Information technology — Database languages — SQL — Part 11: Information and definition schemas (SQL/Schemata)

TECHNICAL CORRIGENDUM 2

Technologies de l'information — Langages de base de données — SQL — Partie 11: Schémas des informations et des définitions (SQL/Schemata)

RECTIFICATIF TECHNIQUE 2

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5   Information Schema

5.2   INFORMATION_SCHEMA_CATALOG_NAME view

1. *Rationale: Correct the syntax.*

   Replace the view definition with:

```
CREATE VIEW INFORMATION_SCHEMA_CATALOG_NAME AS
    SELECT CATALOG_NAME
    FROM DEFINITION_SCHEMA.CATALOG_NAME
    WHERE CATALOG_NAME = 'CN';
```

5.34   KEY_PERIOD_USAGE view

1. *Rationale: Correct a Conformance Rule.*

   Replace Conformance Rule 2) with:

   2)   Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.KEY_PERIOD_USAGE.

5.37   PARAMETERS view

This Subclause is modified by Subclause 19.5, "PARAMETERS view", in ISO/IEC 9075-4.
This Subclause is modified by Subclause 21.10, "PARAMETERS view", in ISO/IEC 9075-14.

1. *Rationale: Identify the correct column.*

   Replace Conformance Rule 4) with:

   4)   Without Feature B200, "Polymorphic table functions", conforming SQL language shall not reference INFORMATION_SCHEMA.PARAMETERS.TABLE_SEMANTICS, INFORMATION_SCHEMA.PARAMETERS.IS_PRUNABLE, or INFORMATION_SCHEMA.PARAMETERS.HAS_PASS_THROUGH_COLUMNS.

2. *Rationale: Remove incorrect and misleading Conformance Rules.*

   Delete Conformance Rules 5) and 6).

5.39   PRIVATE_PARAMETERS view

1. *Rationale: Remove incorrect and inappropriate column references.*

   In the Definition, delete "P.FROM_SQL_SPECIFIC_CATALOG, P.FROM_SQL_SPECIFIC_SCHEMA, P.FROM_SQL_SPECIFIC_NAME, P.TO_SQL_SPECIFIC_CATALOG, P.TO_SQL_SPECIFIC_SCHEMA, P.TO_SQL_SPECIFIC_NAME," and "DTD.TABLE_SEMANTICS, DTD.IS_PRUNABLE, DTD.HAS_PASS_THROUGH_COLUMNS" from the select list.

2. *Rationale: Private parameters of a polymorphic table function cannot be generic tables.*

Delete Conformance Rules 5), 6) and 7).

5.51   ROUTINE_ROUTINE_USAGE view

1. *Rationale: Clarify the contents of columns.*

Replace the Definition with:

Definition

```
CREATE VIEW ROUTINE_ROUTINE_USAGE AS
    SELECT RRU.SPECIFIC_CATALOG, RRU.SPECIFIC_SCHEMA, RRU.SPECIFIC_NAME,
           RRU.SUBJECT_ROUTINE_CATALOG AS ROUTINE_CATALOG,
           RRU.SUBJECT_ROUTINE_SCHEMA AS ROUTINE_SCHEMA,
           RRU.SUBJECT_ROUTINE_NAME AS ROUTINE_NAME
    FROM DEFINITION_SCHEMA.ROUTINE_ROUTINE_USAGE AS RRU
      JOIN
         DEFINITION_SCHEMA.SCHEMATA AS S
       ON ( ( RRU.SUBJECT_ROUTINE_CATALOG, RRU.SUBJECT_ROUTINE_SCHEMA )
         = ( S.CATALOG_NAME, S.SCHEMA_NAME ) )
    WHERE ( S.SCHEMA_OWNER = CURRENT_USER
         OR
           S.SCHEMA_OWNER IN
           ( SELECT ER.ROLE_NAME
             FROM ENABLED_ROLES AS ER ) )
      AND
         RRU.SPECIFIC_CATALOG
       = ( SELECT ISCN.CATALOG_NAME
           FROM INFORMATION_SCHEMA_CATALOG_NAME AS ISCN );

GRANT SELECT ON TABLE ROUTINE_ROUTINE_USAGE
    TO PUBLIC WITH GRANT OPTION;
```

> NOTE 1 — The columns ROUTINE_CATALOG, ROUTINE_SCHEMA, and ROUTINE_NAME of the view identify the subject routine of either a <routine invocation>, a <method reference>, a <method invocation>, or a <static method invocation> contained in the <SQL routine body> or in the <parameter default> of an SQL parameter of an SQL-invoked routine.

