AS ISO/IEC 9075.5—2005
ISO/IEC 9075-5:1999
ISO/IEC 9075-5:1999/Amd.1:2001
ISO/IEC 9075-5:1999/Cor.2:2003

Australian Standard™

Information technology—Database languages—SQL

Part 5: Host Language Bindings (SQL/Bindings)

This Australian Standard was prepared by Committee IT-027, Data Management and Interchange. It was approved on behalf of the Council of Standards Australia on 16 May 2005. This Standard was published on 4 October 2005.

The following are represented on Committee IT-027:

Association of Superannuation Funds of Australia
Australia Post
Australia Bankers Association
Australian Bureau of Statistics
Australian Computer Society
Australian Customs Service
Australian Electoral Commission
Australian Electric and Electronic Manufacturers Association
Australian Industry Group
Australian Information Industry Association
Australian Institute of Health and Welfare
Australian Taxation Office
Centrelink
Department of Defence
Department of Immigration, Multicultural and Indigenous Affairs
Health Insurance Commission
Data Management Association Australia

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to the Chief Executive, Standards Australia, GPO Box 476, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 05146.

Australian Standard™

Information technology—Database languages—SQL

Part 5: Host Language Bindings (SQL/Bindings)

First published as AS ISO/IEC 9075.5—2005.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 6767 2

PREFACE

This Standard was prepared by the Standards Australia Committee IT-027, Data Management and Interchange.

This Standard is identical with, and has been reproduced from ISO/IEC 9075-5:1999, *Information technology—Database languages—SQL*—Part 5*: Host Language Bindings (SQL/Bindings),* and its Amendment and Corrigendum, ISO/IEC 9075-5:1999/Amd.1:2001 and ISO/IEC 9075-5:1999/Cor.2:2003, which have been added to the source text. It should be noted that Corrigendum 2 cancelled and replaced Corrigendum 1, which has not been included in this Australian Standard.

The objective of this Standard is to provide database designers, administrators and developers the SQL language to support dynamic preparation and execution of SQL statements with the syntax and semantics of a database language.

This Standard is Part 5 of AS 9075, *Information technology—Database languages—SQL*, which is published in parts as follows:

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 5: Host Language Bindings (SQL/Bindings) (this Standard)
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)

As this Standard is reproduced from an international standard, the following applies:

(a) Its number appears on the cover and title page while the international standard number appears only on the cover.

(b) In the source text 'this part of ISO/IEC 9075' should read 'this Australian Standard'.

(c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO/IEC		AS	
7185	Information technology—Programming languages—Pascal	2580	Programming languages—Pascal
9075	Information technology—Database languages—SQL	9075	Information technology—Database languages—SQL
9075-1	Part 1: Framework (SQL/Framework)	9075.1	Part 1: Framework (SQL/Framework)
9075-2	Part 2: Foundation (SQL/Foundation)	9075.2	Part 2: Foundation (SQL/Foundation)
9075-3	Part 3: Call-Level Interface (SQL/CLI)	9075.3	Part 3: Call-Level Interface (SQL/CLI)
9075-4	Part 4: Persistent Stored Modules (SQL/PSM)	9075.4	Part 4: Persistent Stored Modules (SQL/PSM)

10206	Information technology—Programming languages—Extended pascal	3981	Information technology—Programming languages—Extended pascal

Only referenced documents that have been adopted as Australian or Australian/New Zealand Standards have been adopted.

