INTERNATIONAL STANDARD

ISO/IEC 9075-3

First edition
1995-12-15

Information technology — Database languages — SQL —

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

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

Partie 3: Interface de niveau d'appel (SQL/CLI)

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Reference number
ISO/IEC 9075-3:1995(E)

Contents

Page

1 **Scope** . . . 1

2 **Normative references** . . . 3

3 **Definitions, notations, and conventions** . . . 5
3.1 Definitions . . . 5
3.2 Notations . . . 5
3.3 Conventions . . . 5
3.3.1 Specification of routine definitions . . . 5
3.3.2 Subclause naming . . . 6

4 **Concepts** . . . 7
4.1 Introduction . . . 7
4.2 Return codes . . . 9
4.3 Diagnostics areas . . . 10
4.4 Miscellaneous characteristics . . . 12
4.4.1 Handles . . . 12
4.4.2 Null terminated strings . . . 12
4.4.3 Null pointers . . . 12
4.4.4 Environment attributes . . . 13
4.4.5 Connection attributes . . . 13
4.4.6 Statement attributes . . . 13
4.4.7 CLI descriptor areas . . . 14

5 **Call-Level Interface specifications** . . . 17
5.1 <CLI routine> . . . 17
5.2 <CLI routine> invocation . . . 23
5.3 SQL/CLI common elements . . . 26
5.3.1 Implicit set connection . . . 26
5.3.2 Implicit cursor . . . 26
5.3.3 Implicit using clause . . . 27
5.3.4 Character string retrieval . . . 34
5.3.5 Deferred parameter check . . . 35
5.3.6 Client-server operation . . . 35
5.3.7 CLI-specific status codes . . . 35
5.3.8 Description of CLI item descriptor areas . . . 37
5.3.9 Other tables associated with CLI . . . 42
5.4 Data type correspondences . . . 58

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(standards.iteh.ai)
ISO/IEC 9075-3:1995
https://standards.iteh.ai/catalog/standards/sist/0b4856c0-46bf-46c5-bbeb-8276d0046747/iso-iec-9075-3-1995

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6 SQL/CLI routines 65
6.1 AllocConnect 65
6.2 AllocEnv 66
6.3 AllocHandle 67
6.4 AllocStmt 70
6.5 BindCol 71
6.6 BindParam 73
6.7 Cancel 77
6.8 CloseCursor 79
6.9 ColAttribute 80
6.10 Connect 82
6.11 CopyDesc 86
6.12 DataSources 87
6.13 DescribeCol 89
6.14 Disconnect 91
6.15 EndTran 93
6.16 Error 96
6.17 ExecDirect 98
6.18 Execute 101
6.19 Fetch 103
6.20 FetchScroll 105
6.21 FreeConnect 108
6.22 FreeEnv 109
6.23 FreeHandle 110
6.24 FreeStmt 113
6.25 GetConnectAttr 114
6.26 GetCursorName 115
6.27 GetData 116
6.28 GetDescField 121
6.29 GetDescRec 123
6.30 GetDiagField 125
6.31 GetDiagRec 131
6.32 GetEnvAttr 133
6.33 GetFunctions 134
6.34 GetInfo 135
6.35 GetStmtAttr 143
6.36 GetTypeInfo 145
6.37 NumResultCols 149
6.38 ParamData 150
6.39 Prepare 155
6.40 PutData 157
6.41 RowCount 159
6.42 SetConnectAttr 160
6.43 SetCursorName 161
6.44 SetDescField 163

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 9075-3:1995
https://standards.iteh.ai/catalog/standards/sist/0b4856c0-46bf-46c5-bbeb-8276d0046747/iso-iec-9075-3-1995

6.45 SetDescRec . . . 166
6.46 SetEnvAttr . . . 168
6.47 SetStmtAttr . . . 169

7 Conformance . . . 173
7.1 Introduction . . . 173
7.2 Claims of conformance . . . 173
7.3 Extensions and options . . . 174

Annex A Typical header files . . . 175
A.1 C Header File SQLCLI.H . . . 175
A.2 COBOL Library Item SQLCLI . . . 185

Annex B Sample C programs . . . 193
B.1 Create table, insert, select . . . 193
B.2 Interactive Query . . . 196
B.3 Providing long dynamic arguments at Execute( ) time . . . 199