5.52   ROUTINE_SEQUENCE_USAGE view

1. *Rationale: Make the definition of the view match its description.*

Replace the Definition with:

```
CREATE VIEW ROUTINE_SEQUENCE_USAGE AS
    SELECT SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
           R.ROUTINE_CATALOG, R.ROUTINE_SCHEMA, R.ROUTINE_NAME,
           RSU.SEQUENCE_CATALOG, RSU.SEQUENCE_SCHEMA, RSU.SEQUENCE_NAME
    FROM ( DEFINITION_SCHEMA.SEQENCE_SEQUENCE_USAGE AS RSU
```

```
        JOIN
             DEFINITION_SCHEMA.ROUTINES AS R
             USING ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME ) )
        JOIN
           DEFINITION_SCHEMA.SCHEMATA AS S
          ON ( ( RSU.SEQUENCE_CATALOG, RSU.SEQUENCE_SCHEMA )
             = ( S.CATALOG_NAME, S.SCHEMA_NAME ) )
      WHERE ( S.SCHEMA_OWNER = CURRENT_USER
           OR
             S.SCHEMA_OWNER IN
             ( SELECT ER.ROLE_NAME
               FROM ENABLED_ROLES AS ER ) )
        AND
           SPECIFIC_CATALOG
        = ( SELECT ISCN.CATALOG_NAME
             FROM INFORMATION_SCHEMA_CATALOG_NAME AS ISCN );

  GRANT SELECT ON TABLE ROUTINE_SEQUENCE_USAGE
      TO PUBLIC WITH GRANT OPTION;
```

5.69   TRIGGER_PERIOD_USAGE view

1. *Rationale: Add missing Conformance Rule.*

    Add the following Conformance Rule:

    5)   Without Feature T211, "Basic trigger capability", conforming SQL language shall not reference
          the view INFORMATION_SCHEMA.TRIGGER_PERIOD_USAGE.

5.78   VIEW_PERIOD_USAGE view

1. *Rationale: Delete incorrect Conformance Rule.*

    Delete Conformance Rule 2).

5.82   Short name views

This Subclause is modified by Subclause 19.8, "Short name views", in ISO/IEC 9075-4.
This Subclause is modified by Subclause 24.14, "Short name views", in ISO/IEC 9075-9.
This Subclause is modified by Subclause 14.7, "Short name views", in ISO/IEC 9075-13.
This Subclause is modified by Subclause 21.15, "Short name views", in ISO/IEC 9075-14.

1. *Rationale: Remove incorrect column references.*

    In the Definition, delete "FROM_SQL_SPEC_CAT, FROM_SQL_SPEC_SCH, FROM_SQL_SPEC_NAME,
    TO_SQL_SPEC_CAT, TO_SQL_SPEC_SCHEMA, TO_SQL_SPEC_NAME," and ", TABLE_SEMANTICS,
    IS_PRUNABLE, HAS_PASS_THRU_COLS" from the view column list of PRIVATE_PARAMS_S, and delete
    "FROM_SQL_SPECIFIC_CATALOG, FROM_SQL_SPECIFIC_SCHEMA, FROM_SQL_SPECIFIC_NAME,
    TO_SQL_SPECIFIC_CATALOG, TO_SQL_SPECIFIC_SCHEMA, TO_SQL_SPECIFIC_NAME," and ",
    TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS" from the select list of
    PRIVATE_PARAMS_S.

2. *Rationale: Make the definition of the view match its description.*

    Replace the Definition of the ROUT_SEQ_USAGE_S view with:

    ```
    CREATE VIEW ROUT_SEQ_USAGE_S
            ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
              ROUTINE_CATALOG, ROUTINE_SCHEMA, ROUTINE_NAME,
              SEQUENCE_CATALOG, SEQUENCE_SCHEMA, SEQUENCE_NAME ) AS
        SELECT SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
               ROUTINE_CATALOG, ROUTINE_SCHEMA, ROUTINE_NAME,
               SEQUENCE_CATALOG, SEQUENCE_SCHEMA, SEQUENCE_NAME
          FROM INFORMATION_SCHEMA.ROUTINE_SEQUENCE_USAGE;
    ```

3. *Rationale: Remove incorrect and misleading Conformance Rules:*

    Delete Conformance Rules 69), 70), and 73).

4. *Rationale: Add missing Conformance Rules:*

    Insert the following Conformance Rules:

    74) Without Feature T522, "Default values for IN parameters of SQL-invoked procedures", Feature T523, "Default values for INOUT parameters of SQL-invoked procedures", or Feature T525, "Default values for parameters of SQL-invoked functions", conforming SQL language shall not reference INFORMATION_SCHEMA.PRIVATE_PARAMS_S.PARAMETER_DEFAULT.

    75) Without Feature F651, "Catalog name qualifiers", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CATALOG_NAME.

    76) Without Feature F690, "Collation support", conforming SQL language shall not reference the view INFORMATION_SCHEMA.COLLATION_APPLIC_S.

    77) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CONSTR_PER_USAGE.

    78) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.CONSTR_PER_USAGE.

    79) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PERIOD_USAGE.

    80) Without Feature T180, "System-versioned tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PER_USAGE.

    81) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.ROUTINE_PER_USAGE.

    82) Without Feature F341, "Usage tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.

    83) Without Feature T180, "System-versioned tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.

84) Without Feature T181, "Application-time period tables", conforming SQL language shall not reference the view INFORMATION_SCHEMA.TRIG_PER_USAGE.

