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Cloud Infrastructure Management Interface - Common Information Model (CIMI-CIM)

A CIM Representation of the CIMI model

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FIGURES

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Foreword

66 This document is a deliverable from the DMTF Cloud Management Working Group. It defines a CIM
67 representation for the Cloud Infrastructure Management Interface [CIMI] logical model. See the CIMI
68 specification [CIMI] for more information. This document assumes that the reader is familiar with the
69 concepts defined in the CIM Infrastructure Specification 2.6 (DSP0004).

70 *Note to reader: The CIMI specification can currently be found on the DMTF Work In Progress*
71 *portal:*

72 <http://dmf.org/standards/wip>

73 *When these specifications become standards, they will be located at an official URI per DMTF*
74 *publication processes.*

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146 **1 Scope**

147 This document makes use of the common meta-model used by CIM, the Common Information Model to
148 describe the CIMI logical model. This is defined in DSP004, **CIM Infrastructure Specification 2.6**

149 **2 References**

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

153 DMTF DSP0263, Cloud Infrastructure Management Interface (CIMI) Model and REST Interface over
154 HTTP, An Interface for Managing Cloud Infrastructure version 1.0.0d,
155 http://www.dmtf.org/standards/published_documents/DSP0263_1.0.0d.pdf.

156 DMTF DSP0004, Common Information Model (CIM) Infrastructure version 2.6,
157 http://www.dmtf.org/standards/published_documents/DSP0004_2.6.pdf

158 **3 Terms and Definitions**

159 **3.1**

160 **CIM (Common Information Model)**

161 CIM (Common Information Model) defined by DSP0004 as:

- 162 1. The name of the meta-model used to define schemas (e.g., the CIM schema or extension
163 schemas).
- 164 2. The name of the schema published by the DMTF (i.e., the CIM schema).

165 This specification describes the translation between the CIM meta-model and CIMI Resources.

166 **3.2**

167 **CIM Schema**

168 The schema published by the DMTF that defines the Common Information Model. It is divided into a core
169 model and a common model. Extension schemas are defined outside of the DMTF and are not
170 considered part of the CIM schema.

171 **3.3**

172 **MOF (Managed Object Format)**

173 A DMTF defined language used to create CIM metamodel conformant representations of model elements.
174 The Managed Object Format (MOF) is an Interface Definition Language (IDL) based on ISO/IEC
175 14750:1999. ANNEX A of the CIM Infrastructure specification (see DSP0004), provides a complete
176 description, of the MOF language.

177 **4 CIMI CIM Translation**

178 Transformation of the CIMI CIM into CIM metamodel conformant representations enables access of the
179 services defined by CIMI in CIM based environments. Such environments encompass a broad range of
180 supported operating systems, languages, platforms, protocols, and other technologies.

181 This specification describes transformations in a manner that enables any CIM metamodel conformant
182 representation. This document will utilize MOF for examples of such transformations.

183 4.1 CIM Formal Model

184 CIM representations of model resources are independent of access protocol and implementation
185 technologies.

186 The use of CIM representations enables CIMI resources to be managed together with other key cloud
187 foundation resources such as storage, virtual machines, hardware, and operating systems that are also
188 use CIM representations.

189 A conformant CIMI CIM Service provider shall provide CIM representations of CIMI resources that are
190 consistent with the formal definitions of the CIMI model according to the transformations described in this
191 specification.

192 The DMTF provides MOF representations of CIMI resources that are transformed according to this
193 specification.

194 NOTE Although some of the CIMI CIM classes correspond to existing CIM schema, for example CIMI_Job, no
195 attempt has been made to derive from the CIM schema at this point.

196 *Note to reader: The MOF files can currently be found on the DMTF Work In Progress portal:*

197 <http://dmf.org/standards/wip>

198 *When these specifications become standards, they will be located at an official URI per DMTF*
199 *publication processes.*

200 4.2 Translation Rules

201 The following sections define normative rules for translating between the CIMI resources as defined in the
202 Cloud Infrastructure Management Interface [CIMI](#) and their representation in CIM. Though all examples
203 are represented using MOF format, this is only one of the formats that can be used to represent CIM
204 class definitions.

