DRAFT INTERNATIONAL STANDARD ISO/DIS 24156-1

ISO/TC **37**/SC **1** Secretariat: **SAC**

Voting begins on **2013-02-11** Voting terminates on **2013-05-11**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Graphic notations for concept modeling in terminology work and its relationship with UML —

Part 1:
Guidelines for using UML and mind-mapping notation in terminology work

Lignes directrices pour l'application de la notation UML dans le travail terminologique —

Partie 1: Directives pour l'application de la notation UML dans le travail terminologique

[Revision of first edition (ISO 24156:2008)]

ICS 01.020

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 shall not be held responsible for identifying any or all such patent rights.

ISO 24156-1 was prepared by Technical Committee ISO/TC 37, *Terminology and other language and content resources*, Subcommittee SC 1, *Principles and methods*.

This second edition cancels and replaces the first edition (ISO TR 24156:2008), [clause(s) / subclause(s) /table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO 24156 consists of the following parts, under the general title *Graphic notations for concept modelling in terminology work*:

— *Part 1: Guidelines for using UML notation in terminology work*

— *Part [2]: ISO/NP TR 24156-2, Graphic notations for concept modeling in terminology work -- Part 2: Guidelines for transforming the content of terminology management systems into UML information models.*

Introduction

Terminology work combines elements from many theoretical approaches which concern processing, ordering, and presentation of knowledge. The basic method of terminology work is concept analysis, which aims to achieve a comprehensive description and presentation of concepts in a subject field. Traditionally the results of concept analysis in terminology are presented in the form of one or more concept diagrams and a set of terms with textual definitions.

In object-oriented programming, graphic techniques are used to describe entity types which are characterised by certain properties and behaviour. The Unified Modeling Language (UML) is a widely spread language which can be used for all kinds of object modelling (information modelling, data modelling, etc.).

This International Standard describes the application of UML symbols by creating a user-defined UML profile for presenting the results of concept analysis. This UML profile re-uses UML symbols to represent the terminological principles of ISO 1087-1 and ISO 704. This is not meant to become a replacement for traditional concept diagrams, but should be considered as an alternative and supplementary notation. This International Standard is meant to promote the use of concept analysis when developing concept diagrams or concept models, information models and data models.

The core text describes the recommendations for use of UML. Annex A contains a table of correspondence between concepts of ISO 1087-1 and suggested representation in UML.

ISO/IEC 19501 is referenced in this International Standard. In ISO/IEC 19501 there is no "Terms and definitions" clause. Instead, every UML concept is described in the normative text and in a glossary. When a reference to ISO/IEC 19501 is given in the "Terms and definitions" clause, the definition given in this International Standard is adapted from the descriptive text in ISO/IEC 19501. Therefore, the definition is noted "Adapted from ISO/IEC 19501".

Graphic notations for concept modelling in terminology work — Part 1: Guidelines for using UML notation in terminology work

1 Scope

This International Standard gives guidelines for using a subset of UML, to represent the results of concept analysis. It describes how object modelling techniques can be used for this purpose. A UML profile designed for this purpose is used to represent concepts and concept relations in terminology work.

This International Standard does not describe UML and its general use in depth. These matters are covered in e.g. ISO/IEC 19501.

This International Standard does not describe the principles and methods of terminology work. This is covered in ISO 704.

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 704, *Terminology work – Principles and methods*

ISO 690 (all parts), *Information and documentation — Bibliographic references*

ISO 1087-1, *Terminology Work – Vocabulary - Part 1: Theory and Application*

ISO 10241-1, *Terminological entries in standards -- Part 1: General requirements and examples of presentation*

ISO/IEC 19501, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1087-1 and the following apply.

3.1
concept model
concept diagram (ISO 1087-1:2000, 3.2.12) formed by means of a **formal language** (3.5)

3.2
concept model view
image of a defined part of a **concept model** (3.1)

3.3
concept system
set of concepts structured according to the relations among them

[SOURCE: ISO 1087-1:2000, 3.2.11]

3.4
constraint
semantic restriction of model elements

NOTE 1 to entry Adapted from ISO/IEC 19501

NOTE 2 to entry A constraint is used to restrict the possible options for a class or a relationship. In concept modelling, constraints can be used to show how relationships interact and how they are delimited.

EXAMPLE 1 There are two associative relations from a concept, but if one of them is present the other one is impossible [constraint {either}].

EXAMPLE 2 In a generic relation, no more specific concepts than those stated are possible [constraint {complete}].