6   Definition Schema

6.10   CHARACTER_REPERTOIRES base table

1. *Rationale: Correct the definition of the Table Population.*

Replace Table Population rule 4) b) iv) with:

4)   ...

    b)   ...

        iv)   UCS: 'UCS' and an implementation-defined choice of either 'UCS_BASIC' or 'UNICODE'.

2. *Rationale: Correct the definition of the Table Population.*

Delete Table Population rules 4) b) v) and 4) b) vi).

6.22   DATA_TYPE_DESCRIPTOR base table

This Subclause is modified by Subclause 25.2, "DATA_TYPE_DESCRIPTOR base table", in ISO/IEC 9075-9.
This Subclause is modified by Subclause 22.1, "DATA_TYPE_DESCRIPTOR base table", in ISO/IEC 9075-14.
This Subclause is modified by Subclause 20.1, "DATA_TYPE_DESCRIPTOR base table", in ISO/IEC 9075-15.

1. *Rationale: Correct the syntax.*

Replace the view definition with:

```
CREATE TABLE DATA_TYPE_DESCRIPTOR (
    OBJECT_CATALOG                      INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_SCHEMA                       INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_NAME                         INFORMATION_SCHEMA.SQL_IDENTIFIER,
    OBJECT_TYPE                         INFORMATION_SCHEMA.CHARACTER_DATA
      CONSTRAINT DATA_TYPE_DESCRIPTOR_CHECK_OBJECT_TYPE
        CHECK ( OBJECT_TYPE IN
                ( 'TABLE', 'DOMAIN', 'USER-DEFINED TYPE',
                  'ROUTINE', 'SEQUENCE' ) ),
    DTD_IDENTIFIER                      INFORMATION_SCHEMA.SQL_IDENTIFIER,
    DATA_TYPE                           INFORMATION_SCHEMA.CHARACTER_DATA
      CONSTRAINT DATA_TYPE_DESCRIPTOR_OBJECT_DATA_TYPE_NOT_NULL
        NOT NULL,
    CHARACTER_SET_CATALOG               INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_SET_SCHEMA                INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_SET_NAME                  INFORMATION_SCHEMA.SQL_IDENTIFIER,
    CHARACTER_MAXIMUM_LENGTH            INFORMATION_SCHEMA.CARDINAL_NUMBER,
    CHARACTER_OCTET_LENGTH              INFORMATION_SCHEMA.CARDINAL_NUMBER,
    COLLATION_CATALOG                   INFORMATION_SCHEMA.SQL_IDENTIFIER,
    COLLATION_SCHEMA                    INFORMATION_SCHEMA.SQL_IDENTIFIER,
```

```
    COLLATION_NAME                        INFORMATION_SCHEMA.SQL_IDENTIFIER,
    NUMERIC_PRECISION                     INFORMATION_SCHEMA.CARDINAL_NUMBER,
    NUMERIC_PRECISION_RADIX               INFORMATION_SCHEMA.CARDINAL_NUMBER,
    NUMERIC_SCALE                         INFORMATION_SCHEMA.CARDINAL_NUMBER,
    DECLARED_DATA_TYPE                    INFORMATION_SCHEMA.CHARACTER_DATA,
    DECLARED_NUMERIC_PRECISION            INFORMATION_SCHEMA.CARDINAL_NUMBER,
    DECLARED_NUMERIC_SCALE                INFORMATION_SCHEMA.CARDINAL_NUMBER,
    DATETIME_PRECISION                    INFORMATION_SCHEMA.CARDINAL_NUMBER,
    INTERVAL_TYPE                         INFORMATION_SCHEMA.CHARACTER_DATA,
    INTERVAL_PRECISION                    INFORMATION_SCHEMA.CARDINAL_NUMBER,
    USER_DEFINED_TYPE_CATALOG             INFORMATION_SCHEMA.SQL_IDENTIFIER,
    USER_DEFINED_TYPE_SCHEMA              INFORMATION_SCHEMA.SQL_IDENTIFIER,
    USER_DEFINED_TYPE_NAME                INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SCOPE_CATALOG                         INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SCOPE_SCHEMA                          INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SCOPE_NAME                            INFORMATION_SCHEMA.SQL_IDENTIFIER,
    MAXIMUM_CARDINALITY                   INFORMATION_SCHEMA.CARDINAL_NUMBER,
    TABLE_SEMANTICS                       INFORMATION_SCHEMA.CHARACTER_DATA
      CONSTRAINT DATA_TYPE_DESCRIPTOR_TABLE_SEMANTICS_CHECK
        CHECK ( TABLE_SEMANTICS IN ( 'ROW', 'SET' ) ),
    IS_PRUNABLE                           INFORMATION_SCHEMA.YES_OR_NO,
    HAS_PASS_THROUGH_COLUMNS              INFORMATION_SCHEMA.YES_OR_NO,

    CONSTRAINT DATA_TYPE_DESCRIPTOR_DATA_TYPE_CHECK_COMBINATIONS
      CHECK ( ( DATA_TYPE IN
                  ( 'CHARACTER', 'CHARACTER VARYING', 'CHARACTER LARGE OBJECT' )
                AND
                  ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                    CHARACTER_SET_NAME ) IS NOT NULL
                AND
                  ( CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH ) IS NOT NULL
                AND
                  ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                    DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                    DECLARED_NUMERIC_SCALE ) IS NULL
                AND
                  DATETIME_PRECISION IS NULL
                AND
                  ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
                AND
                  ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                    USER_DEFINED_TYPE_NAME ) IS NULL
                AND
                  ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
                AND
                  MAXIMUM_CARDINALITY IS NULL
                AND
                  ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
              OR
                ( DATA_TYPE IN
                    ( 'BINARY', 'BINARY VARYING', 'BINARY LARGE OBJECT' )
                AND
                  ( CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH ) IS NOT NULL
                AND
                  ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                    CHARACTER_SET_NAME, COLLATION_CATALOG,
                    COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
```

```
             AND
               ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                 DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                 DECLARED_NUMERIC_SCALE ) IS NULL
             AND
               DATETIME_PRECISION IS NULL
             AND
               ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
             AND
               ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                 USER_DEFINED_TYPE_NAME ) IS NULL
             AND
               ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
             AND
               MAXIMUM_CARDINALITY IS NULL
             AND
               ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
          OR
             ( DATA_TYPE IN
                 ( 'SMALLINT', 'INTEGER', 'BIGINT' )
