



Information technology — Database languages — SQL

TECHNICAL CORRIGENDUM 1

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

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to International Standard ISO/IEC 9075:1992 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*.

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Relation to previous technical corrigenda:

This Corrigendum contains the cumulative set of corrections to ISO/IEC 9075:1992. It cancels and replaces Technical Corrigendum 1:1994.

Statement of purpose for rationale:

A statement indicating the rationale for each change to ISO/IEC 9075:1992 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 rule numbering:

This Corrigendum introduces some new Syntax, Access, General and Leveling Rules. The new Rules in this Corrigendum have been numbered as follows:

Rules inserted between, for example, Rules 7) and 8) (in ISO/IEC 9075:1992) 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.

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Introduction

1. *Rationale: In the list of significant new features, the wording incorrectly implies that all the examples listed in item 10) are referential integrity facilities.*

On page xiv, in Significant new feature 10), replace "referential integrity" with "integrity".

2 Normative references

1. *Rationale: Editorial.*

Add the following reference after the reference to "ISO 8601:1988":

- ISO 8649:1988, *Information processing systems—Open Systems Interconnection—Service definition for the Association Control Service Element.*
2. *Rationale: The newly revised Ada language standard (ISO/IEC 8652:1995, Information technology—Programming languages—Ada) contains support for decimal-encoded numeric data and variable length character strings. The revised interface allows newly written applications in the revised Ada language access to these features of SQL; previously written Ada applications, conformant with the earlier Ada interface, are conformant with the revised interface.*

Replace the reference to ISO/IEC 8652:1987) with the following:

- ISO/IEC 8652:1995, *Information technology—Programming languages—Ada.*
3. *Rationale: Editorial.*

Add the following reference after the reference to ISO/IEC 8824:1990:

- ISO/IEC 9579-1:1993, *Information technology—Open Systems Interconnection—Remote Database Access—Part 1: Generic Model, Service and Protocol.*

Add the following reference after the reference to ISO/IEC 9899:

- ISO/IEC 10026-2:1996, *Information technology—Open Systems Interconnection—Distributed Transaction Processing—Part 2: OSI TP Service.*

3.3.4.3 Terms denoting rule requirements

1. *Rationale: The following unifies the SQLSTATE returned for the different ways of invoking an SQL statement.*

In the first and second paragraphs, replace "syntax error or access rule violation (if this situation occurs during dynamic execution of an SQL-statement, then the exception that is raised is *syntax error or access rule violation in dynamic SQL statement*; if the situation occurs during direct invocation of an SQL-statement, then the exception that is raised is *syntax or access rule violation in direct SQL statement*)" with "syntax error or access rule violation".

4.2 Character strings

1. Rationale: Editorial.

In the second paragraph, replace the last sentence with the following:

Character sets defined by standards or by implementations reside in the Information Schema (named INFORMATION_SCHEMA) in each catalog, as do collations and translations defined by standards and collations, translations, and form-of-use conversions defined by implementations.

4.2.1 Character strings and collating sequences

1. Rationale: The following changes make the definitions of character set and collation descriptors more precise.

Replace the text on page 17 that occurs after the first paragraph with the following:

A character set is described by a character set descriptor. A character set descriptor includes:

- the name of the character set or character repertoire,
- if the character set is a character repertoire, then the name of the form-of-use,
- an indication of what characters are in the character set, and
- whether or not the character set uses the DEFAULT collation for its character repertoire, and,
- if the character set does not utilize the DEFAULT collation for its character repertoire, then the <translation name> contained in the character set's <translation collation>, if any, the <collation name> contained in the character set's <collate clause> or <limited collation definition>, if any, and, whether or not DESC was specified in the reference to the collation.

