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Information technology — Sustainability for and by information technology — Smart data centre resource monitoring and control

Technologies de l'information — Durabilité pour et par les technologies de l'information — Surveillance des ressources et contrôle des centres de données intelligents

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

ISO/IEC 19395 was prepared by Ecma International (as ECMA-400) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Introduction

Operation of data centres requires management of storage, computation, communication, electrical energy and temperature to achieve the required quality of service and efficiency parameters. Often, however, the separate management of Information Technology (IT), electrical energy (or power) and cooling Resource islands yields a sub-optimal result.

This International Standard provides Messages that facilitate integrated or "smart" monitoring and control of Resources in those islands. The Messages are exchanged between the Management Function and Resources. The International Standard acknowledges that those Resources may be composed of other Resources (e.g. a rack may contain servers, ventilators, etc.). In addition, e.g. those servers may be viewed from their computing, energy consumption or dissipation aspects which this International Standard models as Resource Components and groups into IT, power and fluid Domains, respectively.

Information technology — Sustainability for and by information technology — Smart data centre resource monitoring and control

1 Scope

In the Smart Data Centre, Management Functions monitor and control Resources. Resources model IT and facility equipment, systems and components in a data centre. To monitor and control the Resources' Properties, Management Functions exchange command, response or event Messages with Resources, see Figure 1.

Figure 1 — Scope

Resources are made up out of Resource Components which this second edition shares Properties with classes in Common Information Models (CIM). Messages refer to Resources and their Properties. Messages are encoded in XML and exchanged in HTTP primitives.

Figure 1 illustrates the functionality that this second edition adds as described above.

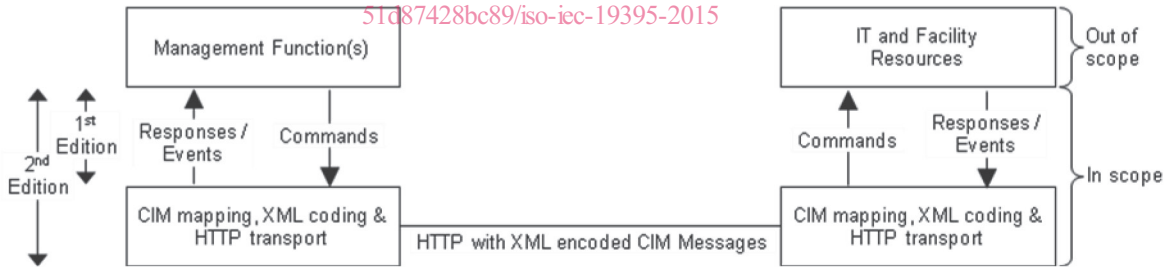

Figure 2 — Functionality that second edition adds

Management Function(s), Resources, IT & facility equipment, systems and components themselves are out of scope as illustrated in Figure 1, Figure 2 and Figure 3. Static information such as location, addressing of Resources and CPU models are out of scope as well.