             AND
               DECLARED_DATA_TYPE IN
                 ( 'SMALLINT', 'INTEGER', 'BIGINT', 'NUMERIC', 'DECIMAL' )
             AND
               ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

                 COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
             AND
               NUMERIC_PRECISION_RADIX IN ( 2, 10 )
             AND
               NUMERIC_PRECISION IS NOT NULL
             AND
               NUMERIC_SCALE = 0
             AND
               ( DECLARED_NUMERIC_SCALE IS NULL OR DECLARED_NUMERIC_SCALE = 0 )
             AND
               DATETIME_PRECISION IS NULL
             AND
               ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
             AND
               ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                 USER_DEFINED_TYPE_NAME ) IS NULL
             AND
               ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
             AND
               MAXIMUM_CARDINALITY IS NULL
             AND
               ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
          OR
             ( DATA_TYPE IN
                 ( 'NUMERIC', 'DECIMAL' )
             AND
               DECLARED_DATA_TYPE IN
                 ( 'SMALLINT', 'INTEGER', 'BIGINT', 'NUMERIC', 'DECIMAL' )
             AND
               ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
```

```
          CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

            COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        NUMERIC_PRECISION_RADIX = 10
      AND
        ( NUMERIC_PRECISION, NUMERIC_SCALE ) IS NOT NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
  OR
    ( DATA_TYPE IN
        ( 'REAL', 'DOUBLE PRECISION', 'FLOAT' )
    AND
      DECLARED_DATA_TYPE IN
        ( 'REAL', 'DOUBLE PRECISION', 'FLOAT' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
       CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        NUMERIC_PRECISION IS NOT NULL
      AND
        NUMERIC_PRECISION_RADIX = 2
      AND
        NUMERIC_SCALE IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
  OR
    ( DATA_TYPE = 'DECFLOAT'
    AND
      DECLARED_DATA_TYPE = 'DECFLOAT'
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
       CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,
```

```
            COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      NUMERIC_PRECISION IS NOT NULL
    AND
      NUMERIC_PRECISION_RADIX = 10
    AND
      NUMERIC_SCALE IS NULL
    AND
      DATETIME_PRECISION IS NULL
    AND
      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IS NULL
    AND
      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
      MAXIMUM_CARDINALITY IS NULL
    AND
      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
  OR
    ( DATA_TYPE IN
        ( 'DATE', 'TIME', 'TIMESTAMP',
          'TIME WITH TIME ZONE', 'TIMESTAMP WITH TIME ZONE' )
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
       CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
        DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
        DECLARED_NUMERIC_SCALE ) IS NULL
    AND
      DATETIME_PRECISION IS NOT NULL
    AND
      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
    AND
      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
        USER_DEFINED_TYPE_NAME ) IS NULL
    AND
      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
    AND
      MAXIMUM_CARDINALITY IS NULL
    AND
      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
  OR
    ( DATA_TYPE = 'INTERVAL'
    AND
      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
       CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

        COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
    AND
      ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
        DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
```

```
              DECLARED_NUMERIC_SCALE ) IS NULL
       AND
         DATETIME_PRECISION IS NOT NULL
       AND
         INTERVAL_TYPE IN
           ( 'YEAR', 'MONTH', 'DAY', 'HOUR', 'MINUTE', 'SECOND',
             'YEAR TO MONTH', 'DAY TO HOUR', 'DAY TO MINUTE',
             'DAY TO SECOND', 'HOUR TO MINUTE',
             'HOUR TO SECOND', 'MINUTE TO SECOND' )
       AND
         INTERVAL_PRECISION IS NOT NULL
       AND
         ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
           USER_DEFINED_TYPE_NAME ) IS NULL
       AND
         ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
       AND
         MAXIMUM_CARDINALITY IS NULL
       AND
         ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
    OR
      ( DATA_TYPE = 'BOOLEAN'
      AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
         CHARACTER_SET_NAME, CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH,

          COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
    OR
      ( DATA_TYPE = 'USER-DEFINED'
      AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
```

```
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NOT NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
    OR
      ( DATA_TYPE = 'REF'
      AND
        ( CHARACTER_MAXIMUM_LENGTH, CHARACTER_OCTET_LENGTH ) IS NOT NULL
      AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NOT NULL
      AND
        MAXIMUM_CARDINALITY IS NULL
      AND
        ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
    OR
      ( DATA_TYPE = 'ARRAY'
      AND
        ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
          CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
          CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
          COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
      AND
        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
          DECLARED_NUMERIC_SCALE ) IS NULL
      AND
        DATETIME_PRECISION IS NULL
      AND
        ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
      AND
        ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
          USER_DEFINED_TYPE_NAME ) IS NULL
      AND
        ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
      AND
        MAXIMUM_CARDINALITY IS NOT NULL
      AND
```

```
              ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
          OR
            ( DATA_TYPE = 'MULTISET'