205 4.2.1 Common Resource Attributes

206 All addressable, non-association, CIMI resources defined in CIM derive from a common class named
207 CIMI_BaseElement. This class defines the common attributes that are shared by all CIMI resources as
208 described in [CIMI](#) section 5.7.1. Complex attributes (as defined in section 4.3.4) and Association classes
209 (as defined in section 4.3.5) do not derive from CIMI_BaseElement.

210 The class definition for CIMI_BaseElement shall contain a property for each Attribute defined in [CIMI](#)
211 section 5.7.1. These properties shall be derived using the Attribute translation rules defined in section
212 4.3.3, except as noted below.

213 The “id” attribute shall be represented as a property of type string. The “id” property shall have the “Key”
214 qualifier associated with it. This property will act as the key property for all instances of CIMI classes.

215 See section 5 for a non-normative reference of the MOF representation of CIMI_BaseElement.

216 4.2.2 Resource Metadata

217 Resource metadata defined in [CIMI](#) section 5.11 shall be defined in CIM following the rules defined below
218 in sections 4.3.3. For the purposes of this document, resource metadata is information about provider-
219 defined constraints, capabilities, or features. Resource metadata shall be represented in the same way as
220 any other resource.

221 4.2.3 Resource Translation Rules

222 The rules described in this section produce a non-association class definition and some number of
223 auxiliary structure and association definitions for each resource defined in [CIMI](#). The CIM classes
224 represented by the MOF files in section 5 conform to these rules.

225 Each CIMI resource is translated first to a CIM class definition (see). This will result in the definition of
226 that class and some number other auxiliary structure, class, and association class definitions.

227 4.2.3.1 Class definitions

228 The schema name for non-association class definitions shall be “CIMI” and the class name for each
229 resource shall be the Name of the resource as defined in [CIMI](#) and separated by an underscore, “_”. For
230 example, define the resource named Machine in CIM with the class name CIMI_Machine.

231 Each non-association class in CIM shall inherit from CIMI_BaseElement, which defines the common
232 attributes as specified in [CIMI](#) section 5.7.1.

233 The following CIM qualifiers apply to each class definition.

234 **Table 4-1: Qualifiers for non-association classes**

CIM Qualifier	Value
Description	Text following the heading of the clause that defines the resource in the CIMI specification.
UMLPackagePath	According to the following ABNF: "CIMI:" resourceName Where resourceName is the name of the corresponding CIMI resource.
Version	The version of the CIMI specification

235 Each top-level attribute of the corresponding CIMI resource is translated either into a property of the CIM
236 class representing the resource or into a CIM association class definition. This decision is based on the
237 following:

- 238 1) If the attribute has a simple type, then it translates to a CIM property with a primitive type, see
239 4.2.3.1.
- 240 2) If the attribute is a reference or a collection, then it translates to a CIM association class (see
241 4.2.3.2).
- 242 3) If the attribute is a complex type that does not directly contain references, it translates to a CIM
243 structure property, see 4.2.3.6
- 244 4) If the attribute is a complex type that directly or indirectly contains references, it translates to a CIM
245 association class (see 4.2.3.2) The CIM class definition shall not contain methods to represent Read,
246 Update, Create or Delete Operations as these are intrinsic operations.

247 Each Operation in [CIMI](#) that is not an intrinsic operation listed above shall be included as a method in
248 the CIM class definition. The method name in CIM shall be the link URL as defined in [CIMI](#) with the
249 prefix “http://www.dmtf.org/cimi/action/” removed. For example, the Operation supported by the
250 Machine resource that is defined in [CIMI](#) with the link http://www.dmtf.org/cimi/action/start is defined
251 in CIM with a method named start.

252 4.2.3.2 Association class definitions

253 As specified above, create an association class either if the property of the CIMI resource is a reference,
254 a collection, or if it is defined with an internal table that includes a reference or collection.

255 In all cases, the association class name shall be the concatenation of “CIMI”, an underscore, “_”, the
 256 name of the resource as defined in [CIMI](#) and the corresponding CIMI attribute name with an initial capital
 257 letter. For example, the association with the class name of CIMI_MachineNetwork (see 5.3.5).