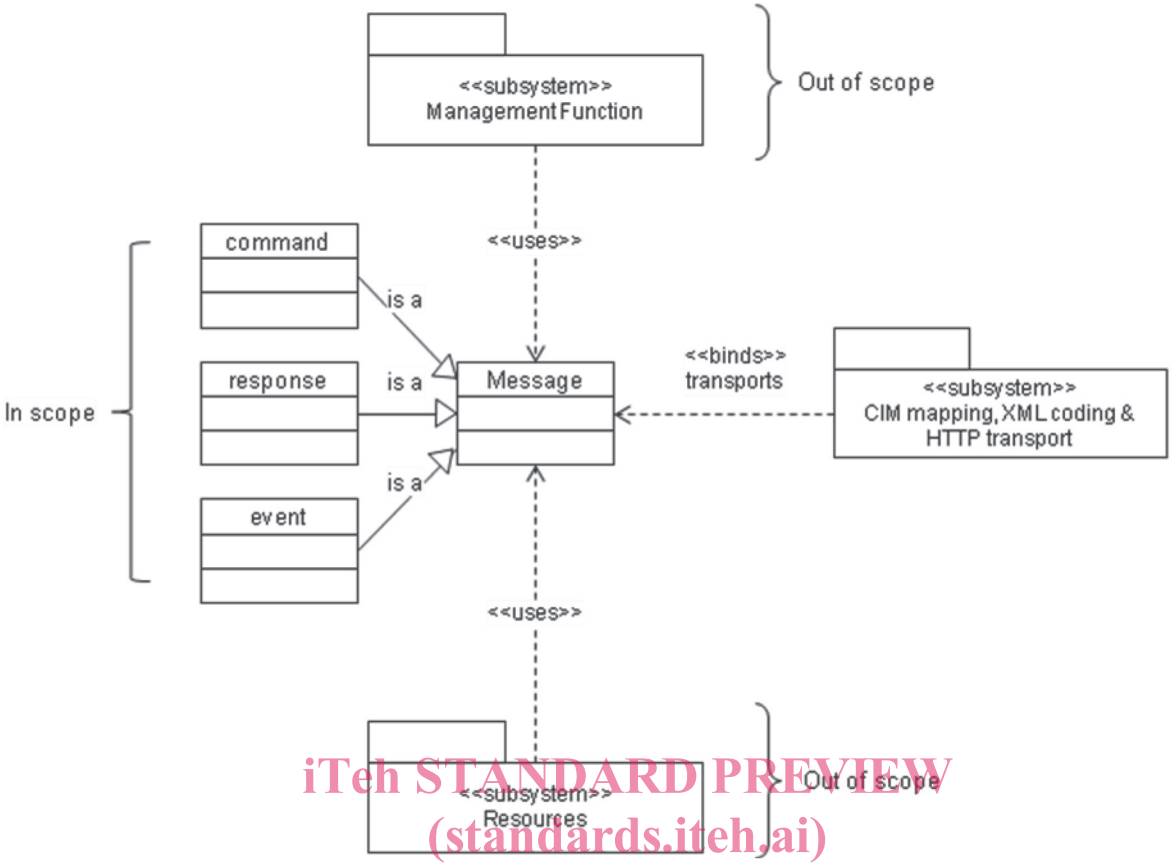

Figure 3 — detailed scope using CIM (UML Notation)

2 Conformance

Conformant Management Functions monitor and control Properties (Clause 6) of Resources using Messages as specified in Clause 7.

In response to the commands, conformant responses and events from Resources use the Messages as specified in Clause 7.

Any of the Resource configurations specified in Annex A may optionally be implemented, in addition to any other configuration using any combination of Resources and Resource Components.

3 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.

DMTF, "CIM Schema", http://dmtf.org/standards/cim

DMTF DSP0004, "CIM Infrastructure Specification"

DMTF DSP0200, "CIM Operations over HTTP"

DMTF DSP1009, "Sensors Profile"

DMTF DSP1011, "Physical Asset Profile"

DMTF DSP1014, “Ethernet Port Profile”

DMTF DSP1022, “CPU Profile”

DMTF DSP1027, “Power State Management Profile”

DMTF DSP1029, “OS Status Profile”

DMTF DSP1033, “Profile Registration Profile”

DMTF DSP1035, “Host LAN Network Port Profile”

DMTF DSP1042, “System Virtualization Profile”

DMTF DSP1044, “Processor Resource Virtualization Profile”

DMTF DSP1045, “Memory Resource Virtualization Profile”

DMTF DSP1047, “Storage Resource Virtualization Profile”

DMTF DSP1052, “Computer System Profile”

DMTF DSP1053, “Base Metrics Profile”

DMTF DSP1057, “Virtual System Profile”

DMTF DSP1081, “Virtual System Migration Profile”

4 Terms, definitions and acronyms

For the purposes of this document, the following terms, definitions and acronyms apply.

4.1
Common Information Model
CIM

4.2
CIM Client
emitter of CIM message requests and consumer of CIM message responses

4.3
CIM Listener
consumer of events

4.4
CIM message request
command or event request

4.5
CIM message response
response

4.6
condition query
expression on property value

4.7
Distributed Management Task Force
DMTF

Note 1 to entry: DMTF's URL is http://www.dmtf.org/

4.8
domain
set of resource components

4.9
event description indication filter
set of conditions and associated parameters

4.10
Information Technology
IT

4.11
CIM message
command, response or event

4.12
Management Function
MF

4.13
property
resource attribute

4.14
Resource Component
RC

4.15
CIM Resource
representation of IT and facility equipment, systems or components

4.16
Smart Data Centre
SDC
arrangement of all the resources and management function(s)

5 Domains

5.1 Introduction

This International Standard specifies Resource Components (RC) which share Properties with CIM classes, to compose Resource configurations as specified in Figure 3. The Resource Components are grouped into IT, power, fluid and base Domains.