            AND
              ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
                CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
                COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
            AND
              ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                DECLARED_NUMERIC_SCALE ) IS NULL
            AND
              DATETIME_PRECISION IS NULL
            AND
              ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
            AND
              ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                USER_DEFINED_TYPE_NAME ) IS NULL
            AND
              ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
            AND
              MAXIMUM_CARDINALITY IS NULL
            AND
              ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
          OR
            ( DATA_TYPE = 'ROW'
            AND
              ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
                CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
                COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
            AND
              ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                DECLARED_NUMERIC_SCALE ) IS NULL
            AND
              DATETIME_PRECISION IS NULL
            AND
              ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
            AND
              ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                USER_DEFINED_TYPE_NAME ) IS NULL
            AND
              ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
            AND
              MAXIMUM_CARDINALITY IS NULL
            AND
              ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
          OR
            ( DATA_TYPE = 'TABLE'
            AND
              ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
                CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
                COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
            AND
```

```
                        ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                          DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                          DECLARED_NUMERIC_SCALE ) IS NULL
                     AND
                       DATETIME_PRECISION IS NULL
                     AND
                       ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
                     AND
                       ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                         USER_DEFINED_TYPE_NAME ) IS NULL
                     AND
                       ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
                     AND
                       MAXIMUM_CARDINALITY IS NULL )
                  OR
                    ( DATA_TYPE = 'DESCRIPTOR'
                    AND
                      ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA,
                        CHARACTER_SET_NAME, CHARACTER_OCTET_LENGTH,
                        CHARACTER_MAXIMUM_LENGTH, COLLATION_CATALOG,
                        COLLATION_SCHEMA, COLLATION_NAME ) IS NULL
                    AND
                      ( NUMERIC_PRECISION, NUMERIC_PRECISION_RADIX, NUMERIC_SCALE,
                        DECLARED_DATA_TYPE, DECLARED_NUMERIC_PRECISION,
                        DECLARED_NUMERIC_SCALE ) IS NULL
                    AND
                      DATETIME_PRECISION IS NULL
                    AND
                      ( INTERVAL_TYPE, INTERVAL_PRECISION ) IS NULL
                    AND
                      ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                        USER_DEFINED_TYPE_NAME ) IS NULL
                    AND
                      ( SCOPE_CATALOG, SCOPE_SCHEMA, SCOPE_NAME ) IS NULL
                    AND
                      MAXIMUM_CARDINALITY IS NULL
                    AND
                      ( TABLE_SEMANTICS, IS_PRUNABLE, HAS_PASS_THROUGH_COLUMNS ) IS NULL )
                  OR
                    ( DATA_TYPE NOT IN
                      ( 'CHARACTER', 'CHARACTER VARYING',
                        'CHARACTER LARGE OBJECT', 'BINARY',
                        'BINARY VARYING', 'BINARY LARGE OBJECT',
                        'NUMERIC', 'DECIMAL', 'SMALLINT', 'INTEGER', 'BIGINT',
                        'FLOAT', 'REAL', 'DOUBLE PRECISION', 'DECFLOAT',
                        'DATE', 'TIME', 'TIMESTAMP',
                        'INTERVAL', 'BOOLEAN', 'USER-DEFINED',
                        'REF', 'ROW', 'ARRAY', 'MULTISET',
                        'TABLE', 'DESCRIPTOR' ) ) ),

         CONSTRAINT DATA_TYPE_DESCRIPTOR_CHECK_REFERENCES_UDT
           CHECK ( USER_DEFINED_TYPE_CATALOG <>
                    ANY ( SELECT CATALOG_NAME
                            FROM SCHEMATA )
                  OR
                    ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                      USER_DEFINED_TYPE_NAME ) IN
```

```
                    ( SELECT USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                             USER_DEFINED_TYPE_NAME
                      FROM USER_DEFINED_TYPES ) ),

        CONSTRAINT DATA_TYPE_DESCRIPTOR_PRIMARY_KEY
          PRIMARY KEY ( OBJECT_CATALOG, OBJECT_SCHEMA, OBJECT_NAME,
                        OBJECT_TYPE, DTD_IDENTIFIER ),

        CONSTRAINT
    DATA_TYPE_DESCRIPTOR_CHECK_REFERENCES_COLLATION_CHARACTER_SET_APPLICABILITY
          CHECK ( CHARACTER_SET_CATALOG NOT IN
                    ( SELECT CATALOG_NAME FROM SCHEMATA )
                OR
                  COLLATION_CATALOG NOT IN
                  ( SELECT CATALOG_NAME FROM SCHEMATA )
                OR
                  ( CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA, CHARACTER_SET_NAME,
                         COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME ) IN
                 ( SELECT CHARACTER_SET_CATALOG, CHARACTER_SET_SCHEMA, CHARACTER_SET_NAME,

                         COLLATION_CATALOG, COLLATION_SCHEMA, COLLATION_NAME
                    FROM COLLATION_CHARACTER_SET_APPLICABILITY ) ),

        CONSTRAINT DATA_TYPE_DESCRIPTOR_FOREIGN_KEY_SCHEMATA
          FOREIGN KEY ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA )
            REFERENCES SCHEMATA
        )
```

