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Information technology — Database languages — SQL —

Part 2: Foundation (SQL/Foundation)

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Partie 2: Fondations (SQL/Foundation)

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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 mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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.

International Standard ISO/IEC 9075-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

This fourth edition of ISO/IEC 9075-2 cancels and replaces the third edition (ISO/IEC 9075-2:2008), which has been technically revised. It also incorporates Technical Corrigendum ISO/IEC 9075-2:2008/Cor.1:2010.

ISO/IEC 9075 consists of the following parts, under the general title *Information technology — Database languages — SQL*:

— Part 1: Framework (SQL/Framework)

— Part 2: Foundation (SQL/Foundation)

— Part 3: Call-Level Interface (SQL/CLI)

— Part 4: Persistent Stored Modules (SQL/PSM)

— Part 9: Management of External Data (SQL/MED)

— Part 10: Object Language Bindings (SQL/OLB)

— Part 11: Information and Definition Schemas (SQL/Schemata)

— Part 13: SQL Routines and Types Using the Java™ Programming Language (SQL/JRT)

— Part 14: XML-Related Specifications (SQL/XML)

NOTE 1 — The individual parts of multi-part standards are not necessarily published together. New editions of one or more parts may be published without publication of new editions of other parts.

Introduction

The organization of this part of ISO/IEC 9075 is as follows:

1) Clause 1, "Scope", specifies the scope of this part of ISO/IEC 9075.

2) Clause 2, "Normative references", identifies additional standards that, through reference in this part of ISO/IEC 9075, constitute provisions of this part of ISO/IEC 9075.

3) Clause 3, "Definitions, notations, and conventions", defines the notations and conventions used in this part of ISO/IEC 9075.

4) Clause 4, "Concepts", presents concepts used in the definition of SQL.

5) Clause 5, "Lexical elements", defines the lexical elements of the language.

6) Clause 6, "Scalar expressions", defines the elements of the language that produce scalar values.

7) Clause 7, "Query expressions", defines the elements of the language that produce rows and tables of data.

8) Clause 8, "Predicates", defines the predicates of the language.

9) Clause 9, "Additional common rules", specifies the rules for assignments that retrieve data from or store data into SQL-data, and formation rules for set operations.

10) Clause 10, "Additional common elements", defines additional language elements that are used in various parts of the language.

11) Clause 11, "Schema definition and manipulation", defines facilities for creating and managing a schema.

12) Clause 12, "Access control", defines facilities for controlling access to SQL-data.

13) Clause 13, "SQL-client modules", defines SQL-client modules and externally-invoked procedures.

14) Clause 14, "Data manipulation", defines the data manipulation statements.

15) Clause 15, "Additional data manipulation rules", defines additional rules for data manipulation.

16) Clause 16, "Control statements", defines the SQL-control statements.

17) Clause 17, "Transaction management", defines the SQL-transaction management statements.

18) Clause 18, "Connection management" defines the SQL-connection management statements.

19) Clause 19, "Session management", defines the SQL-session management statements.

20) Clause 20, "Dynamic SQL", defines the SQL dynamic statements.

21) Clause 21, "Embedded SQL", defines the host language embeddings.

22) Clause 22, "Direct invocation of SQL", defines direct invocation of SQL language.

23) Clause 23, "Diagnostics management", defines the diagnostics management facilities.

24) Clause 24, "Status codes", defines values that identify the status of the execution of SQL-statements and the mechanisms by which those values are returned.

25) Clause 25, “Conformance”, defines the criteria for conformance to this part of ISO/IEC 9075.

26) Annex A, “SQL Conformance Summary”, is an informative Annex. It summarizes the conformance requirements of the SQL language.

27) Annex B, “Implementation-defined elements”, is an informative Annex. It lists those features for which the body of this part of ISO/IEC 9075 states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or any other behavior is partly or wholly implementation-defined.

28) Annex C, “Implementation-dependent elements”, is an informative Annex. It lists those features for which the body of this part of ISO/IEC 9075 states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or any other behavior is partly or wholly implementation-dependent.

29) Annex D, “Deprecated features”, is an informative Annex. It lists features that the responsible Technical Committee intend will not appear in a future revised version of this part of ISO/IEC 9075.

30) Annex E, “Incompatibilities with ISO/IEC 9075:2008”, is an informative Annex. It lists incompatibilities with the previous version of this part of ISO/IEC 9075.

31) Annex F, “SQL feature taxonomy”, is an informative Annex. It identifies features of the SQL language specified in this part of ISO/IEC 9075 by an identifier and a short descriptive name. This taxonomy is used to specify conformance.

32) Annex G, “Defect Reports not addressed in this edition of ISO/IEC 9075”, is an informative Annex. It describes the Defect Reports that were known at the time of publication of this part of this International Standard. Each of these problems is a problem carried forward from the previous edition of ISO/IEC 9075. No new problems have been created in the drafting of this edition of this International Standard.