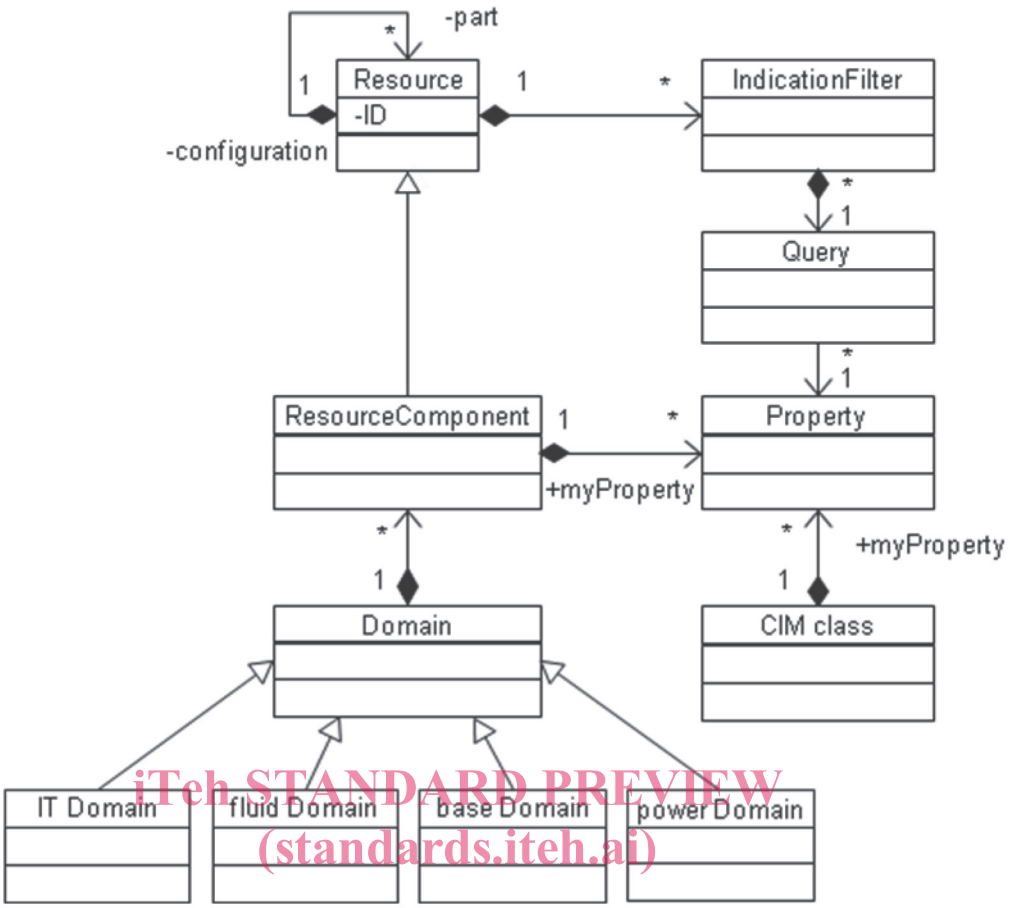

Figure 4 — Resource and Resource Component

In tables in this Clause, the Key indicates the identifier which shall be unique in the SDC namespace as specified in *Common Information Model (CIM) Infrastructure Specification* (DSP0004). The Key uniquely identifies each instance.

5.2 Base Domain

To construct the foundation of Resources, Resource Components from the base Domain shall be used.

5.2.1 CIM_System

See *CIM Schema*.

5.2.2 CIM_BaseMetricDefinition

See *Base Metrics Profile* (DSP1053). TimeScope is optional in DSP1053 whereas in this International Standard, TimeScope is mandatory.

5.2.3 CIM_BaseMetricValue

The requirements in *Base Metrics Profile* (DSP1053) and those in Table 1 apply.

Table 1 — Class: CIM_BaseMetricValue

Properties	M/O*1	Requirements on Value
TimeStamp	Mandatory	In case the device generating the metric instances does not have a clock device, the TimeStamp value shall be "99990101000000.000000+000" in case the base metric definition time scope requires that the TimeStamp value is not NULL. "99990101000000.000000+000" is used to indicate that the DateTime property value is not valid.
Volatile	Mandatory	TRUE
*1 "M/O" indicates "mandatory or optional."		

5.2.4 CIM_MetricDefForME

CIM_MetricDefForME shall be used to associate CIM_BaseMetricDefinition to SDC_FluidMeasurementPoint. The requirements in *Base Metrics Profile* (DSP1053) and those in Table 2 apply.

If the CIM_BaseMetricDefinition class is implemented, CIM_MetricDefForME shall be also implemented.

Table 2 — Class: CIM_MetricDefForME

Properties	M/O	Requirements on value
Antecedent	Mandatory	**Key**: Shall be a reference to SDC_FluidMeasurementPoint with Cardinality 1 indicating one reference
Dependent	Mandatory	**Key**: Shall be a reference to CIM_BaseMetricDefinition with Cardinality 1..* indicating one or more references
MetricCollectionEnabled	Optional	

5.2.5 CIM_MetricInstance

CIM_MetricInstance shall be used to associate CIM_BaseMetricValue instances to CIM_BaseMetricValue instances. See *Base Metrics Profile* (DSP1053).

If the CIM_BaseMetricDefinition class is implemented, CIM_MetricInstance shall be also implemented.

5.2.6 CIM_RegisteredProfile

The requirements in *Profile Registration Profile* (DSP1033) and those in Table 3 apply.

Table 3 — Class: CIM_RegisteredProfile

Properties	M/O	Requirements on value
RegisteredName	Mandatory	"CoolingSystem"
RegisteredVersion	Mandatory	"1.0.0"
RegisteredOrganization	Mandatory	1 (Others)
OtherRegisteredOrganization	Mandatory	"Ecma_TGG"

5.2.7 CIM_SystemDevice

CIM_SystemDevice association shall be used to associate SDC_FluidElement with the CIM_System instance of which it is a member. The requirements in *CIM Schema* and those in Table 4 apply.