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Part 16: Property Graph Queries (SQL/PGQ)

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Contents

Page

Tables

Table

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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

This first edition of ISO/IEC 9075-16 is designed to be used in conjunction with the following editions of other parts of the ISO/IEC 9075 series, all published in 2023:

— ISO/IEC 9075-1, sixth edition;

— ISO/IEC 9075-2, sixth edition;

— ISO/IEC 9075-3, sixth edition;

— ISO/IEC 9075-4, seventh edition;

— ISO/IEC 9075-9, fifth edition;

— ISO/IEC 9075-10, fifth edition;

— ISO/IEC 9075-11, fifth edition;

— ISO/IEC 9075-13, fifth edition;

— ISO/IEC 9075-14, sixth edition;

— ISO/IEC 9075-15, second edition.

A list of all parts in the ISO/IEC 9075 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

The organization of this document is as follows:

1) Clause 1, "Scope", specifies the scope of this document.

2) Clause 2, "Normative references", identifies additional standards that, through reference in this document, constitute provisions of this document.

3) Clause 3, "Terms and definitions", defines the terms and definitions used in this document.

4) Clause 4, "Concepts", presents concepts used in the definition of property graph queries.

5) Clause 5, "Lexical elements", defines a number of lexical elements used in the definition of property graph queries.

6) Clause 6, "Scalar expressions", defines a number of scalar expressions used in the definition of property graph queries.

7) Clause 7, "Query expressions", defines the elements of the language that produce rows and tables of data as used in property graph queries.

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

9) Clause 9, "Additional common rules", specifies additional rules for implicit or explicit invocation from other places in this document.

10) Clause 10, "Additional common elements", defines additional common elements used in the definition of property graph queries.

11) Clause 11, "Schema definition and manipulation", defines the schema definition and manipulation statements associated with the definition of property graph queries.

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

13) Clause 13, "SQL-client modules", defines the facilities for using property graph queries.

14) Clause 14, "Diagnostics management", defines the diagnostics management facilities.

15) Clause 15, "Information Schema", defines viewed tables that contain schema information.

16) Clause 16, "Definition Schema", defines base tables on which the viewed tables containing schema information depend.

17) Clause 17, "Status codes", defines SQLSTATE values related to property graph queries.

18) Clause 18, "Conformance", defines the criteria for conformance to this document.

19) Annex A, "SQL conformance summary", is an informative Annex. It summarizes the conformance requirements of the SQL language.

20) Annex B, "Implementation-defined elements", is an informative Annex. It lists those features for which the body of this document states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or other aspect is partly or wholly implementation-defined.

21) Annex C, "Implementation-dependent elements", is an informative Annex. It lists those features for which the body of this document states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or other aspect is partly or wholly implementation-dependent.

22) Annex D, "SQL optional feature taxonomy", is an informative Annex. It identifies features of the SQL language specified in this document by an identifier and a short descriptive name. This taxonomy is used to specify conformance.

23) Annex E, "Deprecated features", is an informative Annex. It lists features that the responsible Technical Committee intends not to include in a future edition of this document.

24) Annex F, "Incompatibilities with ISO/IEC 9075:2016", is an informative Annex. It lists incompatibilities with the previous edition of this document.

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

In the text of this document, in Clause 5, "Lexical elements", through Clause 18, "Conformance", Subclauses begin new pages. Any resulting blank space is not significant.

Information technology — Database language SQL —

Part 16:
Property Graph Queries (SQL/PGQ)

1 Scope

This document defines ways for the SQL language to represent property graphs and to interact with them.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 9075-1, *Information technology — Database languages — SQL — Part 1: Framework (SQL/Framework)*

ISO/IEC 9075-2, *Information technology — Database languages — SQL — Part 2: Foundation (SQL/Foundation)*

ISO/IEC 9075-4, *Information technology — Database languages — SQL — Part 4: Persistent Stored Modules (SQL/PSM)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 9075-1, ISO/IEC 9075-2, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at `https://www.iso.org/obp`

— IEC Electropedia: available at `https://www.electropedia.org/`

3.1
destination vertex
vertex (3.37) that is distinguished as the destination of a *directed edge* (3.4)

3.2
destination vertex table
table that contains data representing the *destination vertices* (3.1) of a *directed edge* (3.4)

3.3
defined label set
<pure property graph> distinguished set of labels

Note 1 to entry: Subclause 4.5.2, "Pure property graph", specifies six kinds of defined label sets: vertex defined label set, edge defined label set, edge triplet defined label set, source vertex defined label set, destination vertex defined label set, and endpoint vertex defined label set.

3.4
directed edge
edge (3.6) that distinguishes one of its *endpoints* (3.14) as its *source vertex* (3.30) and one of its endpoints as its *destination vertex* (3.1)

Note 1 to entry: A directed edge expresses a relationship that is asymmetric.

Note 2 to entry: The antonym is *undirected edge* (3.35).

3.5
directed graph
graph in which every *edge* (3.6) is directed

Note 1 to entry: The antonym is *undirected graph* (3.36).

3.6
edge
relationship
connection between two *vertices* (3.37)

Note 1 to entry: Both terms, "edge" and "relationship", are used in the real world to denote the same concept. Without judgement or prejudice, this document uses only the term "edge". In BNF productions, wherever the keyword EDGE is allowed, the keyword RELATIONSHIP can equally well be used instead.

3.7
edge pattern
path pattern (3.24) that matches a single *edge* (3.6)