3.5
formal language
language of which the rules are explicitly established before its use

NOTE 1 to entry A formal language is not meant to be spoken. Its purpose is to assure exact communication of information, e.g. between computer systems, and between man and computer.

EXAMPLE OWL.

3.6
multiplicity
constraint (3.4) which defines the number of occurrences that is allowed for the model element concerned

NOTE 1 to entry In concept modelling, multiplicity specifies how many objects depicted by a certain concept may have an associative relation with or form a part/whole of how many objects depicted by another concept.

EXAMPLE 1 A characteristic of a month is that it is a period of 28-31 days (28..31).

EXAMPLE 2 A mouse (pointing device) may or may not have a ball, depending on whether it is a mechanical or optical mouse. It has zero balls or one ball (0..1). In that case the multiplicity itself is a criterion of subdivision, as a mechanical mouse has exactly one ball (1).

NOTE 2 to entry Multiplicity applies to attributes as well, and specifies whether an attribute is obligatory or optional.

3.7
notation
a set of symbols, and the rules for their use, for the representation of data

[SOURCE: ISO/IEC 2382-5:1999, 05.01.01]

3.8
symbol
graphic representation of a concept that has meaning in a specific context

[SOURCE: ISO/IEC 2382-1:1993, 01.02.07]

4 Symbols and abbreviated terms

UML Unified Modeling Language

5 Mapping of terminological items to UML

5.1 General

This clause describes how concepts defined in ISO 1087-1 can be represented in concept modelling by means of a limited set of UML symbols. Features which are not described in this clause are outside the scope of this International Standard.

Each paragraph describes the principles according to which UML symbols can be used in concept modelling. In ISO 24156-1, UML symbols are only used as graphic representations, hence do not serve as equivalents between UML and ISO 1087-1 semantics.

Table A (Annex A) visualises ISO 1087-1 concepts and their corresponding UML symbols.

5.2 Concept

For the modelling of a concept, the UML class symbol (ISO/IEC 19501) can be adopted, which is a solid-outline rectangle displaying the class name. The UML class name is centered in boldface and with an initial uppercase character[1]. The designation (ISO 1087-1) of the concept in the user-defined UML profile is centered in boldface and lowercase, except for uppercase characters that constitute part of the normal spelling of the term in a running text (ISO 10241-1). This applies for individual concepts (ISO 1087-1) as well as for general concepts (ISO 1087-1).

UML (ISO/IEC 19501)	ISO 1087-1	ISO 24156-1 user-defined UML profile
Class	**concept**	**concept**
ClassName	**designation**	**designation**

Figure 1 — Class (Class name) & concept (designation)

5.3 Concept system

A **concept model** (see 3.1) is meant to depict and represent a **concept system** (see 3.3). A graphic tool may store the concept model in a **formal language** (see 3.5), making it possible to communicate, in a machine-readable format, the model with data modelling, information modelling and software development systems.

EXAMPLE Concept model for pointing devices". (see Figure 2).

[1] If the class name has more than one word name, the words are joined together and the initial character of every word is capitalized; for the designations, please refer to ISO 10241-1.