2. *Rationale: Remove redundant and incomplete Description.*

   Delete Description 10).

6.45   ROUTINES base table

This Subclause is modified by Subclause 20.5, "ROUTINES base table", in ISO/IEC 9075-4.
This Subclause is modified by Subclause 15.5, "ROUTINES base table", in ISO/IEC 9075-13.
This Subclause is modified by Subclause 22.3, "ROUTINES base table", in ISO/IEC 9075-14.

1. *Rationale: Correct the syntax and add missing foreign key constraint.*

   Replace the table definition with:

```
CREATE TABLE ROUTINES (
     SPECIFIC_CATALOG                    INFORMATION_SCHEMA.SQL_IDENTIFIER,
     SPECIFIC_SCHEMA                     INFORMATION_SCHEMA.SQL_IDENTIFIER,
     SPECIFIC_NAME                       INFORMATION_SCHEMA.SQL_IDENTIFIER,
     ROUTINE_CATALOG                     INFORMATION_SCHEMA.SQL_IDENTIFIER,
     ROUTINE_SCHEMA                      INFORMATION_SCHEMA.SQL_IDENTIFIER,
     ROUTINE_NAME                        INFORMATION_SCHEMA.SQL_IDENTIFIER,
     MODULE_CATALOG                      INFORMATION_SCHEMA.SQL_IDENTIFIER,
     MODULE_SCHEMA                       INFORMATION_SCHEMA.SQL_IDENTIFIER,
     MODULE_NAME                         INFORMATION_SCHEMA.SQL_IDENTIFIER,
     USER_DEFINED_TYPE_CATALOG           INFORMATION_SCHEMA.SQL_IDENTIFIER,
     USER_DEFINED_TYPE_SCHEMA            INFORMATION_SCHEMA.SQL_IDENTIFIER,
```

```
                 USER_DEFINED_TYPE_NAME                 INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 ROUTINE_TYPE                           INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT ROUTINE_TYPE_NOT_NULL
                     NOT NULL
                   CONSTRAINT ROUTINE_TYPE_CHECK
                     CHECK ( ROUTINE_TYPE IN
                             ( 'PROCEDURE', 'FUNCTION', 'PTF',
                               'INSTANCE METHOD', 'STATIC METHOD', 'CONSTRUCTOR METHOD' ) ),
                 DTD_IDENTIFIER                         INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 ROUTINE_BODY                           INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT ROUTINE_BODY_NOT_NULL
                     NOT NULL
                   CONSTRAINT ROUTINE_BODY_CHECK
                     CHECK ( ROUTINE_BODY IN
                             ( 'SQL', 'EXTERNAL', 'PTF' ) ),
                 ROUTINE_DEFINITION                     INFORMATION_SCHEMA.CHARACTER_DATA,
                 EXTERNAL_NAME                          INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 EXTERNAL_LANGUAGE                      INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT EXTERNAL_LANGUAGE_CHECK
                     CHECK ( EXTERNAL_LANGUAGE IN
                             ( 'ADA', 'C', 'COBOL',
                               'FORTRAN', 'MUMPS', 'PASCAL', 'PLI' ) ),
                 PARAMETER_STYLE                        INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT PARAMETER_STYLE_CHECK
                     CHECK ( PARAMETER_STYLE IN
                             ( 'SQL', 'GENERAL' ) ),
                 IS_DETERMINISTIC                       INFORMATION_SCHEMA.YES_OR_NO
                   CONSTRAINT ROUTINES_IS_DETERMINISTIC_NOT_NULL
                     NOT NULL,
                 SQL_DATA_ACCESS                        INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT ROUTINES_SQL_DATA_ACCESS_NOT_NULL
                     NOT NULL
                   CONSTRAINT ROUTINES_SQL_DATA_ACCESS_CHECK
                     CHECK ( SQL_DATA_ACCESS IN
                             ( 'NO SQL', 'CONTAINS SQL',
                               'READS SQL DATA', 'MODIFIES SQL DATA' ) ),