For every character set, there is at least one collation. A collation is described by a collation descriptor. A collation descriptor includes:

- the name of the collation,
- the name of the character repertoire on which the collation operates,
- whether the collation has the NO PAD or the PAD SPACE attribute, and
- whether or not this collation utilizes the DEFAULT collation for its character repertoire,
- if the collation does not utilize the DEFAULT collation for its character repertoire, then the <translation name> contained in the collation's <translation collation>, if any, the <collation name> contained in the collation's <collation source>, if any, and whether or not DESC was specified in the definition of the collation.

4.4 Numbers

1. *Rationale: Clarification.*

Add the following sentence immediately before the heading of Subclause 4.4.1 Characteristics of Numbers:

A value described by a numeric data type descriptor is always signed.

4.5 Datetimes and intervals

1. *Rationale: Clarification.*

Add the following sentence before the paragraph starting "Every datetime ...":

A value described by an interval data type descriptor is always signed.

4.5.1 Datetimes

1. *Rationale: Editorial.*

In the penultimate paragraph on page 24, replace "Universal Coordinated Time" with "Coordinated Universal Time".

4.5.2 Intervals

1. *Rationale: Editorial.*

In Table 7, replace "<interval leading field precision" with "<interval leading field precision>" (two occurrences).

4.8 Columns

1. *Rationale: Editorial.*

In the penultimate paragraph on page 28, replace "<row value constructor expression>" with "<row value constructor element>".

4.9 Tables

1. *Rationale: There is no named derived table other than a viewed table.*

After the paragraph that begins with "A derived table descriptor describes a derived table.", delete the first item ("— if the table is named, then the name of the table;").

2. *Rationale: There is no named derived table other than a viewed table.*

After the paragraph that begins with "A view descriptor describes a view.", insert "— the name of the view, and" before the existing item.

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4.10.2 Table constraints

1. Rationale: Editorial.

In the **Note**, replace "<match option>" with "<match type>".

2. Rationale: Editorial.

In the paragraph that begins with "A referential constraint is satisfied", replace "<match option>" with "<match type>".

4.18.1 Status parameters

1. Rationale: To insure that the value returned to the user in *SQLSTATE* is representative of the actual state of the transaction or *SQL*-statement.

Add the following as the last paragraph:

For the purpose of choosing status parameter values to be returned, *exceptions* for transaction rollback have precedence over *exceptions* for statement failure. Similarly, completion condition *no data* has precedence over *warning*, which has precedence over *successful completion*. All *exceptions* have precedence over all completion conditions. The values assigned to *SQLSTATE* shall obey these precedence rules.

4.22.6 SQL-statements and transaction states

1. Rationale: No statement can be both transaction-initiating and not transaction-initiating.

In the first dashed list (of transaction-initiating *SQL*-statements), in the bulleted sublist of *SQL*-data statements, delete the entry for <dynamic select statement>

4.24 SQL dynamic statements

1. Rationale: Editorial.

In the fourth paragraph, replace "<target specification>s" with "<simple value specification>s".

2. Rationale: Editorial.

In the eighth paragraph, replace the first occurrence of "<SQL statement>s" with "<SQL procedure statement>s", and replace the second occurrence of "<SQL statement>s" with "<embedded SQL statement>s".

4.26 Privileges

1. Rationale: Editorial.

In the fourth paragraph on page 52, replace "<module authorization identifier> is" with "<schema authorization identifier> is".

2. *Rationale: Provide missing rules that cover the acquisition of the necessary privileges to acquire the WITH GRANT OPTION on views through a grant to PUBLIC.*

Add the following before the antepenultimate paragraph of this Subclause:

The phrase *user privileges* refers to the set of privileges defined by the privilege descriptors whose grantee is either the identified <authorization identifier> or PUBLIC.

4.28 SQL-transactions

1. *Rationale: Clarification.*

In the paragraph that begins "In some environments (e.g., remote database access)", replace all occurrences of "SQL-environment" with "SQL-implementation".

4.29 SQL-connections

1. *Rationale: Editorial.*

Replace the second paragraph with the following:

An SQL-connection is an *active SQL-connection* if any SQL-statement that initiates or requires an SQL-transaction has been executed at its SQL-server via that SQL-connection during the current SQL-transaction.

