



# INTERNATIONAL STANDARD ISO/IEC 9075-1:1999 TECHNICAL CORRIGENDUM 2

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## Information technology — Database languages — SQL — Part 1: Framework (SQL/Framework)

### TECHNICAL CORRIGENDUM 2

*Technologies de l'information — Langues de base de données — SQL —*

*Partie 1: Charpente (SQL/Charpente)*

RECTIFICATIF TECHNIQUE 2

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ISO/IEC 9075-1:1999/Cor 2:2003

Technical Corrigendum 2 to ISO/IEC 9075-1:1999 was prepared by Joint Technical Committee ISO/IEC JTC 1, Information technology, Subcommittee SC 32, Data management and interchange. ISO/IEC 9075-1:1999/Cor. 2:2003 cancels and replaces ISO/IEC 9075-1:1999/Cor. 1:2000.

#### Statement of purpose for rationale:

A statement indicating the rationale for each change to ISO/IEC 9075 is included. This is to inform the users of that standard as to the reason why it was judged necessary to change the original wording. In many cases the reason is editorial or to clarify the wording; in some cases it is to correct an error or an omission in the original wording.

#### Notes on numbering:

Where this Corrigendum introduces new Syntax, Access, General and Conformance Rules, the new rules have been numbered as follows:

Rules inserted between, for example, Rules 7) and 8) are numbered 7.1), 7.2), etc. [or 7) a.1), 7) a.2), etc.]. Those inserted before Rule 1) are numbered 0.1), 0.2), etc.

Where this Corrigendum introduces new Subclauses, the new subclauses have been numbered as follows:

Subclauses inserted between, for example, Subclause 4.3.2 and 4.3.3 are numbered 4.3.2a, 4.3.2b, etc.

Those inserted before, for example, 4.3.1 are numbered 4.3.0, 4.3.0a, etc.

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# Information technology — Database languages — SQL —

## Part 1: Framework (SQL/Framework)

### TECHNICAL CORRIGENDUM 2

#### 4.6.2.1 Character sets

1. *Rationale: Clarify the distinction between character sets and character repertoires.*

Replace the 1<sup>st</sup> paragraph with:

A character set has a named set of characters (character repertoire) that may be used for forming values of the character data type, as well as a named character encoding form. Every character set has a default collation. Character sets provided by the SQL-implementation, whether defined by other standards or by the SQL-implementation, are represented in the Information Schema.

Replace the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> paragraphs with:

The character repertoire of every character set supported by an SQL-implementation is some subset of the repertoire of the Universal Character Set specified by ISO/IEC 10646.

The notation specified in ISO/IEC 10646-1, Subclause 6.5, "Identifiers for characters", is the canonical representation of characters and character strings in ISO/IEC 9075.

NOTE 3 – ISO/IEC 10646 assigns a range of code points for "private use". Future editions of ISO/IEC 10646 are likely to add more code points, which SQL-implementations are required to support.

#### 4.6.2.2 Collations

1. *Rationale: Standardize terminology.*

Replace the 1<sup>st</sup> paragraph with:

A collation is a named operation for ordering character strings in a particular character repertoire.

#### 4.8.2.3 Locators

1. *Rationale: Correct the specification of which locators are marked invalid when an SQL-transaction ends.*

Replace the 8<sup>th</sup> paragraph with:

A non-holdable locator remains valid until the end of the SQL-transaction in which it was generated, unless it is explicitly made invalid by the execution of a <free locator statement> or a <rollback statement> that specifies a <savepoint clause> is executed before the end of that SQL-transaction if the locator was generated subsequent to the establishment of the savepoint identified by the <savepoint clause>.

Replace 9<sup>th</sup> paragraph with:

A holdable locator may remain valid beyond the end of the SQL-transaction in which it is generated. A holdable locator becomes invalid whenever a <free locator statement> identifying that locator is executed or the SQL-transaction in which it is generated or any subsequent SQL-transaction is rolled back. All locators remaining valid at the end of an SQL-session are marked invalid when that SQL-session terminates.

### 4.10.3 Built-in Functions

1. *Rationale: Clarify the semantics of built-in functions.*

Delete the entire Subclause.

### 4.11.2 SQL-statements classified by function

1. *Rationale: Correct the classification of SQL-statements.*

Add a list element to the 1<sup>st</sup> paragraph:

- SQL-dynamic statements, which support the preparation and execution of dynamically generated SQL-statements, and obtaining information about them.

