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Information technology — Common Logic (CL): a framework for a family of logic-based languages

Technologies de l'information — Logique commune (CL): un cadre pour une famille de langages basés sur la logique
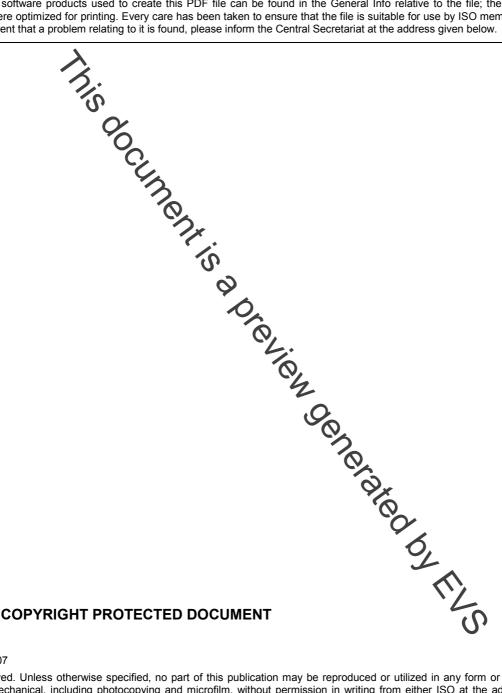
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Foreword

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 the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national 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 24707 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

Introduction

Common Logic is a logic framework intended for information exchange and transmission. The framework allows for a variety of different syntactic forms, called dialects, all expressible within a common XML-based syntax and all sharing a single semantics.

Common Logic has some novel features, chief among them being a syntax which is signature-free and permits 'higher-order' constructions such as quantification over classes or relations while preserving a first-order model theory, and a semantics which allows theories to describe intensional entities such as classes or properties. It also fixes the meanings of a few conventions in widespread use, such as numerals to denote integers and quotation marks to denote character strings, and has provision for the use of datatypes and for naming, importing and transmitting content on the World Wide Web using XML.

Information technology — Common Logic (CL): a framework for a family of logic-based languages

1 Scope

This International Standard specifies a family of logic languages designed for use in the representation and interchange of information and data among disparate computer systems.

The following features are essential to the design of this International Standard:

- Languages in the family have declarative semantics. It is possible to understand the meaning of expressions in these languages without appeal to an interpreter for manipulating those expressions.

- Languages in the family are logically comprehensive — at its most general, they provide for the expression of arbitrary first-order logical sentences.

- Interchange of information among heterogeneous computer systems.

The following are within the scope of this International Standard:

- representation of information in ontologies and knowledge bases;

- specification of expressions that are the input or output of inference engines;

- formal interpretations of the symbols in the language.

The following are outside the scope of this International Standard:

- the specification of proof theory or inference rules;

- specification of translators between the notations of heterogeneous computer systems;

- computer-based operational methods of providing relationships between symbols in the logical "universe of discourse" and individuals in the "real world".

This International Standard describes Common Logic's syntax and semantics.

It defines an abstract syntax and an associated model-theoretic semantics for a specific extension of first-order logic. The intent is that the content of any system using first-order logic can be represented in this International Standard. The purpose is to facilitate interchange of first-order logic-based information between systems.

Issues relating to computability using this International Standard (efficiency, optimization, etc.) are not addressed.

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/IEC 2382-15:1999, *Information technology — Vocabulary — Part 15: Programming languages*

ISO/IEC 10646:2003, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

ISO/IEC 14977:1996, *Information technology — Syntactic metalanguage — Extended BNF*

3   Terms and definitions

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

3.1
atom
sentence form which has no subsentences as syntactic components

NOTE   Can be either an equation, or an atomic sentence consisting of a predicate applied to an argument sequence.

3.2
axiom
any sentence which is assumed to be true, from which others are derived, or by which they are entailed

NOTE   In a computational setting, an axiom is a sentence which is never posed as a goal to be proved, but only used to prove other sentences.

3.3
Common Logic Interchange Format
CLIF
KIF-based syntax that is used for illustration purposes in this International Standard

NOTE   It is one of the concrete syntaxes as described in Annex A. The name "KIF" is not used for this syntax in order to distinguish it from the commonly used KIF dialects. No assumptions are made in this International Standard with respect to KIF semantics; in particular, no equivalence between CLIF and KIF is intended.

3.4
conceptual graph
CG
graphical or textual display of symbols arranged according to the style of conceptual graph theory

3.5
Conceptual Graph Interchange Format
CGIF
text version of conceptual graphs whose rules of formation conform to Annex B of this International Standard

NOTE   Sometimes may refer to an example of a character string that conforms to Annex B. Intended to convey exactly the same structure and semantics as an equivalent conceptual graph.

3.6
conceptual graph theory
form of first-order logic which represents existential quantification and conjunction via the assertion of logical constructs called concepts and relations, which are arranged in an abstract or visually displayed graph

NOTE   Conceptual graph theory was introduced by John Sowa [1].