2. *Rationale: Clarification.*

In the last sentence of the penultimate paragraph, replace "SQL-environment" with "SQL-implementation".

4.31 Client-server operation

1. *Rationale: Clarification.*

Replace the first sentence with the following:

As perceived by an SQL-agent, an SQL-implementation consists of one or more SQL-servers and one SQL-client through which SQL-connections can be made to them.

5.2 <token> and <separator>

1. *Rationale: The maximum length of an <identifier> is intended to be 128 characters.*

Replace Syntax Rule 8) with the following:

- 8) In a <regular identifier>, the number of <underscore>s plus the number of <identifier part>s shall be less than 128.
2. *Rationale: A <regular identifier> shall not contain any <quote> or <double quote>. Thus, a <delimited identifier> with a <delimited identifier body> containing a <quote> or <double quote> is not equivalent to any <regular identifier>.*

In Syntax Rule 13), delete the expression "(with all occurrences of <quote> replaced by <quote symbol> and all occurrences of <doublequote symbol> replaced by <double quote>)".

3. *Rationale: Correct the incorrect references to "<quote>" and "<quote symbol>" and delete the redundant references to "<double quote>"s and "<double quote symbol>"s in Syntax Rule 14.*

In Syntax Rule 14), delete "(with all occurrences of <quote> replaced by <quote symbol> and all occurrences of <doublequote symbol> replaced by <doublequote>)".

4. *Rationale: A <character representation> does not appear in a <regular identifier> or in a <delimited identifier body>.*

Replace Leveling Rule 2) a) with the following:

- a) The number of <underscore>s plus the number of <identifier part>s contained in a <regular identifier> shall be less than 18.

Insert the following Leveling Rule 2) a.1):

- a.1) The <delimited identifier body> of a <delimited identifier> shall not comprise more than 18 <delimited identifier part>s.

5.3 <literal>

1. *Rationale: Support changes to Subclause 6.10.*

In Format, replace the BNF for <date string>, <time string>, <timestamp string>, <interval string> with the following:

<date string> ::= <quote> <unquoted date string> <quote>

<time string> ::= <quote> <unquoted time string> <quote>

<timestamp string> ::= <quote> <unquoted timestamp string> <quote>

<interval string> ::= <quote> <unquoted interval string> <quote>

Add the following to Format:

<unquoted date string> ::= <date value>

<unquoted time string> ::= <time value> [<time zone interval>]

<unquoted timestamp string> ::= <unquoted date string> <space> <unquoted time string>

<unquoted interval string> ::= [<sign>] { <year-month literal> | <day-time literal> }

Add the following sentence at the end of General Rule 5):

If a <sign> is specified in both possible locations in an <interval literal>, the sign of the literal is determined by the normal mathematical interpretation of multiple sign operators, i.e., double negation results in a positive literal.

2. *Rationale: Ellipses were placed both in the definition of <separator> and in the usage of <separator> in several types of string literals. This leads to a small ambiguity when two separator characters follow one another. The following changes remove the ellipses in the latter of these two places:*

In Format, in each of the productions for <character string literal>, <national character string literal>, <bit string literal>, <hex string literal>, replace "<separator> ..." with "<separator>".

In Syntax Rules 1) - 3) replace "<separator> ..." with "<separator>".

5.4 Names and identifiers

1. *Rationale: Editorial.*

In Syntax Rule 1), replace "identified" with "indicated".

2. *Rationale: Add the rule for the comparison of <character set name>s missing since <character set name> was decoupled from <qualified name>.*

Add the following Syntax Rule:

- 10.5) Two <character set names> are equal if they have the same <SQL language identifier> and the same <schema name>, regardless of whether the <schema name>s are implicit or explicit.

6.1 <data type>

1. *Rationale: Clarify the error condition that should be returned if a datetime overflow occurs.*

Delete General Rule 6).