### 5.3.3 SQL-statements specified in ISO/IEC 9075-2

1. *Rationale: Correct the classification of SQL-statements.*

Replace the 4<sup>th</sup> bullet of the 1<sup>st</sup> paragraph with:

- Two SQL-control statements (CALL and RETURN), which can be used to invoke a procedure and specify a value to be returned by a function.

### 5.5.1 SQL-statements specified in ISO/IEC 9075-4

1. *Rationale: Correct the classification of SQL-statements.*

Replace the 1<sup>st</sup> bullet of the 1<sup>st</sup> paragraph with:

- Additional SQL-control statements which may be used to control the execution of an SQL routine.

2. *Rationale: Correct the classification of SQL-statements.*

Delete the 2<sup>nd</sup> bullet from the 1<sup>st</sup> paragraph

3. *Rationale: Correct the classification of SQL-statements.*

Replace the 3<sup>rd</sup> bullet of the 1<sup>st</sup> paragraph with:

- Additional SQL-diagnostics statements, which may be used to signal exceptions.

4. *Rationale: Correct the classification of SQL-statements.*

Insert the following bullets to the 1<sup>st</sup> paragraph:

- SQL-control declaration statements which may be used to declare variables and exception handlers.
- Additional SQL-schema statements, which may be used to create and drop modules.

### 5.6.5.1 Additional functional classes of SQL-statements

1. *Rationale: Correct the classification of SQL-statements.*

Replace the bullet of the 1<sup>st</sup> paragraph with:

- SQL-dynamic statements, which support the preparation and execution of dynamically generated SQL-statements, and obtaining information about them.

2. *Rationale: Correct the classification of SQL-statements.*

Replace the 2<sup>nd</sup> paragraph with:

A number of SQL-data statements are also added, most of which contain the word "dynamic" in their names. They are not to be confused with SQL-dynamic statements.

## 6.1 Notation

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1. *Rationale: Define "left normal form derivation" for use in Subclause 14.1, "<declare cursor>" in Part 1.*

Insert the following paragraph at the end of the Subclause:

The left normal form derivation of a character string *CS* in the source language character set from a BNF non-terminal *NT* is obtained by applying steps 1 through 5 above, to *NT*, always selecting in step 5 the leftmost BNF non-terminal.

### 6.2.3.2 Syntactic containment

1. *Rationale: General containment must also recurse through <query name>s.*

Replace the 8<sup>th</sup> paragraph with:

If <A> contains a <table name> that identifies a view that is defined by a <view definition> *V*, then <A> is said to *generally contain* the <query expression> contained in *V*. If <A> contains a <query name> that identifies a <query expression> *QE*, then <A> is said to *generally contain QE*. If <A> contains a <routine invocation> *RI*, then <A> is said to *generally contain* the routine bodies of all <SQL-invoked routine>s in the set of subject routines of *RI*. If <A> contains <B>, then <A> generally contains <B>. If <A> generally contains <B> and <B> generally contains <C>, then <A> generally contains <C>.

#### 6.2.3.4 Rule evaluation order

1. *Rationale: Define the term “intermediate results”.*

Insert the following paragraph as the last paragraph of this Subclause:

During the computation of the result of an expression, the SQL-implementation may produce one or more *intermediate results* that are used in determining that result. The declared type of an intermediate result is implementation-dependent.

#### 6.2.5 Relationships of incremental parts to ISO/IEC 9075-2, Foundation

1. *Rationale: To permit the modification of Parts 1, 3 and 10 as well as Parts 2 and 5 in other Parts, since Part 1 needs to be updated by the Conformance clauses of other Parts and Parts 3 and 10 are analogous in functionality to Part 5.*

Replace the entire Subclause with:

#### 6.2.5 Relationships of incremental parts within ISO/IEC 9075

Parts of ISO/IEC 9075 other than this part of ISO/IEC 9075 and ISO/IEC 9075-2 depend on ISO/IEC 9075-1, ISO/IEC 9075-2 and its Technical Corrigenda and are referenced as incremental parts. Each incremental part is to be used as though it were merged with the text of ISO/IEC 9075. This Subclause describes the conventions used to specify the merger.