258 The following CIM qualifiers apply to each association class definition.

259 **Table 4-2: Qualifiers for non-association classes**

CIM Qualifier	Value
Association	Must be specified first and with no value.
Description	Text following the heading of the clause that defines the CIMI attribute that is translated into the association class.
UMLPackagePath	According to the following ABNF: <code>"CIMI:" resourceName referenceName</code> Where <code>resourceName</code> is the name of the CIMI resource that defines the CIMI attribute that is translated into the association class and <code>referenceName</code> is the name of the CIMI attribute that caused creation of this association. The <code>referenceName</code> is specified with an initial capital letter.
Version	The version of the CIMI specification

260 If the CIMI attribute is a reference, collection, collection array, or reference array, include two reference
 261 properties (see 4.2.3.5) with the Key qualifier to the association class. The first is a reference to the CIM
 262 class representing the CIMI resource that included the reference or collection property. The description
 263 shall be "The referencing resource." The other is a reference to the CIM class corresponding to the
 264 referenced or collected CIMI resource. If the CIMI attribute is not an array, the Max qualifier shall be
 265 specified with a value of one (1). The description shall be the description of the original CIMI reference or
 266 collection attribute.

267 If the CIMI attribute is defined with an internal table, then start by adding reference properties (see
 268 4.2.3.5) to the association class. The first is a reference property with the key property set to the CIM
 269 class representing the CIMI resource that included the reference property. The description shall be "The
 270 referencing resource." Add the additional reference properties to the association class according to the
 271 following algorithm.

- 272 1) Simple properties are added as defined in 4.2.3.1.
- 273 2) Reference or collection properties are added as defined in 4.2.3.5. If the property is not an array,
 274 the Max qualifier shall be specified with a value of one (1). If the CIMI attribute is specified with
 275 consumer support mandatory, then the Key qualifier shall be included.
- 276 3) If the attribute is a complex type that does not directly contain references, it translates to a CIM
 277 structure property (see 4.2.3.6).
- 278 4) If the attribute is a complex type that directly or indirectly contains references, it translates to
 279 reference property (see 4.2.3.5) to a new CIM class (see 4.2.3.1).
 - 280 a. Add a reference property to the association class that references that new class. The
 281 Max qualifier shall be one (1) if the CIMI attribute is not an array.
 - 282 b. If the CIMI specification specifies a name for this new resource (in square brackets within
 283 the CIMI attribute's type field), then that name is used for the new class, otherwise the
 284 name of the new resource is the containing resource name suffixed by the CIMI attribute
 285 name with an uppercase first letter. Treat the new class as if defined as a first level
 286 resource in the CIMI specification.

287 The result shall have at least two reference properties specified with the Key qualifier.

288 4.2.3.3 Structure definitions

289 The schema name for a structure definition shall be the name determined by creation of the structure
290 property (see 4.2.3.6).

291 Each non-association class in CIM shall inherit from CIMI_BaseElement, which defines the common
292 attributes as specified in [CIMI](#) section 5.7.1.

293 The following CIM qualifiers apply to each structure definition.

294 **Table 4-3: Qualifiers for structures**

CIM Qualifier	Value
Structure	Specify this qualifier with no arguments first
Indication	Specify this qualifier with no arguments second
Description	Modified version of text following the CIMI attribute that causes creation of this structure.
UMLPackagePath	According to the following ABNF: <pre>"CIMI:" resourceName</pre> Where resourceName is the name of the corresponding CIMI resource.
Version	The version of the CIMI specification

295 Each top-level attribute of the corresponding CIMI resource is translated either into a property of the CIM
296 class representing the resource or into a CIM association class definition. Structures defined because of
297 the rules in this specification will not contain references. The following rules apply:

- 298 1) If the attribute has a simple type, then it translates to a CIM property with a primitive type, see
299 4.2.3.1.
- 300 2) Otherwise, the attribute is a complex type, it translates to a CIM structure property, see 4.2.3.6

301 4.2.3.4 Simple Properties

302 The CIMI CIM model uses standard CIM types in the MOF files.

303 Table 4-4 defines the translation between CIMI and CIM primitive types.

304 **Table 4-4: Primitive Type mapping**

MOF	CIMI
datetime	DateTimeUTC
uint8	Integer
sint8	Integer
uint16	Integer
sint16	Integer
uint32	Integer
sint32	Integer
uint64	Integer
sint64	Integer
string	String
boolean	Boolean
real32	N/A
real64	N/A

305 The property name of a CIMI attribute with a primitive type shall be the same as the CIMI attribute name.
306 The property type shall be the CIM primitive type from

307 Table 4-4. There are multiple rows shown for CIMI integer type. The modeler may exercise judgment.
308 However if there is any doubt, sint64 should be chosen. If the CIMI specification shows the attribute as
309 an array, then the CIM property shall also be an array.