2. *Rationale: Clarification.*

Add the following Note after Syntax Rule 28):

Note: The length of interval data types is specified in the General Rules of 10.1, "<interval qualifier>".

6.2 <value specification> and <target specification>

1. *Rationale: Identify possible upward incompatibility.*

Add the following at the end of Syntax Rule 3):

Note: In an environment where the SQL-implementation conforms to Entry SQL, conforming SQL language that contains either:

- a) a specified or implied <comparison predicate> that compares the <value specification> USER with a <value specification> other than USER, or
- b) a specified or implied assignment in which the "value" (as defined in Subclause 9.2 Store assignment) contains the <value specification> USER

will become non-conforming in an environment where the SQL-implementation conforms to Intermediate SQL or Full SQL, unless the character repertoire of the implementation-defined character set in that environment is identical to the character repertoire of SQL_TEXT.

6.3 <table reference>

1. *Rationale: Editorial.*

In Syntax Rule 2) a), replace "with no intervening" with "without an intervening".

2. *Rationale: Editorial.*

In Syntax Rule 2) a), replace "The scope clause of the exposed" with "The scope of the exposed".

3. *Rationale: Editorial.*

In Syntax Rule 2) b), replace "with no intervening" with "without an intervening".

4. *Rationale: Clarify that references to non-existing objects is only allowed within the same <schema definition>.*

Add the following Syntax Rule:

- 8.1) Let *T* be the table identified by the <table name> immediately contained in <table reference>. If the <table reference> is not contained in a <schema definition>, then the schema identified by the explicit or implicit qualifier of the <table name> shall include the descriptor of *T*. If the <table reference> is contained in a <schema definition> *S*, then the schema identified by the explicit or implicit qualifier of the <table name> shall include the descriptor of *T*, or *S* shall include a <schema element> that creates the descriptor of *T*.

5. *Rationale: Editorial.*

Delete the first sentence of Access Rule 1).

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6.6 <numeric value function>

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1. *Rationale: Correct Format for <position expression> to support <bit value expression>s in addition to <character value expression>s.*

In the Format replace the production for <position expression> with the following:

```
<position expression> ::=
    POSITION <left paren> <string value expression>
    IN <string value expression> <right paren>
```

Replace Syntax Rule 1) with the following:

- 1) If <position expression> is specified, then both <string value expression>s shall be <bit value expression>s or both shall be <character value expression>s having the same character repertoire.

Replace General Rules 1) and 2) with the following:

- 1) If <position expression> is specified and neither <string value expression> is the null value, then
Case:
 - a) If the first <string value expression> has a length 0, then the result is 1.
 - b) If the value of the first <string value expression> is equal to an identical-length substring of contiguous characters or bits from the value of the second <string value expression>, then the result is 1 greater than the number of characters or bits within the value of the second <string value expression> preceding the start of the first such substring.
 - c) Otherwise, the result is 0.
- 2) If <position expression> is specified and either <string value expression> is the null value, then the result is the null value.

6.8 <datetime value function>

1. *Rationale: The following change clarifies that <datetime value function> is effectively evaluated only once per SQL statement.*

Replace General Rule 3) with the following:

- 3) If an SQL-statement causes the evaluation of one or more <datetime value function>s, then all such evaluations are effectively performed simultaneously. The time of evaluation of the <datetime value function> during the execution of the SQL-statement is implementation-dependent.

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6.10 <cast specification>

1. *Rationale: Clarify that references to non-existing objects is only allowed within the same <schema definition>.*

Add the following Syntax Rule:

- 8.1) If <domain name> is specified, then let *D* be the domain identified by the <domain name>. If the <cast specification> is not contained in a <schema definition>, then the schema identified by the explicit or implicit qualifier of the <domain name> shall include the descriptor of *D*. If the <cast specification> is contained in a <schema definition> *S*, then the schema identified by the explicit or implicit qualifier of the <domain name> shall include the descriptor of *D*, or *S* shall include a <schema element> that creates the descriptor of *D*.