Annex C Implementation-defined elements . . . 203

Annex D Implementation-dependent elements . . . 211

Index . . . 215

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 9075-3:1995
https://standards.iteh.ai/catalog/standards/sist/0b4856c0-46bf-46c5-bbeb-8276d0046747/iso-iec-9075-3-1995

TABLES

Table		Page
1	Fields in CLI diagnostics areas	11
2	Supported calling conventions of CLI routines by language	19
3	Abbreviated CLI generic names	20
4	SQLSTATE class and subclass values for CLI-specific conditions	35
5	Fields in CLI item descriptor areas	40
6	Codes used for implementation data types in CLI	41
7	Codes used for application data types in CLI	41
8	Codes associated with datetime data types in SQL/CLI	42
9	Codes associated with <interval qualifier> in SQL/CLI	42
10	SQL-statement integer codes for use in a diagnostics area	42
11	SQL-statement character codes for use in a diagnostics area	44
12	Codes used for diagnostic fields	45
13	Codes used for handle types	46
14	Codes used for transaction termination	46
15	Codes used for environment attributes	46
16	Codes used for connection attributes	46
17	Codes used for statement attributes	46
18	Codes used for FreeStmt options	46
19	Data types of attributes	47
20	Codes used for descriptor fields	48
21	Codes used for fetch orientation	49
22	Miscellaneous codes used in CLI	49
23	Codes used for GetData data types	49
24	Codes used to identify SQL/CLI routines	49
25	Codes and data types for implementation information	51
26	Values for ALTER TABLE with GetInfo	52
27	Values for CURSOR COMMIT BEHAVIOR with GetInfo	52
28	Values for FETCH DIRECTION with GetInfo	53
29	Values for GETDATA EXTENSIONS with GetInfo	53
30	Values for IDENTIFIER CASE with GetInfo	53
31	Values for OUTER JOIN CAPABILITIES with GetInfo	53
32	Values for SCROLL CONCURRENCY with GetInfo	54
33	Values for TRANSACTION CAPABLE with GetInfo	54
34	Values for TRANSACTION ISOLATION OPTION with GetInfo	54
35	Values for NULL COLLATION with GetInfo	54
36	Codes used for concise data types	55
37	Codes used with concise datetime data types in SQL/CLI	56
38	Codes used with concise interval data types in SQL/CLI	56

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 9075-3:1995
https://standards.iteh.ai/catalog/standards/sist/0b4856c0-46bf-46c5-bbeb-8276d0046747/iso-iec-9075-3-1995

39 Concise codes used with datetime data types in SQL/CLI 57
40 Concise codes used with interval data types in SQL/CLI 57
41 Data type correspondences for Ada 58
42 Data type correspondences for C 59
43 Data type correspondences for COBOL 60
44 Data type correspondences for Fortran 61
45 Data type correspondences for MUMPS 62
46 Data type correspondences for Pascal 63
47 Data type correspondences for PL/I 64

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 9075-3:1995
https://standards.iteh.ai/catalog/standards/sist/0b4856c0-46bf-46c5-bbeb-8276d0046747/iso-iec-9075-3-1995

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 9075-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *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 and 2 are currently published as ISO/IEC 9075:1992.

Annexes A to D of this part of ISO/IEC 9075 are for information only.

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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 the Call-Level Interface.

5) Clause 5, "Call-Level Interface specifications", defines facilities for using SQL through a Call-Level Interface.

6) Clause 6, "SQL/CLI routines", defines each of the routines that comprise the Call-Level Interface.

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7) Clause 7, "Conformance", defines the criteria for conformance to this part of ISO/IEC 9075.

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8) Annex A, "Typical header files", is an informative Annex. It provides examples of typical header files for application programs using the SQL Call-Level Interface.

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9) Annex B, "Sample C programs", is an informative Annex. It provides a sample of using the SQL Call-Level Interface from the C programming language.

10) Annex C, "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 implementor shall provide in each case.

11) Annex D, "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.

In the text of this part of ISO/IEC 9075, Clauses begin a new odd-numbered page, and in Clause 5, "Call-Level Interface specifications", through Clause 7, "Conformance", Subclauses begin a new page. Any resulting blank space is not significant.

Information technology — Database languages — SQL —

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

1 Scope

This part of ISO/IEC 9075 defines the structures and procedures that may be used to execute statements of the database language SQL from within an application written in a standard programming language in such a way that procedures used are independent of the SQL statements to be executed.