                 IS_NULL_CALL                           INFORMATION_SCHEMA.YES_OR_NO,
                 SQL_PATH                               INFORMATION_SCHEMA.CHARACTER_DATA,
                 SCHEMA_LEVEL_ROUTINE                   INFORMATION_SCHEMA.YES_OR_NO
                   CONSTRAINT ROUTINES_SCHEMA_LEVEL_ROUTINE_NOT_NULL
                     NOT NULL,
                 MAX_DYNAMIC_RESULT_SETS                INFORMATION_SCHEMA.CARDINAL_NUMBER,
                 IS_USER_DEFINED_CAST                   INFORMATION_SCHEMA.YES_OR_NO,
                 IS_IMPLICITLY_INVOCABLE                INFORMATION_SCHEMA.YES_OR_NO,
                 SECURITY_TYPE                          INFORMATION_SCHEMA.CHARACTER_DATA
                   CONSTRAINT ROUTINES_SECURITY_TYPE_CHECK
                     CHECK ( SECURITY_TYPE IN
                             ( 'DEFINER', 'INVOKER', 'IMPLEMENTATION DEFINED' ) ),
                 TO_SQL_SPECIFIC_CATALOG                INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 TO_SQL_SPECIFIC_SCHEMA                 INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 TO_SQL_SPECIFIC_NAME                   INFORMATION_SCHEMA.SQL_IDENTIFIER,
                 AS_LOCATOR                             INFORMATION_SCHEMA.YES_OR_NO,
                 CREATED                                INFORMATION_SCHEMA.TIME_STAMP,
                 LAST_ALTERED                           INFORMATION_SCHEMA.TIME_STAMP,
                 NEW_SAVEPOINT_LEVEL                    INFORMATION_SCHEMA.YES_OR_NO,
                 IS_UDT_DEPENDENT                       INFORMATION_SCHEMA.YES_OR_NO
                   CONSTRAINT ROUTINES_IS_UDT_DEPENDENT_NOT_NULL
```

```
      NOT NULL,
  RESULT_CAST_FROM_DTD_IDENTIFIER          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  RESULT_CAST_AS_LOCATOR                   INFORMATION_SCHEMA.YES_OR_NO,


  RETURNS_ONLY_PASS_THROUGH                INFORMATION_SCHEMA.YES_OR_NO,
  DESCRIBE_PROCEDURE_SPECIFIC_CATALOG      INFORMATION_SCHEMA.SQL_IDENTIFIER,
  DESCRIBE_PROCEDURE_SPECIFIC_SCHEMA       INFORMATION_SCHEMA.SQL_IDENTIFIER,
  DESCRIBE_PROCEDURE_SPECIFIC_NAME         INFORMATION_SCHEMA.SQL_IDENTIFIER,
  START_PROCEDURE_SPECIFIC_CATALOG         INFORMATION_SCHEMA.SQL_IDENTIFIER,
  START_PROCEDURE_SPECIFIC_SCHEMA          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  START_PROCEDURE_SPECIFIC_NAME            INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FULFILL_PROCEDURE_SPECIFIC_CATALOG       INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FULFILL_PROCEDURE_SPECIFIC_SCHEMA        INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FULFILL_PROCEDURE_SPECIFIC_NAME          INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FINISH_PROCEDURE_SPECIFIC_CATALOG        INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FINISH_PROCEDURE_SPECIFIC_SCHEMA         INFORMATION_SCHEMA.SQL_IDENTIFIER,
  FINISH_PROCEDURE_SPECIFIC_NAME           INFORMATION_SCHEMA.SQL_IDENTIFIER,

  CONSTRAINT ROUTINES_PRIMARY_KEY
    PRIMARY KEY ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME ),

  CONSTRAINT ROUTINES_FOREIGN_KEY_SCHEMATA
    FOREIGN KEY ( ROUTINE_CATALOG, ROUTINE_SCHEMA )
    REFERENCES SCHEMATA,

  CONSTRAINT ROUTINES_FOREIGN_KEY_USER_DEFINED_TYPES
    FOREIGN KEY ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA,
                  USER_DEFINED_TYPE_NAME )
    REFERENCES USER_DEFINED_TYPES
      MATCH FULL,

  CONSTRAINT ROUTINES_COMBINATIONS
    CHECK ( ( ROUTINE_BODY IN ( 'SQL', 'PTF' )
          AND
            ( EXTERNAL_NAME, EXTERNAL_LANGUAGE, PARAMETER_STYLE ) IS NULL )
         OR
           ( ROUTINE_BODY = 'EXTERNAL'
