_ElementCapabilities associates an instance of CIM_AllocationCapabilities with CIM_ResourcePool.

359 Table 4 defines the properties of CIM_ElementCapabilities.

360 **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	

361 **10.3 CIM_RegisteredProfile**

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

365 **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).

366

367
368
369
370

(informative)

Change Log

371

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

372
373