INTERNATIONAL STANDARD

ISO/IEC 11179-3

Second edition
2003-02-15

Information technology — Metadata registries (MDR) —

Part 3: Registry metamodel and basic attributes

Technologies de l'information — Registres de métadonnées (MDR) — Partie 3: Métamodèle de registre et attributs de base

Reference number
ISO/IEC 11179-3:2003(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 11179-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

This second edition cancels and replaces the first edition (ISO/IEC 11179-3:1994), which has been technically revised.

ISO/IEC 11179 (first edition) consists of the following parts, under the general title *Information technology — Specification and standardization of data elements*:

— *Part 1: Framework for the specification and standardization of data elements*

— *Part 2: Classification for data elements*

— *Part 3: Registry metamodel and basic attributes*

— *Part 4: Rules and guidelines for the formulation of data definitions*

— *Part 5: Naming and identification principles for data elements*

— *Part 6: Registration of data elements*

NOTE ISO/IEC 11179 is currently being revised under the general title *Information technology — Metadata registries (MDR)*. The part titles may also change in the process.

Introduction

Data processing and electronic data interchange rely heavily on accurate, reliable, controllable and verifiable data recorded in databases. A prerequisite for correct and proper use and interpretation of data is that both users and owners of data have a common understanding of the meaning and representation of the data. To facilitate this common understanding, a number of characteristics, or attributes, of the data have to be defined. These characteristics of data are known as “metadata”, that is, “data that describes data”. This part of ISO/IEC 11179 provides for the attributes of data elements and associated metadata to be specified and registered as metadata items in a *Metadata Registry*.

The structure of a *Metadata Registry* is specified in the form of a conceptual data model. The *Metadata Registry* is used to keep information about data elements and associated concepts, such as “data element concepts”, “conceptual domains” and “value domains”. Generically, these are all referred to as “metadata items”. Such metadata are necessary to clearly describe, record, analyse, classify and administer data.

When considering data and metadata, it is important to distinguish between types of data/metadata, and instances of these types. Clause 4 of this part of ISO/IEC 11179 specifies the types of metadata objects that form the structure of a *Metadata Registry*. A *Metadata Registry* will be populated with instances of these metadata objects (metadata items), which in turn define types of data, e.g. in an application database. In other words, instances of metadata specify types of application level data. In turn, the application database will be populated by the real world data as instances of those defined data types.

NOTE ISO/IEC 10027:1990 IRDS Framework explains the concepts of different levels of modelling.

This part of ISO/IEC 11179 also describes the basic attributes of metadata items for purposes where a complete *Metadata Registry* is not appropriate.

This part of ISO/IEC 11179 is of interest to information developers, information managers, data administrators, standards developers and others who are responsible for making data understandable and shareable. ISO/IEC 11179 has broad applicability across subject area domains and information technologies.

Information technology — Metadata registries (MDR) —

Part 3:
Registry metamodel and basic attributes

1 Scope

The primary purpose of ISO/IEC 11179-3 is to specify the structure of a *Metadata Registry* (see 1.1). ISO/IEC 11179-3 also specifies basic attributes which are required to describe metadata items, and which may be used in situations where a complete metadata registry is not appropriate (e.g. in the specification of other International Standards) (see 1.2).

1.3 identifies aspects not currently addressed.

1.4 provides examples of activities where ISO/IEC 11179-3 may be applied.

1.1 Scope – Structure of a Metadata Registry

A comprehensive *Metadata Registry* management function requires a set of rules and procedures. These rules and procedures are set out in the following Clauses and Annexes and are complemented elsewhere in this document as follows:

a) the definitions of metadata objects are in Clause 3.3 of this part of ISO/IEC 11179;

b) the structure of the registry in the form of a conceptual data model is in Clause 4 of this part of ISO/IEC 11179;

Aspects of the registry are expanded on in other parts of ISO/IEC 11179, as follows:

a) the overall framework for this family of International Standards is specified in ISO/IEC 11179-1;

b) rules and guidelines for classifying metadata are in ISO/IEC 11179-2;

c) rules and guidelines for the formulation of definitions are in ISO/IEC 11179-4;

d) naming and identifying principles for metadata are in ISO/IEC 11179-5;

e) rules and guidelines for registering metadata are in ISO/IEC 11179-6.

While the model diagrams are presented in UML notation, this part of ISO/IEC 11179 does not assume nor endorse any specific system environment, database management system, database design paradigm, system development methodology, data definition language, command language, system interface, user interface, computing platform, or any technology required for implementation. This part of ISO/IEC 11179 does not directly apply to the actual use of data in communications and information processing systems.

1.2 Scope – Basic attributes of metadata items

This part of ISO/IEC 11179 also specifies basic attributes which are required to describe metadata items, and which may be used in situations where a complete *Metadata Registry* is not appropriate (e.g. in the specification of other International Standards). These basic attributes are described in Clause 5.