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ISO/IEC 9075-3:1995
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2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this part of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 7185:1990, *Information technology — Programming languages — Pascal.*

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

NOTE — 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.*

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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

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

a) **handle**: An opaque data value returned by an SQL/CLI implementation when a CLI resource is allocated and used by an SQL/CLI application to reference that CLI resource.

b) **inner table**: The second operand of a left outer join or the first operand of a right outer join.

3.2 Notations

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

This version of BNF is fully described in Subclause 3.2, "Notation", of ISO/IEC 9075:1992.

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3.3 Conventions

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The conventions used in this part of ISO/IEC 9075 are identical to those described in Subclause 3.3, "Conventions", of ISO/IEC 9075:1992.

The contents of this part of ISO/IEC 9075 depend wholly on ISO/IEC 9075:1992. For example, the Syntax found in the Format portions of this part of ISO/IEC 9075 often uses symbols that are defined in ISO/IEC 9075:1992.

3.3.1 Specification of routine definitions

The routines in this part of ISO/IEC 9075 are specified in terms of:

— Function: A short statement of the purpose of the routine.

— Definition: The name of the routine and the names, modes, and data types of its parameters.

— General Rules: A specification of the run-time effect of the routine. Where more than one General Rule is used to specify the effect of a routine, the required effect is that which would be obtained by beginning with the first General Rule and applying the Rules in numerical sequence until a Rule is applied that specifies or implies a change in sequence or termination of the application of the Rules. Unless otherwise specified or implied by a specific Rule that is applied, application of General Rules terminates when the last in the sequence has been applied.

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3.3.2 Subclause naming

Clauses and Subclauses in this part of ISO/IEC 9075 that have names identical to Clauses or Subclauses in ISO/IEC 9075:1992 supplement the Clause or Subclause, respectively, in ISO/IEC 9075:1992, typically by replacing Format items or Rules or by providing new Format items or Rules.

Clauses and Subclauses in this part of ISO/IEC 9075 that have names that are not identical to Clauses or Subclauses in ISO/IEC 9075:1992 provide language specification particular to this part of ISO/IEC 9075.

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4 Concepts

4.1 Introduction

The Call-Level Interface (SQL/CLI) is an alternative binding style for executing SQL statements comprising routines that:

— Allocate and deallocate resources,

— Control connections to SQL-servers,

— Execute SQL statements using mechanisms similar to dynamic SQL,

— Obtain diagnostic information,

— Control transaction termination, and

— Obtain information about the implementation.

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The AllocHandle routine allocates the resources to manage an SQL-environment, an SQL-connection, a CLI descriptor area, or SQL-statement processing. An SQL-connection is allocated in the context of an allocated SQL-environment. A CLI descriptor area and an SQL-statement are allocated in the context of an allocated SQL-connection. The FreeHandle routine deallocates a specified resource. The AllocConnect, AllocEnv, and AllocStmt routines can be used to allocate the resources to manage an SQL-connection, an SQL-environment, and SQL-statement processing, respectively, instead of using the AllocHandle routine. The FreeConnect, FreeEnv, and FreeStmt routines can be used to deallocate the specific resource instead of using FreeHandle.

Each allocated SQL-environment has an attribute that determines whether output character strings are null terminated by the implementation. The application can set the value of this attribute by using the routine SetEnvAttr and can retrieve the current value of the attribute by using the routine GetEnvAttr.

The Connect routine establishes an SQL-connection. The Disconnect routine terminates an established SQL-connection. Switching between established SQL-connections occurs automatically whenever the application switches processing to a dormant SQL-connection.

The ExecDirect routine is used for a one-time execution of an SQL-statement. The Prepare routine is used to prepare an SQL-statement for subsequent execution using the Execute routine. In each case, the executed SQL-statement can contain dynamic parameters.

The interface for a description of dynamic parameters, dynamic parameter values, the resultant columns of a <dynamic select statement> or <dynamic single row select statement>, and the target specifications for the resultant columns is a CLI descriptor area. A CLI descriptor area for each type of interface is automatically allocated when an SQL-statement is allocated. The application may allocate additional CLI descriptor areas and nominate them for use as the interface for the description of dynamic parameter values or the description of target specifications by using the routine SetStmtAttr. The application can determine the handle value of the CLI descriptor area currently being used for a specific interface by using the routine GetStmtAttr. The GetDescField and