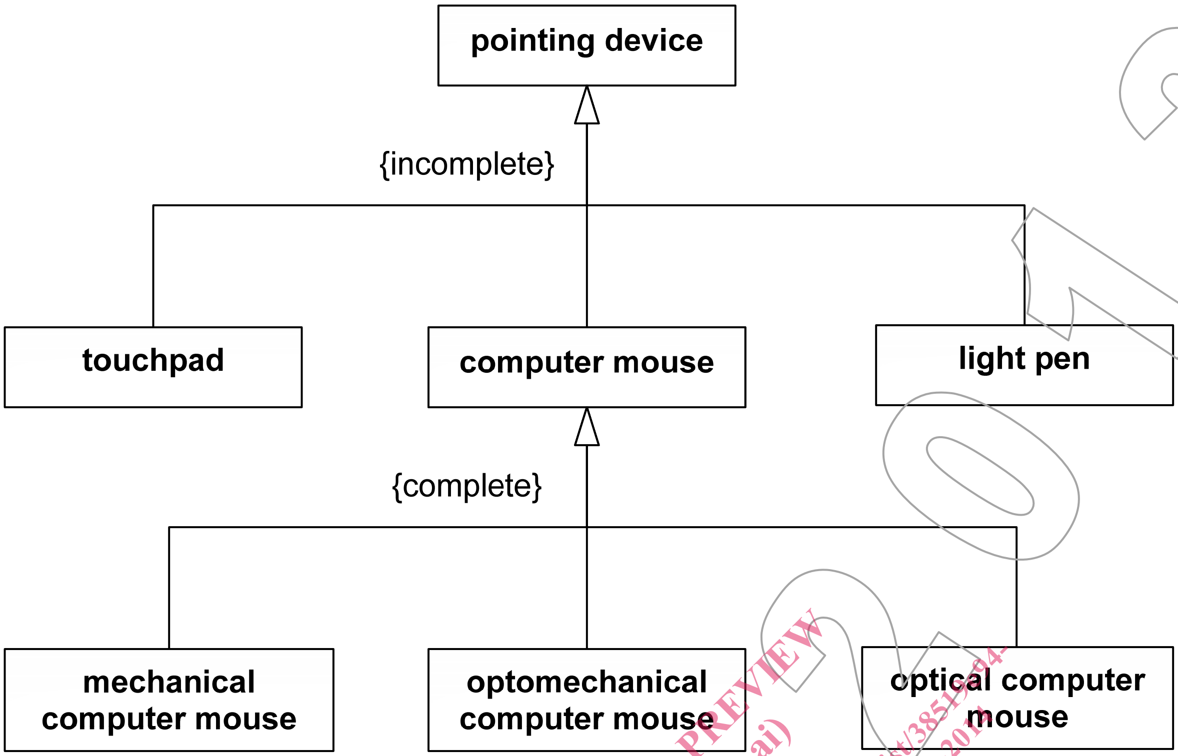
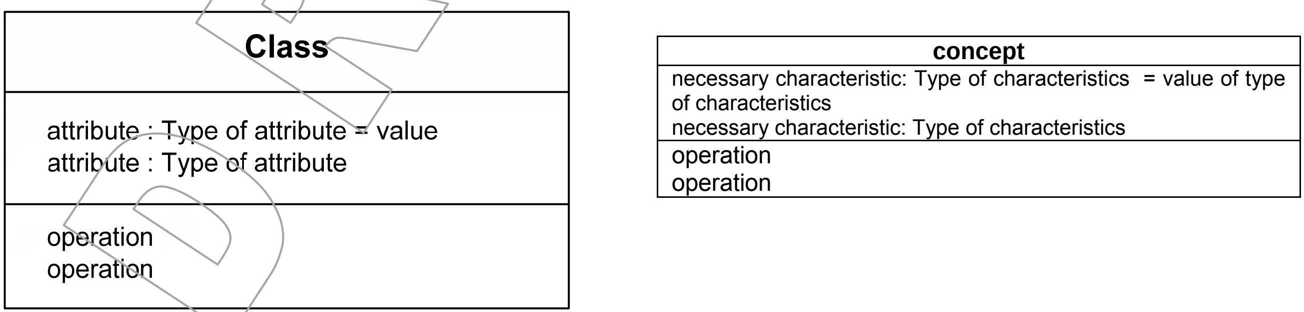


Figure 2 — Concept model for pointing devices that depicts generic relations

5.4 Attributes (generalisation) and characteristics (generic relation)

For concept modelling in UML, the UML class symbol is used (see Figure 1), which is a rectangle, in which the top compartment displays the class name (centered in boldface and capitalized), and the middle one a list of attribute names (left justified, plain face and lowercase), and attribute types (left justified, plain face and capitalized). A third compartment may show a list of operations. To convert the class symbol to an ISO compatible modelling template, a concept is modelled by a rectangle which has equally three compartments, with the top one displaying the designation (in accordance with ISO 10241-1), and the middle one displaying the necessary and delimiting characteristics. The UML string *attribute: Type of attribute = value* is converted into a *necessary characteristic: Type of characteristics = value of type of characteristics* string, and represents the delimiting characteristics. A third compartment may list an ISO equivalent of the UML operations.