The merger described also accounts for the Technical Corrigenda that have been published to correct ISO/IEC 9075. This accommodation is typically indicated by the presence of a phrase like “in the Technical Corrigenda” or “in the TC”.

##### 6.2.5.1 New and modified Clauses, Subclauses, and Annexes

Where a Clause (other than Clause 1, “Scope”, and Clause 2, “Normative references”), Subclause, or Annex in any incremental part of ISO/IEC 9075 has a name identical to a Clause, Subclause, or Annex in ISO/IEC 9075-1, ISO/IEC 9075-2, ISO/IEC 9075-3, ISO/IEC 9075-5 or ISO/IEC 9075-10 (unless the incremental part is itself ISO/IEC 9075-3, ISO/IEC 9075-5 or ISO/IEC 9075-10), it supplements the Clause, Subclause, or Annex, respectively, in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, regardless of whether or not the number or letter of the Clause, Subclause, or Annex corresponds. It typically does so by adding or replacing paragraphs, Format items, or Rules.

In each incremental part, Table 1, "Clause, Subclause, and Table relationships", identifies the relationships between each Clause, Subclause, and Annex in that incremental part and the corresponding Clause, Subclause, or Annex in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10.

Where a Clause, Subclause, or Annex in an incremental part has a name that is not identical to the name of some Clause, Subclause, or Annex in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, it provides language specification particular to that part. A Subclause that is part of a Clause or Subclause identified as new is inherently new and is not marked.

The Clauses, Subclauses, and Annexes in each incremental part appear in the order in which they are intended to appear in the merged document. In the absence of other explicit instructions regarding its placement, any new Clause, Subclause, or Annex is to be positioned as follows: Locate the prior Clause, Subclause, or Annex in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 whose name is identical to the name of a corresponding Clause, Subclause, or Annex that appears in the incremental part of ISO/IEC 9075. The new Clause, Subclause, or Annex shall immediately follow that Clause, Subclause, or Annex. If there are multiple new Clauses, Subclauses, or Annexes with no intervening Clause, Subclause, or Annex that modifies an existing Clause, Subclause, or Annex, then those new Clauses, Subclauses, or Annexes appear in order, following the prior Clause, Subclause, or Annex whose name was matched.

When an incremental part performs a modification to the Clause, Subclause, or Annex in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, then the modifications are applied in the following sequence:

- 1) All modifications to ISO/IEC 9075-1 from the incremental part.
- 2) All modifications to ISO/IEC 9075-3 from the incremental part.
- 3) All modifications to ISO/IEC 9075-5 from the incremental part.
- 4) All modifications to ISO/IEC 9075-10 from the incremental part.
- 5) All modifications to ISO/IEC 9075-2 from ISO/IEC 9075-3, including all modifications that were added, augmented, or replaced as a result of step 2.
- 6) All modifications to ISO/IEC 9075-2 from ISO/IEC 9075-5, including all modifications that were added, augmented, or replaced as a result of step 2.
- 7) All modifications to ISO/IEC 9075-2 from ISO/IEC 9075-10, including all modifications that were added, augmented, or replaced as a result of step 2.
- 8) All modifications to ISO/IEC 9075-2 from the incremental part. Note that modifications in this third step may augment or replace modifications applied as a result of steps 2, 3 and 4.

Modifications to ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 by more than one incremental part do not interact. The modifications made by an incremental part only have influence on the language specification of that part and those specifications are not influenced by modifications made by any other incremental part.

#### 6.2.5.2 New and modified Format items

In a modified Subclause, a Format item that defines a BNF non-terminal symbol (that is, the BNF non-terminal symbol appears on the left-hand side of the ::= mark) either modifies a Format item whose definition appears in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, or replaces a Format item whose definition appears in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, or defines a new Format item that does not have a definition at all in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10. Those Format items in the incremental part that modify a Format item whose definition appears in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 are identified by the existence of a “Format comment” such as:

```
<modified item> ::=
    !! All alternatives from ISO/IEC 9075-2
    | <new alternative>
```

By contrast, Format items that completely replace Format items in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 have BNF non-terminal symbols identical to BNF non-terminal symbols of Format items in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or

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ISO/IEC 9075-10, but do not state that they include any alternatives from ISO/IEC 9075-2 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10.

New Format items that have no correspondence to any Format item in ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 are not distinguished in the incremental part.