CONTENTS

Page

1 Scope . . . 1

2 Normative references . . . 2

3 Definitions, notations, and conventions . . . 3
3.1 Definitions . . . 3
3.2 Notation . . . 3
3.3 Conventions . . . 3
3.3.1 Use of terms . . . 3
3.3.1.1 Other terms . . . 3
3.3.2 Relationships to other parts of ISO/IEC 9075 . . . 3
3.3.2.1 Clause, Subclause, and Table relationships . . . 3
3.4 Object identifier for Database Language SQL . . . 10

4 Concepts . . . 12
4.1 Catalogs . . . 12
4.2 SQL-client modules . . . 12
4.3 SQL-invoked routines . . . 12
4.4 Locators . . . 12
4.5 Cursors . . . 12
4.6 SQL-statements . . . 13
4.6.1 Classes of SQL-statements . . . 13
4.6.2 SQL-statements classified by function . . . 13
4.6.3 SQL-statements and transaction states . . . 15
4.6.4 Embeddable SQL-statements . . . 16
4.6.5 Preparable and immediately executable SQL-statements . . . 17
4.6.6 Directly executable SQL-statements . . . 19
4.7 Standard programming languages . . . 20
4.8 Embedded syntax . . . 21
4.9 SQL dynamic statements . . . 21
4.10 Direct invocation of SQL . . . 24
4.11 Privileges and roles . . . 24
4.12 SQL transactions . . . 24

Page

4.13 SQL-connections . . . 24
4.14 SQL-sessions . . . 25
4.15 Client-server operation . . . 26

5 Lexical elements . . . 27
5.1 <token> and <separator> . . . 27
5.2 <literal> . . . 28
5.3 Names and identifiers . . . 30

6 Scalar expressions . . . 33
6.1 <value specification> and <target specification> . . . 33
6.2 <column reference> . . . 35
6.3 <interval value expression> . . . 36

7 Query expressions . . . 37
7.1 <table reference> . . . 37
7.2 <query specification> . . . 38

8 Additional common elements . . . 39
8.1 <routine invocation> . . . 39

9 Data assignment rules and routine determination . . . 40
9.1 Retrieval assignment . . . 40
9.2 Store assignment . . . 41
9.3 Data types of results of aggregations . . . 42

10 Schema definition and manipulation . . . 43
10.1 <check constraint definition> . . . 43
10.2 <view definition> . . . 44
10.3 <assertion definition> . . . 45
10.4 <trigger definition> . . . 46
10.5 <SQL-invoked routine> . . . 47

11 SQL-client modules . . . 48
11.1 <SQL-client module definition> . . . 48
11.2 Calls to an <externally-invoked procedure> . . . 50
11.3 <SQL procedure statement> . . . 52

12 Data manipulation . . . 54
12.1 <select statement: single row> . . . 54
12.2 <free locator statement> . . . 55

13 Transaction management . . . 56
13.1 <commit statement> . . . 56

Page

14 Session management 57
14.1 <set catalog statement> 57
14.2 <set schema statement> 58
14.3 <set names statement> 59
14.4 <set path statement> 60
14.5 <set transform group statement> 61

15 Dynamic SQL 62
15.1 Description of SQL descriptor areas 62
15.2 <allocate descriptor statement> 71
15.3 <deallocate descriptor statement> 73
15.4 <get descriptor statement> 74
15.5 <set descriptor statement> 77
15.6 <prepare statement> 82
15.7 <deallocate prepared statement> 91
15.8 <describe statement> 92
15.9 <input using clause> 98
15.10 <output using clause> 102
15.11 <execute statement> 107
15.12 <execute immediate statement> 109
15.13 <dynamic declare cursor> 110
15.14 <allocate cursor statement> 112
15.15 <dynamic open statement> 114
15.16 <dynamic fetch statement> 115
15.17 <dynamic single row select statement> 116
15.18 <dynamic close statement> 117
15.19 <dynamic delete statement: positioned> 118
15.20 <dynamic update statement: positioned> 120
15.21 <preparable dynamic delete statement: positioned> 122
15.22 <preparable dynamic update statement: positioned> 123

16 Embedded SQL 124
16.1 <embedded SQL host program> 124
16.2 <embedded exception declaration> 136
16.3 <embedded SQL Ada program> 140
16.4 <embedded SQL C program> 145
16.5 <embedded SQL COBOL program> 152
16.6 <embedded SQL Fortran program> 158
16.7 <embedded SQL MUMPS program> 163
16.8 <embedded SQL Pascal program> 167
16.9 <embedded SQL PL/I program> 172