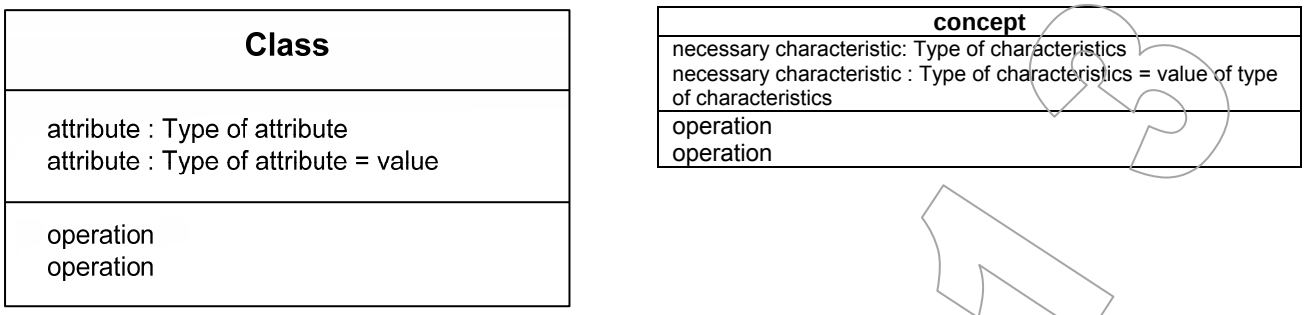


Figure 3 — Attributes and characteristics in UML & ISO 24156-1 user-defined UML profile

An ellipsis (...) may indicate that there are attributes/operations which are not shown in the concept model (see Figure 4).

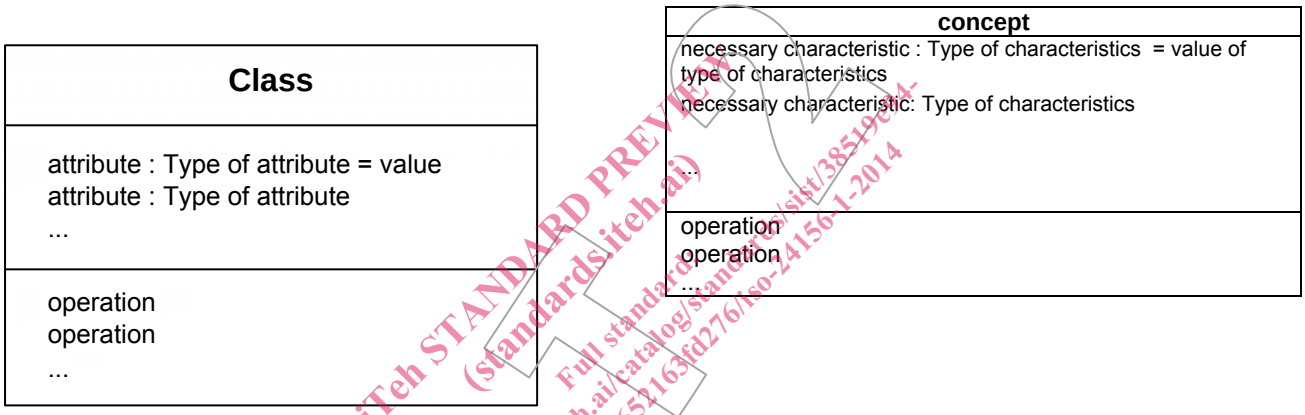


Figure 4 — Attributes and characteristics in UML & ISO 24156-1 user-defined UML profile (ellipsis)

5.5 Type of characteristics and criterion of subdivision

A type of characteristics is defined as a category of characteristics which serves as the criterion of subdivision when establishing concept systems. The criterion of subdivision is defined as a criterion according to which a superordinate concept is divided into subordinate concepts. In UML, a criterion of subdivision may be modelled either as a class symbol following certain rules (*powertype class* (ISO 19501)), or as an attribute in the class representing the generic concept followed by its attribute type and value representing the delimiting characteristics of the specific concept (see Figures 3 & 4).

a) To visualise classes and their relationships in a class diagram, together with their criteria of subdivision, UML displays in a rectangle a metaclass which is adorned with a <<powertype>> label. The name of the powertype is placed in the upper compartment, in the case the powertype metaclass has also the attributes compartment (ISO/IEC 19501 2005:223). This metaclass can be considered as equivalent to the criterion of subdivision in ISO terminology (ISO 1087-1; ISO 704). According to Audibert (2007:56), a powertype rectangle refers to an association class which labels a criterion of subdivision. This criterion of subdivision links subclasses to a superclass by means of a dashed horizontal line, attached to the generalisation symbol. Such a powertype class does not necessarily explicit attributes or attribute types of classes. To represent the above UML notation with equivalent ISO notation (ISO 704, p. 8), the type of characteristics is displayed in full wording under which appears the name of the criterion (see Figure 5). The ISO notation adopts the UML notation in the following mode: a "<<Type of characteristics>> concept" houses in its rectangle the criterion of subdivision, which is linked by a horizontal dashed line to the generic relation arrow. This arrow in turn links the generic concept to its specific concepts by the UML generalisation symbol. However, by doing so, the UML class-like concept compartments (adopted to graphically represent a concept), which serve to display the characteristics, are not present (see Figure 5).