In the text of this part of ISO/IEC 9075, Clauses and Annexes begin new odd-numbered pages, and in Clause 5, “Lexical elements”, through Clause 24, “Status codes”, Subclauses begin new pages. Any resulting blank space is not significant.

Information technology — Database languages — SQL —

Part 2:
Foundation (SQL/Foundation)

1 Scope

This part of ISO/IEC 9075 defines the data structures and basic operations on SQL-data. It provides functional capabilities for creating, accessing, maintaining, controlling, and protecting SQL-data.

This part of ISO/IEC 9075 specifies the syntax and semantics of a database language:

— For specifying and modifying the structure and the integrity constraints of SQL-data.

— For declaring and invoking operations on SQL-data and cursors.

— For declaring database language procedures.

— For embedding SQL-statements in a compilation unit that is otherwise written in a particular programming language (host language).

— For deriving an equivalent compilation unit in the host language. In that equivalent compilation unit, each embedded SQL-statement has been replaced by one or more statements in the host language, some of which invoke an SQL externally-invoked procedure that, when executed, has an effect equivalent to executing the SQL-statement.

— For direct invocation of SQL-statements.

— To support dynamic preparation and execution of SQL-statements.

This part of ISO/IEC 9075 provides a vehicle for portability of data definitions and compilation units between SQL-implementations.

This part of ISO/IEC 9075 provides a vehicle for interconnection of SQL-implementations.

Implementations of this part of ISO/IEC 9075 may exist in environments that also support application programming languages, end-user query languages, report generator systems, data dictionary systems, program library systems, and distributed communication systems, as well as various tools for database design, data administration, and performance optimization.

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.

2.1 ISO and IEC standards

[ISO1539] ISO/IEC 1539-1:2004, *Information technology — Programming languages — Fortran — Part 1: Base language*.

ISO/IEC 1539-1:2004/Cor 1:2006.

ISO/IEC 1539-1:2004/Cor 2:2007.

ISO/IEC 1539-1:2004/Cor 3:2008.

ISO/IEC 1539-1:2004/Cor 4:2009.

[ISO1989] ISO/IEC 1989:2002, *Information technology — Programming languages — COBOL*.

ISO/IEC 1989:2002/Cor 1:2006.

ISO/IEC 1989:2002/Cor 2:2006.

ISO/IEC 1989:2002/Cor 3:2009.

[ISO6160] ISO 6160:1979, *Programming languages — PL/I* (Endorsement of ANSI X3.53-1976).

[ISO7185] ISO 7185:1990, *Information technology — Programming languages — Pascal*.

[ISO8601] ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*.

[ISO8652] ISO/IEC 8652:1995, *Information technology — Programming languages — Ada*.

ISO/IEC 8652:1995/Cor.1:2001.

[ISO8859-1] ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

[ISO9075-1] ISO/IEC 9075-1:2011, *Information technology — Database languages — SQL — Part 1: Framework (SQL/Framework)*.

[ISO9075-11] ISO/IEC 9075-11:2011, *Information technology — Database languages — SQL — Part 11: Information and Definition Schemas (SQL/Schemata)*.

[ISO9579] ISO/IEC 9579, *Information technology — Remote database access for SQL with security enhancement*.

[ISO9899] ISO/IEC 9899:1999, *Programming languages — C*.

ISO/IEC 9899:1999/Cor 1:2001.

ISO/IEC 9899:1999/Cor 2:2004.

ISO/IEC 9899:1999/Cor 3:2007.

[ISO10206] ISO/IEC 10206:1991, *Information technology — Programming languages — Extended Pascal*.

[ISO10646] ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*.

[ISO11756] ISO/IEC 11756:1999, *Information technology — Programming languages — M*.

[ISO14651] ISO/IEC 14651, *Information technology — International string ordering and comparison — Method for comparing character strings and description of the common template tailorable ordering*.

2.2 Other international standards

[Unicode] The Unicode Consortium, *The Unicode Standard*. (Information about the latest version of the Unicode standard can be found by using the "Latest Unicode Version" link on the "Enumerated Versions of The Unicode Standard" page.)
http://www.unicode.org/versions/enumeratedversions.html

[Unicode10] Davis, Mark and Whistler, Ken. *Unicode Technical Standard #10, Unicode Collation Algorithm*, The Unicode Consortium.
http://www.unicode.org/reports/tr10/

[Unicode15] Davis, Mark and Dürst, Martin, *Unicode Standard Annex #15: Unicode Normalization Forms*, The Unicode Consortium.
http://www.unicode.org/reports/tr15/

[Unicode18] Davis, Mark, *Unicode Technical Standard #18: Unicode Regular Expressions*, The Unicode Consortium.
http://www.unicode.org/reports/tr18/

[XQueryFO] (W3C Recommendation) XQuery 1.0 and XPath 2.0 Functions and Operators. World Wide Web Consortium.
http://www.w3.org/TR/xpath-functions/