17 Direct invocation of SQL 177
17.1 <direct SQL statement> 177
17.2 <direct select statement: multiple rows> 181

Page

18 Diagnostics management 183
18.1 <get diagnostics statement> 183

19 Definition Schema 186
19.1 SQL_LANGUAGES base table 186

20 Status codes 187
20.1 SQLSTATE 187

21 Conformance 189
21.1 General conformance requirements 189
21.2 Claims of conformance 189

Annex A SQL Conformance Summary 190

Annex B Implementation-defined elements 204

Annex C Implementation-dependent elements 207

Annex D Deprecated features 209

Annex E Incompatibilities with ISO/IEC 9075:1992 210

Annex F SQL feature and package taxonomy 211

TABLES

Page

1 Clause, Subclause, and Table relationships 3
2 Data types of <key word>s used in the header of SQL descriptor areas 66
3 Data types of <key word>s used in SQL item descriptor areas 66
4 Codes used for SQL data types in Dynamic SQL 68
5 Codes associated with datetime data types in Dynamic SQL 69
6 Codes used for <interval qualifier>s in Dynamic SQL 69
7 Codes used for input/output SQL parameter modes in Dynamic SQL 70
8 <identifier>s for use with <get diagnostics statement> 183
9 SQL-statement codes 184
10 SQLSTATE class and subclass values 187
11 Implied feature relationships 189
12 SQL/Bindings feature taxonomy and definition for Core SQL 212
13 SQL/Bindings feature taxonomy for features outside Core SQL 212

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 SQL modules.

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, “Additional common elements”, defines additional language elements that are used in various parts of the language.

9) Clause 9, “Data assignment rules and routine determination”, specifies the rules for assignments that retrieve data from or store data into SQL-data, and formation rules for set operations.

10) Clause 10, “Schema definition and manipulation”, defines facilities for creating and managing a schema.

11) Clause 11, “SQL-client modules”, defines modules and procedures.

12) Clause 12, “Data manipulation”, defines the data manipulation statements.

13) Clause 13, “Transaction management”, defines the SQL-transaction management statements.

14) Clause 14, “Session management”, defines the SQL-session management statements.

15) Clause 15, “Dynamic SQL”, defines the SQL dynamic statements.

16) Clause 16, “Embedded SQL”, defines the host language embeddings.

17) Clause 17, “Direct invocation of SQL”, defines direct invocation of SQL language.

18) Clause 18, “Diagnostics management”, defines the diagnostics management facilities.

19) Clause 19, “Definition Schema”, defines base tables on which the viewed tables containing schema information depend.

20) Clause 20, “Status codes”, defines values that identify the status of the execution of SQL-statements and the mechanisms by which those values are returned.

21) Clause 21, “Conformance”, defines the criteria for conformance to this part of ISO/IEC 9075.

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

23) 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.

24) 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.

25) Annex D, “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.

26) Annex E, “Incompatibilities with ISO/IEC 9075:1992”, is an informative Annex. It lists the incompatibilities between this version of ISO/IEC 9075 and ISO/IEC 9075:1992.

27) Annex F, “SQL feature and package taxonomy”, is an informative Annex. It identifies features of the SQL language specified in this part of ISO/IEC 9075 by a numeric identifier and a short descriptive name. This taxonomy is used to specify conformance to Core SQL and may be used to develop other profiles involving the SQL language.

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.

AUSTRALIAN STANDARD

Information technology — Database languages — SQL —

Part 5:
Host Language Bindings (SQL/Bindings)

1 Scope

This part of ISO/IEC 9075 specifies:

— Syntax for embedding SQL-statements in a compilation unit that otherwise conforms to the standard for a particular programming language (host language).

— How an equivalent compilation unit may be derived that conforms to the particular programming language standard. 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.

— Syntax for direct invocation of SQL-statements.

— SQL language to support dynamic preparation and execution of SQL-statements.