1.3 Scope – Aspects not currently addressed

This part of ISO/IEC 11179 does not currently support the following requirements;

a) Complex data structures, encapsulation, stereotyping and inheritance;

b) Ability to enforce uniqueness of names within a Context;

c) Specification of Naming Conventions for a Context;

d) Designations other than names (e.g. icons);

e) Specification of Time in addition to Date;

f) Prescribed conceptual domains and value domains for the attributes in the metamodel;

g) Registration of XML documents or XML schemas;

h) Application Programming Interfaces (APIs) and associated bindings to access a registry;

i) Multilingual support, except for names and definitions;

j) Cultural adaptability.

It is anticipated that some or all of these requirements will be addressed in future editions of this part of ISO/IEC 11179, or in companion standards or technical reports.

1.4 Areas of Applicability

This part of ISO/IEC 11179 applies to activities including:

a) the definition, specification and contents of metadata registries, including interchanging or referencing among various collections of data elements;

b) the design and specification of application-oriented data models, databases and message types for data interchange;

c) the actual use of data in communications and information processing systems;

d) interchange or reference among various collections of metadata.

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.

ISO 31-0, *Quantities and units — Part 0: General principles*

ISO 639-2:1998, *Codes for the representation of the names of languages — Part 2: Alpha-3 code*

ISO 1087-1:2000, *Terminology work — Vocabulary — Part 1: Theory and application*

ISO/IEC 2382-1:1993, *Information technology — Vocabulary — Part 1: Fundamental terms*

ISO/IEC 2382-17:1999, *Information technology — Vocabulary — Part 17: Databases*

ISO 3166-1:1997, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 5127:2001, *Information and documentation — Vocabulary*

ISO/IEC 6523-1:1998, *Information technology — Structure for the identification of organization and organization parts — Part 1: Identification of organization identification schemes*

ISO/IEC 6523-2:1998, *Information technology — Structure for the identification of organization and organization parts — Part 2: Registration of organization identification schemes*

ISO 8601:2000, *Data elements and interchange formats — Information exchange — Representation of dates and times*

ISO/IEC 11179-1, *Information technology — Specification and standardization of data elements — Part 1: Framework for the specification and standardization of data elements*

ISO/IEC 11179-2, *Information technology — Specification and standardization of data elements — Part 2: Classification for data elements*

ISO/IEC 11179-4, *Information technology — Specification and standardization of data elements — Part 4: Rules and guidelines for the formulation of data definitions*

ISO/IEC 11179-5, *Information technology — Specification and standardization of data elements — Part 5: Naming and identification principles for data elements*

ISO/IEC 11179-6, *Information technology — Specification and standardization of data elements — Part 6: Registration of data elements*

ISO/IEC 11404:1996, *Information technology — Programming languages, their environments and system software interfaces — Language-independent datatypes*

ISO 12620:1999, *Computer applications in terminology — Data categories*

ISO/IEC 19501-1:2002, *Information technology — Unified Modeling Language (UML) — Part 1: Specification*

3 Definitions

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

3.1 defines metamodel constructs, used in specifying the registry metamodel.

3.2 lists broader terms, and their definitions, used in this document that are not included in either 3.1 or 3.3.

3.3 defines metadata objects prescribed by the metamodel itself.

An alphabetical list of terms from all three Clauses is provided in Annex A.

3.1 Definitions of Metamodel Constructs

This subclause defines the metamodel constructs used in specifying the registry metamodel in Clause 4.

3.1.1
association
⟨metamodel⟩ a semantic **relationship** between two **classes**

NOTE An **association** is a type of **relationship**.

[Adapted from ISO/IEC 19501-1:2001, 2.5.2.3]

3.1.2
association class
⟨metamodel⟩ an **association** that is also a **class**

NOTE It not only connects a set of **class**es, but also defines a set of features that belong to the **relationship** itself.

[Adapted from ISO/IEC 19501-1:2001, 2.5.2.4]

3.1.3
attribute
⟨metamodel⟩ a **characteristic** of an **object** or **entity**

3.1.4
class
⟨metamodel⟩ a description of a set of **object**s that share the same **attribute**s, operations, methods, **relationship**s, and semantics

[ISO/IEC 19501-1:2001, 2.5.2.9]

3.1.5
composite attribute
⟨metamodel⟩ an **attribute** whose **datatype** is non-atomic

3.1.6
composite datatype
⟨metamodel⟩ a **datatype** that is also a **class**

NOTE A **composite datatype** is used as a **datatype** for a **composite attribute**.

3.1.7
generalization
⟨metamodel⟩ a **relationship** between a more general **class** (the parent) and a more specific **class** (the child) that is fully consistent with the first **class** (i.e. it has all of its **attributes** and **relationships**) and that adds additional information.

NOTE A **generalization** is a type of **relationship**.

[Adapted from ISO/IEC 19501-1:2001, 2.5.2.24]

3.1.8
identifier (in **Metadata Registry**)
⟨metamodel⟩ a sequence of characters, capable of uniquely identifying that with which it is associated, within a specified context

NOTE A name should not be used as an identifier because it is not linguistically neutral.

3.1.9
relationship (in **registry metamodel**)
⟨metamodel⟩ a connection among model elements

NOTE In ISO/IEC 11179-3, a relationship is either an **association** or a **generalization**.