Format items in new Subclauses are unmarked.

### 6.2.5.3 New and modified paragraphs and rules

In modified Subclauses, each paragraph or Rule is marked to indicate whether it is a modification of a paragraph or Rule in ISO/IEC 9075-1, ISO/IEC 9075-2, ISO/IEC 9075-3, ISO/IEC 9075-5 or ISO/IEC 9075-10 or is a new paragraph or Rule added by this incremental part.

Modifications of paragraphs or Rules in ISO/IEC 9075-2 are identified by the inclusion of an indicative phrase enclosed in a box.

**Replace the 5th paragraph** means that the following text is to replace the fifth paragraph of the corresponding Subclause in ISO/IEC 9075-2.

**Replace SR6) b) ii)** means that the following text is to replace Syntax Rule 6)b)ii) of the corresponding Subclause in ISO/IEC 9075-2.

**Augments SR3)** means that the following text is to extend or enhance Syntax Rule 3). In most instances, the augmentation is the addition of a new alternative meant to support new syntax. New paragraphs or Rules in an incremental part is marked to indicate where it is to be inserted.

**Insert before 2nd paragraph** means that the following text is to be read as though it were inserted immediately before the second paragraph of the corresponding Subclause in ISO/IEC 9075-2.

**Insert before GR4)** means that the following text is to be read as though it were inserted immediately before General Rule 4) of the corresponding Subclause in ISO/IEC 9075-2.

If no specific insertion point is indicated, as in **Insert this paragraph** or **Insert this GR**, then the following text is to be read as though it were appended at the end of the appropriate section (the General Rules, for example) of the corresponding Subclause in ISO/IEC 9075-2.

Modifications of paragraphs or Rules in ISO/IEC 9075-1 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 are identified in the same way as for modifications of ISO/IEC 9075-2, except that “in Part 1”, “in Part 3”, “in Part 5” or “in Part 10” is appended to the indicative phrase, as appropriate.

In such indications, “SR” is used to mean “Syntax Rule”, “AR” is used to mean “Access Rule”, “GR” is used to mean “General Rule”, and “CR” is used to mean “Conformance Rule”. “Desc.” is used to mean “Description” and “Func.” is used to mean “Function”.

All paragraphs, Format items, and Rules in new Clauses or Subclauses are also new and are therefore unmarked.

### 6.2.5.4 New and modified tables



If the name of a table in an incremental part is identical to that of a table in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, then the table supplements the table in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, typically by adding or replacing one or more table entries; otherwise, it is a new table.

In each incremental part, there is a table, Table 1, "Clause, Subclause, and Table relationships", that identifies the relationships between tables in that incremental part and the corresponding tables in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10.

The rows in modified tables are generally new rows to be effectively inserted into the corresponding table in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10, though in rare cases a row already in a table in ISO/IEC 9075-1 and/or ISO/IEC 9075-2 and/or ISO/IEC 9075-3 and/or ISO/IEC 9075-5 and/or ISO/IEC 9075-10 is effectively replaced by a row in the table in the incremental part. Such replacement is required wherever the value in the first column of the corresponding table is the same.

### 6.3 Object identifier for Database Language SQL

#### 1. Rationale: Add a missing OID production and rule

Replace the production for <bindings> with:

```
<bindings> ::= <module> <embedded> <direct> <invoked routine languages>
```

```
<invoked routine languages> ::=
  <invoked Ada>
  | <invoked C>
  | <invoked COBOL>
  | <invoked Fortran>
  | <invoked MUMPS>
  | <invoked Pascal>
  | <invoked PL/I>
```

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```
<invoked Ada> ::=
  1 | invokedAda <left paren> 1 <right paren>
```

```
<invoked C> ::=
  2 | invokedC <left paren> 2 <right paren>
```

```
<invoked COBOL> ::=
  3 | invokedCOBOL <left paren> 3 <right paren>
```

```
<invoked Fortran> ::=
  4 | invokedFortran <left paren> 4 <right paren>
```

```
<invoked MUMPS> ::=
  5 | invokedMUMPS <left paren> 5 <right paren>
```

```
<invoked Pascal> ::=
  6 | invokedPascal <left paren> 6 <right paren>
```

```
<invoked PL/I> ::=
  7 | invokedPLI <left paren> 7 <right paren>
```