310 Table 4-5 defines qualifiers that apply to simple properties.

311 **Table 4-5: Primitive Property Qualifiers**

CIM Qualifier	Value
Description	The text provided in the description of the attribute.
Read	Specify this property with value False if the Consumer Constraints listed in the description specifies "write-only"
Required	Specify this qualifier with no value if the Provider Constraints listed in the description specifies support mandatory.
Values	Specify this value if the attribute type is string and the description includes the phrase, "Allowable values include:" The qualifier value is the array of strings specified by the highlighted values listed in the description. Each value shall be prefixed with "CIMI_"
Write	Specify this property with no value if the Consumer Constraints listed in the description specifies "read-write" or "write-only"

312 **4.2.3.5 Reference Properties**

313 As described above, some CIMI reference or collection attributes cause the creation of an association
 314 class definition. The remaining CIMI reference or collection attributes are modeled in CIM as reference
 315 properties. These have a type formed by the referenced or collected class name followed by the keyword
 316 "REF". The property name of a CIMI attribute with a reference or collection type shall be the same as the
 317 CIMI attribute name. Table 4-5 defines qualifiers that apply to reference properties.

318 **Table 4-6: Reference Property Qualifiers**

CIM Qualifier	Value
Key	If required by clause 4.2.3.2, this qualifier is specified first with no arguments
Description	The text provided in the description of the attribute
Min	Specify with a value if the minimum number of referenced instances is not 0
Max	Specify with a value if the maximum number of referenced instances is not unlimited
Read	Specify this property with value False if the Consumer Constraints listed in the description specifies "write-only"
Required	Specify this qualifier with no value if the Provider Constraints listed in the description specifies support mandatory.
Write	Specify this property with no value if the Consumer Constraints listed in the description specifies "read-write" or "write-only"

319 **4.2.3.6 Structure Properties**

320 The property name of a CIMI attribute with a structure type shall be the same as the CIMI attribute name.
 321 If the CIMI attribute lists a type name in square brackets, then that name prefixed with "CIMI_" shall be
 322 the type name for the CIM property. Otherwise, the type name shall be "CIMI_" followed by the name of
 323 the resource, followed by the name of the CIMI attribute with upper-case first letter. In both cases, create
 324 a structure definition (see 4.2.3.3) with that name using the information from the CIMI table associated
 325 with the CIMI attribute.

326 If the CIMI specification shows the attribute as an array, then the CIM property shall also be an array.

327 Table 4-7: Structure Property Qualifiers defines qualifiers that apply to structure properties.

328

Table 4-7: Structure Property Qualifiers

CIM Qualifier	Value
Description	The text provided in the description of the attribute.
Read	Specify this property with value False if the Consumer Constraints listed in the description specifies "write-only"
Required	Specify this qualifier with no value if the Provider Constraints listed in the description specifies support mandatory.
Values	Specify this value if the attribute type is string and the description includes the phrase, "Allowable values include". The qualifier value is the array of strings specified by the highlighted values listed in the description. Each value shall be prefixed with "CIMI_"
Write	Specify this property with no value if the Consumer Constraints listed in the description specifies "read-write" or "write-only"

329 5 CIMI CIM MOF Representation Examples

330 The following sections shows examples of CIMI entities represented as CIM MOF classes.

331 The normative CIM meta-model representations are published by the DMTF at the URI below. The
332 representations are published in MOF, XSD and other formats.

333 *Note to reader: The URIs listed in the examples may not work due to the Work In Progress*
334 *status of this document. The files can currently be found on the DMTF Work In Progress portal:*

335 <http://dmtf.org/standards/wip>

336 *When these specifications become standards, they will be located at an official URI per DMTF*
337 *publication processes.*

338 The following non-normative copies of the MOF files are provided for illustration. Where any differences
339 occur between the published MOF files and the copies below, the published MOF files shall be
340 considered authoritative.