[ISO/IEC 19501-1:2001, 2.5.2.36]

3.2 Broad Terms used in this part of ISO/IEC 11179

3.2.1
attribute instance
a specific instance of an **attribute**

NOTE Amended from ISO 2382-17:1993 (17.02.13) to distinguish an instance of an attribute from its value.

3.2.2
attribute value
the value associated with an **attribute instance**

NOTE Amended from ISO 2382-17:1993 (17.02.13) to distinguish an instance of an attribute from its value.

3.2.3
basic attribute
an **attribute** of a **metadata item** commonly needed in its specification

3.2.4
binding
a mapping from one framework or specification to another

3.2.5
characteristic
abstraction of a property of an **object** or of a set of objects

NOTE Characteristics are used for describing **concepts**.

[ISO 1087-1:2000, 3.2.4]

3.2.6
common attribute
a **basic attribute** that is applicable to all types of metadata item

3.2.7
common facility (of **Metadata Registry**)
a facility provided by a **Metadata Registry** that is applicable to all types of **Administered Item** within the registry.

NOTE The common facilities specified in this edition of ISO/IEC 11179-3 are:

— Administration and identification (see 4.8)

— Naming and definition (see 4.9)

— Classification (see 4.10).

3.2.8
conceptual data model
a **data model** that represents an abstract view of the real world

3.2.9
conditional
required under certain specified conditions

NOTE 1 One of three obligation statuses applied to the attributes of metadata items, indicating the conditions under which the attribute is required. See also **mandatory** (3.2.17) and **optional** (3.2.28).

NOTE 2 Obligation statuses apply to metadata items with a Registration Status of "recorded" or higher.

3.2.10
data
a re-interpretable representation of information in a formalized manner suitable for communication, interpretation or processing

NOTE Data can be processed by human or automatic means.

[ISO/IEC 2382-1:1998, 01.01.02]

3.2.11
data model
a graphical and/or lexical representation of data, specifying their properties, structure and inter-relationships

3.2.12
definition
representation of a concept by a descriptive statement which serves to differentiate it from related concepts

[ISO 1087-1:2000, 3.3.1]

NOTE See also **Definition (of Administered Item)** (3.3.58).

3.2.13
designation
representation of a concept by a sign which denotes it

[ISO 1087-1:2000, 3.4.1]

NOTE See also **Designation (of Administered Item)** (3.3.67) and **name** (3.2.27).

3.2.14
entity

any concrete or abstract thing that exists, did exist, or might exist, including associations among these things

EXAMPLE A person, object, event, idea, process, etc…

NOTE Please observe that an entity exists whether data about it are available or not.

[ISO/IEC 2382-17:1999, 17.02.05]

3.2.15
extension
<11179-3> a feature not defined by ISO/IEC 11179-3

<registry metamodel> a **class**, an **attribute** or a **relationship** that an implementation of a **Metadata Registry** provides that is not defined by ISO/IEC 11179-3

3.2.16
language
system of signs for communication, usually consisting of a vocabulary and rules

[ISO 5127:2001, 1.1.2.01]

3.2.17
mandatory
always required

NOTE 1 One of three obligation statuses applied to the attributes of metadata items, indicating the conditions under which the attribute is required. See also **conditional** (3.2.9) and **optional** (3.2.28).

NOTE 2 Obligation statuses apply to metadata items with a Registration Status of "recorded" or higher.

3.2.18
metadata
data that defines and describes other **data**

3.2.19
metadata item
an instance of a **metadata object**

NOTE 1 In all parts of ISO/IEC 11179, this term is applied only to instances of metadata objects described by the metamodel in Clause 4 of ISO/IEC 11179-3. Examples include instances of Data Elements, Data Element Concepts, Permissible Values etc.

NOTE 2 A metadata item has associated attributes, as appropriate for the metadata object it instantiates.

3.2.20
metadata object
an object type defined by a metamodel

NOTE In all parts of ISO/IEC 11179, this term is applied only to metadata objects described by the metamodel in Clause 4 of ISO/IEC 11179-3. Examples include Data Elements, Data Element Concepts, Permissible Values etc. See 3.3 for a complete list.

3.2.21
metadata register
the information store or database maintained by a **Metadata Registry**

3.2.22
Metadata Registry
MDR
an information system for registering **metadata**

NOTE The associated information store or database is known as a **metadata register**.

3.2.23
metadata set
any collection of **metadata**

3.2.24
metamodel
a **data model** that specifies one or more other data models

3.2.25
metamodel construct
a unit of notation for modelling

NOTE The metamodel constructs used in ISO/IEC 11179-3 are defined in 3.1.

3.2.26
name
the **designation** of an object by a linguistic expression

NOTE See also **name (of Administered Item)** (3.3.83)

3.2.27
object
anything perceivable or conceivable

NOTE Objects may also be material (e.g. an engine, a sheet of paper, a diamond), immaterial (e.g. a conversion ratio, a project plan) or imagined (e.g. a unicorn).

[Adapted from ISO 1087-1:2000, 3.1.1]