2. *Rationale: Legalize a simpler format for character strings being cast to temporal data types.*

In General Rule 9) a) i), replace "rules for <literal>" with "rules for <literal> or for <unquoted date string>".

3. *Rationale: Clarify the error condition that should be returned if a datetime overflow occurs.*

Replace General Rule 9) a) ii) with the following:

- ii) Otherwise,
 - 1) If a <datetime value> does not conform to the natural rules for dates or times according to the Gregorian calendar, an exception condition is raised: *data exception—invalid datetime format*.
 - 2) Otherwise, an exception condition is raised: *data exception—invalid character value for cast*.

4. *Rationale: Legalize a simpler format for character strings being cast to temporal data types.*

In General Rule 10) a) i), replace "rules for <literal>" with "rules for <literal> or for <unquoted time string>".

5. *Rationale: Clarify the error condition that should be returned if a datetime overflow occurs.*

Replace General Rule 10) a) ii) with the following:

- ii) Otherwise,
 - 1) If a <datetime value> does not conform to the natural rules for dates or times according to the Gregorian calendar, an exception condition is raised: *data exception—invalid datetime format*.
 - 2) Otherwise, an exception condition is raised: *data exception—invalid character value for cast*.

6. *Rationale: Legalize a simpler format for character strings being cast to temporal data types.*

In General Rule 11) a) i), replace "rules for <literal>" with "rules for <literal> or for <unquoted timestamp string>".

7. *Rationale: Clarify the error condition that should be returned if a datetime overflow occurs.*

Replace General Rule 11) a) ii) with the following:

- ii) Otherwise,
 - 1) If a <datetime value> does not conform to the natural rules for dates or times according to the Gregorian calendar, an exception condition is raised: *data exception—invalid datetime format*.
 - 2) Otherwise, an exception condition is raised: *data exception—invalid character value for cast*.

8. *Rationale: Legalize a simpler format for character strings being cast to temporal data types.*

In General Rule 12) b) i), replace "rules for <literal>" with "rules for <literal> or for <unquoted interval string>".

9. *Rationale: Clarify the error condition that should be returned if a datetime overflow occurs.*

Replace General Rule 12) b) ii) with the following:

- ii) Otherwise,
 - 1) If a <datetime value> does not conform to the natural rules for intervals according to the Gregorian calendar, an exception condition is raised: *data exception—invalid interval format*.
 - 2) Otherwise, an exception condition is raised: *data exception—invalid character value for cast*.

6.12 <numeric value expression>

1. *Rationale: Editorial.*

In General Rule 2), replace "then the value of" with "then the result of".

6.14 <datetime value expression>

1. *Rationale: The expression "X AT TIME ZONE Y - Z" may be parsed as either "(X AT TIME ZONE Y) - Z" or "X AT TIME ZONE (Y - Z)". The following clarifies that it should be the former.*

Replace the Format for <time zone specifier> with the following:

<time zone specifier> ::=
 LOCAL
 | TIME ZONE <interval primary>

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2. *Rationale: Editorial.*

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In Syntax Rule 4), replace "<interval value expression>" with "<interval primary>".

3. *Rationale: Clarify the meaning of the list of data types given in Syntax Rule 5).*

Add a Note following Syntax Rule 5) b) as follows:

Note: In the preceding Syntax Rule, TIME does not include TIME WITH TIME ZONE and TIMESTAMP does not include TIMESTAMP WITH TIME ZONE.

4. *Rationale: If <time zone> is implied, then <time zone specifier> shall not be specified.*

In General Rule 2), replace "specified or implied" with "specified".

5. *Rationale: Editorial.*

In General Rule 2), replace "<interval value expression>" with "<interval primary>".

In General Rule 4) b), replace "<interval value expression>" with "<interval primary>".