341 The Cloud Infrastructure Management Interface classes are defined in a schema with the prefix CIMI and
342 derived from a common root class CIMI_BaseElement, which does not derive from any DMTF standard
343 CIM schema class. In order to facilitate this translation, a set of common structures is defined which are
344 reused in the CIM meta-model expression of CIMI.

345 5.1 Classes

346 5.1.1 CIMI_BaseElement

347 Defined in: CIMI_BaseElement.mof

```

348 [Abstract, Version ( "0.0.1" ),
349   UMLPackagePath ( "CIMI::BaseElement" ),
350   Description ( "Common properties for all CMWG classes" )]
351 class CIMI_BaseElement {
352
353   [Key, Description (
354     "The unique identifier of this resource; assigned upon "
355     "resource creation. This attribute value is immutable, and "
356     "should be unique in the providers cloud." )]
357   string uri;
358
359   [Description (
```

```

360         "The human readable name of this resource; assigned by the "
361         "creator as a part of the resource creation input." )]
362     string name;
363
364     [Description (
365         "The human readable description of this resource; assigned "
366         "by the creator as a part of the resource creation input." )]
367     string description;
368
369     [Description (
370         "The timestamp when this resource was created. The format "
371         "should be unambiguous, and the value is immutable" )]
372     datetime created;
373 };

```

374 5.1.2 CIMI_Machine

375 Defined in: CIMI_Machine.mof

```

376     [Version("0.0.1"),
377     Description(
378         "An instantiated compute resource that encapsulates both CPU and Memory."),
379     UMLPackagePath ( "CIMI::Machine" )]
380 Class CIMI_Machine : CIMI_BaseElement {
381     [Required,
382     Description(
383         "The operational state of the Machine. "
384         "Allowable values include: "
385         "CREATING: The Machine is in the process of being created. "
386         "Allowable action when in this state is: delete. "
387         "STARTING: The Machine is in the process of being started. "
388         "Allowable actions when in this state are: start, restart, "
389         "stop, and delete. "
390         "STARTED: The Machine is available and ready for use. Allowable actions "
391         "when in this state are: stop, restart, pause, suspend, capture, "
392         "and delete. "
393         "STOPPING: The Machine is in the process of being stopped. Allowable "
394         "actions when in this state are: start, restart, stop, and delete. "
395         "STOPPED: This value is the virtual equivalent of powering off a physical "
396         " Machine. There is no saved CPU or memory state. Allowable actions when "
397         "in this state are: start, restart, capture, and delete. "
398         "PAUSING: The Machine in the process of being PAUSED. Allowable actions "
399         "when in this state are: start, restart, and delete. "
400         "PAUSED: In this state the Machine and its virtual resources remain "
401         "instantiated and resources remain allocated, similar to the STARTED "
402         "state, but the Machine and its virtual resources are not enabled to "
403         "perform tasks. Allowable actions when in this state are: start, restart, "
404         "capture, and delete. "
405         "SUSPENDING: The Machine is in the process of being suspended. Allowable "
406         "actions when in this state are: start, restart, and delete. "

```

```

407     "SUSPENDED: In this state the Machine and its virtual resources are stored "
408     "on non-volatile storage. The Machine and its resources are not enabled to "
409     "perform tasks. Allowable actions when in this state are: start, restart, "
410     "capture, and delete. "
411     "DELETING: The Machine is in the process of being deleted. Allowable "
412     "action when in this state is: delete. "
413     "ERROR: The Provider has detected an error in the Machine. Allowable "
414     " actions when in this state are: start, restart, stop, and delete. "
415     "PAUSED and SUSPENDED states are optional and Providers may choose to "
416     "support them or not. "
417     "Providers may define additional values.")
418     Values{"CIMI_CREATING","CIMI_STARTING","CIMI_STOPPING","CIMI_STOPPED",
419           "CIMI_PAUSING","CIMI_PAUSED","CIMI_SUSPENDING",
420           "CIMI_SUSPENDED","CIMI_DELETING","CIMI_ERROR",
421           "CIMI_PAUSED","CIMI_SUSPENDED"}]
422     String state;
423
424     [Description("The amount of CPU that this Machine has.")]
425     Uint32 cpu;
426
427     [Required,
428     Description(
429         "The size of the memory (RAM) allocated to this Machine. "
430         "When this value is increased, it implies that the Machine is allocated "
431         "more RAM, and vice versa when the value is decreased. "
432         "This attribute has the following sub-attributes that serve to describe "
433         "it:"),
434     EmbeddedInstance("CIMI_MachineMemory")]
435     String memory;
436
437     [Description (
438         "The list of disks (local storage) that are part of the Machine. Adding an "
439         " element to this list creates a disk. "
440         "Each disk in the collection has the following attributes, which describe "
441         "aspects of the disk:"),
442     EmbeddedInstance("CIMI_Disk")]
443     String disks;
444
445     [Description(
446         "The CPU architecture that will be supported by Machines created by using "
447         "this configuration. "
448         "Allowable values include: 68000, Alpha, ARM, Itanium, MIPS, PA_RISC, "
449         "POWER, PowerPC, x86, x86_64, z/Architecture, SPARC. Providers may define "
450         "additional values.")]
451     String cpuArch;
452 };

