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**Information technology — Database
languages — SQL —**

Part 4:
Persistent Stored Modules (SQL/PSM)

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Technologies de l'information — Langages de base de données — SQL —

Partie 4: Modules mémorisés persistants SQL (SQL/PSM)

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ISO/IEC 9075-4:1996(E)

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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. 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.

International Standard ISO/IEC 9075-4, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC21, *Open systems interconnection, data management, and open distributed processing*.

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

- Part 3: Call-Level Interface (SQL/CLI)
- Part 4: Persistent Stored Modules (SQL/PSM)

Parts 1, 2, and 5 are currently published as ISO/IEC 9075:1992.

Part 3 is currently published as ISO/IEC 9075-3:1995.

Annexes A, B, C, and D of this part of ISO/IEC 9075 are for information only.

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 persistent stored modules.
- 5) Clause 5, “Lexical elements”, defines a number of lexical elements used in the definition of persistent stored modules.
- 6) Clause 6, “Scalar expressions”, defines a number of scalar expressions used in the definition of persistent stored modules.
- 7) Clause 7, “Query expressions”, defines the elements of the language that produce rows and tables of data as used in persistent stored modules.
- 8) Clause 8, “Data assignment rules and routine determination”, defines the data assignment rules used in the definition of persistent stored modules.
- 9) Clause 9, “Additional common elements”, defines additional common elements used in the definition of persistent stored modules.
- 10) Clause 10, “Schema definition and manipulation”, defines the schema definition and manipulation statements associated with the definition of persistent stored modules.
- 11) Clause 11, “Modules”, defines the facilities for using persistent stored modules.
- 12) Clause 12, “Data manipulation”, defines data manipulation operations associated with persistent stored modules.
- 13) Clause 13, “Control statements”, defines the control statements used with persistent stored modules.
- 14) Clause 14, “Transaction management”, defines the SQL-transaction management statements associated with persistent stored modules.
- 15) Clause 15, “Session management”, defines the SQL-session management statements associated with persistent stored modules.
- 16) Clause 16, “Dynamic SQL”, defines the facilities for executing SQL-statements dynamically in the context of persistent stored modules.
- 17) Clause 17, “Diagnostics management”, defines enhancements to the facilities used with persistent stored modules.

- 18) Clause 18, “Embedded SQL”, defines host language embeddings related to persistent stored modules.
- 19) Clause 19, “Information Schema and Definition Schema”, defines the Information and Definition Schema objects associated with persistent stored modules.
- 20) Clause 20, “Status codes”, defines SQLSTATE values related to persistent stored modules.
- 21) Clause 21, “Conformance”, defines the criteria for conformance to this part of ISO/IEC 9075.
- 22) Annex A, “Implementation-defined elements”, is an informative Annex. It lists those features for which the body of this part of the standard states that the syntax or meaning or effect on the database is partly or wholly implementation-defined, and describes the defining information that an implementer shall provide in each case.
- 23) Annex B, “Implementation-dependent elements”, is an informative Annex. It lists those features for which the body of this part of the standard states that the syntax or meaning or effect on the database is partly or wholly implementation-dependent.
- 24) Annex C, “Deprecated features”, is an informative Annex. It lists features that the responsible Technical Committee intends will not appear in a future revised version of ISO/IEC 9075.
- 25) Annex D, “Incompatibilities with ISO/IEC 9075:1992”, is an informative Annex. It lists the incompatibilities between this edition of ISO/IEC 9075 and ISO/IEC 9075:1992.

In the text of this part of ISO/IEC 9075, Clauses begin a new odd-numbered page, and in Clause 5, “Lexical elements”, through Clause 21, “Conformance”, Subclauses begin a new page. Any resulting blank space is not significant.

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Information technology — Database languages — SQL —

Part 4: Persistent Stored Modules (SQL/PSM)

1 Scope

This part of International Standard ISO/IEC 9075 specifies the syntax and semantics of a database language for declaring and maintaining persistent database language routines either in SQL-server modules or as standalone schema-level routines, and invoking them from programs written in a standard programming language.

The database language for <procedure>s and <SQL-invoked routine>s includes:

- The specification of statements to direct the flow of control.
- The assignment of the result of expressions to variables and parameters.
- The specification of condition handlers that allow SQL-invoked routines to deal with various conditions that arise during their execution.
- The specification of statements to signal and resignal conditions.
- The ability to set an SQL-path for controlling the determination of the subject routine to be invoked.
- The declaration of local cursors.
- The declaration of local variables.

It also includes the definition of the Information Schema tables that contain schema information pertaining to SQL-server modules and SQL-invoked routines.

NOTE 1 – The context for ISO/IEC 9075 is described by the Reference Model of Data Management (ISO/IEC 10032:1993).

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2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this part of ISO/IEC 9075. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9075 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 1539:1991, *Information technology — Programming languages — FORTRAN*.

ISO 1989:1985, *Programming languages — COBOL*.

ISO 6160:1979, *Programming languages — PL/I*.

ISO/IEC 7185:1990, *Information technology — Programming languages — Pascal*.

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

NOTE 2 – ISO 8652:1987 has been superseded by a new edition (ISO/IEC 8652:1995). However, when this part of ISO/IEC 9075 was under development, the previous edition was valid and this part of ISO/IEC 9075 is therefore based on that edition, which is listed below.

ISO 8652:1987, *Programming languages — Ada*.

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ISO/IEC 9075:1992, *Information technology — Database languages — SQL*.

ISO/IEC 9899:1990, *Programming languages — C*.

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

ISO/IEC 11756:1992, *Information technology — Programming languages — MUMPS*.

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3 Definitions, notations, and conventions

3.1 Definitions

Insert this paragraph For the purposes of this part of ISO/IEC 9075, the definitions given in ISO/IEC 9075:1992 and the following definitions apply.

- a) **external routine**: An SQL-invoked routine whose routine body is an external body reference that identifies a program written in a standard programming language other than SQL.
- b) **signature (of an SQL-invoked routine)**: The name of the SQL-invoked routine, the position and data types of each of its SQL parameters, and an indication of whether it is an SQL-invoked function or an SQL-invoked procedure.
- c) **SQL routine**: An SQL-invoked routine whose routine body is written in SQL.
- d) **SQL-invoked routine**: A routine that is allowed to be invoked only from within SQL.

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3.2 Notations

Insert this paragraph All notations in ISO/IEC 9075:1992 apply to this part of ISO/IEC 9075.

Insert this paragraph The syntax notation used in this part of ISO/IEC 9075 is an extended version of BNF (“Backus Normal Form” or “Backus-Naur Form”).

Insert this paragraph This version of BNF is fully described in ISO/IEC 9075:1992.

3.3 Conventions

Insert this paragraph Except as otherwise specified in this part of ISO/IEC 9075, the conventions used in this part of ISO/IEC 9075 are identical to those described in part 1 of ISO/IEC 9075.

3.3.1 Use of terms

3.3.1.1 Exceptions

Modified paragraph The phrase “an exception condition is raised:”, followed by the name of a condition, is used in General Rules and elsewhere to indicate that:

- The execution of a statement is unsuccessful.
- The application of General Rules, other than those of Subclause 12.3, “<procedure>”, in ISO/IEC 9075:1992, Subclause 9.1, “<routine invocation>”, Subclause 11.4, “<SQL procedure statement>”, Subclause 20.1, “<direct SQL statement>”, in ISO/IEC 9075:1992, Subclause 13.3, “<compound statement>”, and Subclause 13.4, “<handler declaration>”, may be terminated.
- Diagnostic information is to be made available.