```

453 **5.2 Structure**454 **5.2.1 CIMI_DiskCapacity**

455 Defined in: CIMI_DiskCapacity.mof

```

456 [Structure, Indication,
457     Version("0.0.1"),
458     Description("")]
459 CIMI_DiskCapacity {
460
461     [Required,
462         Description("A numerical quantity expressed as an integer.")]
463     Uint32 quantity;
464
465     [Required,
466         Description(
467             "An enumerated value that expresses the unit of measurement used. "
468             "Allowable values are byte, kilobyte, megabyte, gigabyte, terabyte, "
469             "petabyte, exabyte, zettabyte, and yottabyte.")
470     ]
471     String units;
472 };

```

472 **5.2.2 CIMI_Disk**

473 Defined in: CIMI_Disk.mof

```

474 [Structure, Indication,
475     Version("0.0.1"),
476     Description(
477         "The size of the memory (RAM) allocated to this Machine. "
478         "When this value is increased, it implies that the Machine is allocated more "
479         "RAM, and vice versa when the value is decreased. "
480         "This attribute has the following sub-attributes that serve to describe it:")]
481 CIMI_Disk {
482
483     [Required,
484         Description(
485             "The initial capacity of the disk described by this attribute. This "
486             "property is an (unnamed) structure that has the following "
487             "sub-attributes."),
488         EmbeddedInstance("CIMI_DiskCapacity")]
489     String capacity;
490
491     [Description(
492         "Operating System specific location(path) in its namespace where this disk "
493         "will first appear. Note, once deployed Consumers might move where this "
494         "Disk is located. "
495         "Support of this attribute indicates that the Provider can report this "

```



```
496         "information back to the Consumer.")]
497     String initialLocation;
498 };
```

499 5.2.3 CIMI_MachineMemory

500 Defined in: CIMI_MachineMemory.mof

```
501     [Structure, Indication,
502         Version("0.0.1"),
503         Description("")]
504 CIMI_MachineMemory {
505
506     [Required,
507         Description("A numerical quantity expressed as an integer."),
508         Uint32 quantity;
509
510     [Required,
511         Description(
512             "An enumerated value that expresses the unit of measurement used. "
513             "Allowable values are byte, kibibyte, mebibyte, gibibyte, tebibyte, "
514             "pebibyte, exbibyte, zebibyte, and yobibyte.")
515         String units;
516 };
```

517 5.3 Associations

518 5.3.1 CIMI_MachineEventLog

519 Defined in: CIMI_MachineEventLog.mof

```
520     [Association,
521         Version("0.0.1"),
522         Description(""),
523         UMLPackagePath ( "CIMI::Machine" ) ]
524 CIMI_MachineEventLog {
525
526     [Key,
527         Description("")]
528     CIMI_Machine machine;
529
530     [Key,
531         MAX(1),
532         Description("A reference to the EventLog of this Machine.")]
533     CIMI_EventLog eventLog;
534 };
```

535 5.3.2 CIMI_MachineLatestSnapshot

536 Defined in: CIMI_MachineLatestSnapshot.mof

```
537 [Association,  
538     Version("0.0.1"),  
539     Description(""),  
540     UMLPackagePath ( "CIMI::Machine" )]  
541 CIMI_MachineLatestSnapshot {  
542  
543     [Key,  
544         Description("")]  
545     CIMI_Machine machine;  
546  
547     [Key, MAX(1),  
548         Description(  
549             "A reference to the SNAPSHOT representing the latest state captured for "  
550             "this Machine (either most recent Snapshot or the last Snapshot reverted "  
551             "to). \n"  
552             "NOTE Snapshot is a MachineImage.")]  
553     CIMI_MachineImage latestSnapshot;  
554 };
```

555 5.3.3 CIMI_MachineNetworkInterfaces

556 Defined in: CIMI_MachineNetworkInterfaces.mof

```

557 [Association,
558     Version("0.0.1"),
559     Description(
560         "A list of resources that define the network interfaces on this Machine."),
561     UMLPackagePath ( "CIMI::Machine" )]
562 CIMI_MachineNetworkInterfaces {
563
564     [Key, Description("")]
565     CIMI_Machine machine;
566
567     [Key,
568     Description(
569         "A list of references to the Addresses for this network interface.")]
570     CIMI_Address addresses;
571
572     [Key,
573     Description("A reference to a Network for this network interface")]
574     CIMI_Network network;
575
576     [Description(
577         "A reference to the NetworkPort for this network interface. "
578         "If this attribute is provided, the \"network\" attribute in the "
579         "referenced NetworkPort shall have the same value as the 'network' "
580         "attribute in this networkInterface")]
581     CIMI_NetworkPort networkPort;
582
583     [Required,
584     Description(
585         "The state of an interface configurable to be 'Active' or 'Passive'. "
586         "A passive interface is in a standby mode ready to forward traffic if "
587         "the primary interface fails.")]
588     String state;
589
590     [Description(
591         "Address assigned by the hypervisor when a machine is created or a unique "
592         "address can be manually assigned. "
593         "While this attribute can be specified, in most cases it is expected to "
594         "be supplied by the Provider. Specifying this value is typically only done "
595         "when the Template is only used for one particular Machine.")]
596     String macAddress;
597
598     [Description(
599         "To set the largest supported packet size.")]
600     Uint32 maxTransmissionUnit;
601 };

```

602 5.3.4 CIMI_MachineSnapshots

603 Defined in: CIMI_MachineSnapshots.mof

```
604 [Association,  
605     Version("0.0.1"),  
606     Description(""),  
607     UMLPackagePath ( "CIMI::Machine" )]  
608 CIMI_MachineSnapshots {  
609  
610     [Key,  
611         Description("")]  
612     CIMI_Machine machine;  
613  
614     [Key,  
615         Description(  
616             "A list of references to the SNAPSHOT Machine Images taken of this "  
617             "Machine.")]  
618     CIMI_MachineImage     snapshots;  
619 };  
620  
621  
622 [Association, Version("0.0.1"), Description("")]  
623 CIMI_MachineMeters {  
624 [Key, Description("")]  
625 CIMI_Machine machine;  
626  
627 [Key, Description("A list of references to Meters monitored for this Machine.")]  
628 CIMI_Meter     meters;  
629 };
```

630 5.3.5 CIMI_MachineVolumes

631 Defined in: CIMI_MachineVolumes.mof

```
632 [Association,
633     Version("0.0.1"),
634     Description(
635         "The list of networked volumes that are connected to this Machine. "
636         "Adding a Volume to this list means that the Machine has some access to the "
637         "data on the Volume. Removing a Volume from this list means that the Machine "
638         "no longer has access to the data on the Volume. "
639         "Each volume in the collection has the following attributes, which describe "
640         "aspects of the way in which the Machine is connected to the Volume:"),
641     UMLPackagePath ( "CIMI::Machine" )]
642 CIMI_MachineVolumes {
643
644     [Key, Description("")]
645     CIMI_Machine machine;
646
647     [Key, Description("Reference to the Volume that will be connected.")]
648     CIMI_Volume volume;
649
650     [Key, Description(
651         "Operating System specific location(path) in its namespace where this "
652         "Volume will first appear. Note, once deployed Consumers might move where "
653         "this Volume is located. "
654         "Support of this attribute indicates that the Provider can report this "
655         "information back to the Consumer.")]
656     String initialLocation;
657 };
```

658
659
660

ANNEX A (informative) Change log

Version	Date	Description
1.0.0a	09/07/2011	Released as a Work in Progress
1.0.0b	06/13/2012	Released as a Work in Progress

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