           AND
             ( EXTERNAL_NAME, EXTERNAL_LANGUAGE, PARAMETER_STYLE ) IS NOT NULL )
           ),

  CONSTRAINT ROUTINES_SAME_SCHEMA
    CHECK ( ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA ) =
            ( ROUTINE_CATALOG, ROUTINE_SCHEMA )
         OR ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA ) =
            ( MODULE_CATALOG, MODULE_SCHEMA )
         OR ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA ) =
            ( USER_DEFINED_TYPE_CATALOG, USER_DEFINED_TYPE_SCHEMA ) ),

  CONSTRAINT ROUTINES_CHECK_RESULT_TYPE
    CHECK ( ( ROUTINE_TYPE ='PROCEDURE'
          AND
            DTD_IDENTIFIER IS NULL )
         OR
           ( ROUTINE_TYPE <>'PROCEDURE'
           AND
```

```
                        ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
                          'ROUTINE', DTD_IDENTIFIER ) IN
                          ( SELECT OBJECT_CATALOG, OBJECT_SCHEMA, OBJECT_NAME,
                                   OBJECT_TYPE, DTD_IDENTIFIER
                            FROM DATA_TYPE_DESCRIPTOR ) ) ),

    CONSTRAINT ROUTINES_CHECK_RESULT_CAST
      CHECK ( ( RESULT_CAST_FROM_DTD_IDENTIFIER IS NULL
              AND
                RESULT_CAST_AS_LOCATOR IS NULL )
            OR
              ( RESULT_CAST_FROM_DTD_IDENTIFIER IS NOT NULL
              AND
                RESULT_CAST_AS_LOCATOR IS NOT NULL
              AND
                ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
                  'ROUTINE', RESULT_CAST_FROM_DTD_IDENTIFIER ) IN
                  ( SELECT OBJECT_CATALOG, OBJECT_SCHEMA, OBJECT_NAME,
                           OBJECT_TYPE, DTD_IDENTIFIER
                    FROM DATA_TYPE_DESCRIPTOR ) ) ),

    CONSTRAINT ROUTINES_TO_SQL_ROUTINE_FOREIGN_KEY
      FOREIGN KEY ( TO_SQL_SPECIFIC_CATALOG,
                    TO_SQL_SPECIFIC_SCHEMA,
                    TO_SQL_SPECIFIC_NAME )
      REFERENCES ROUTINES,

    CONSTRAINT ROUTINES_PTF_DESCRIBE_FOREIGN_KEY
      FOREIGN KEY ( DESCRIBE_PROCEDURE_SPECIFIC_CATALOG,
                    DESCRIBE_PROCEDURE_SPECIFIC_SCHEMA,
                    DESCRIBE_PROCEDURE_SPECIFIC_NAME )
      REFERENCES ROUTINES,

    CONSTRAINT ROUTINES_PTF_DESCRIBE_CHECK
      CHECK ( ROUTINE_TYPE = 'PTF'
          OR
              ( DESCRIBE_PROCEDURE_SPECIFIC_CATALOG,
                DESCRIBE_PROCEDURE_SPECIFIC_SCHEMA,
                DESCRIBE_PROCEDURE_SPECIFIC_NAME ) IS NULL ),

    CONSTRAINT ROUTINES_PTF_START_FOREIGN_KEY
      FOREIGN KEY ( START_PROCEDURE_SPECIFIC_CATALOG,
                    START_PROCEDURE_SPECIFIC_SCHEMA,
                    START_PROCEDURE_SPECIFIC_NAME )
      REFERENCES ROUTINES,

    CONSTRAINT ROUTINES_PTF_START_CHECK
      CHECK ( ROUTINE_TYPE = 'PTF'
          OR
              ( START_PROCEDURE_SPECIFIC_CATALOG,
                START_PROCEDURE_SPECIFIC_SCHEMA,
                START_PROCEDURE_SPECIFIC_NAME ) IS NULL ),

    CONSTRAINT ROUTINES_PTF_FULFILL_FOREIGN_KEY
      FOREIGN KEY ( FULFILL_PROCEDURE_SPECIFIC_CATALOG,
                    FULFILL_PROCEDURE_SPECIFIC_SCHEMA,
                    FULFILL_PROCEDURE_SPECIFIC_NAME )
```

```
        REFERENCES ROUTINES,

    CONSTRAINT ROUTINES_PTF_FULFILL_CHECK
      CHECK ( ( ROUTINE_TYPE = 'PTF'
         AND
                 ( FULFILL_PROCEDURE_SPECIFIC_CATALOG,
                   FULFILL_PROCEDURE_SPECIFIC_SCHEMA,
                   FULFILL_PROCEDURE_SPECIFIC_NAME ) IS NOT NULL )
         OR
                 ( ROUTINE_TYPE <> 'PTF'
         AND
                 ( FULFILL_PROCEDURE_SPECIFIC_CATALOG,
                   FULFILL_PROCEDURE_SPECIFIC_SCHEMA,
                   FULFILL_PROCEDURE_SPECIFIC_NAME ) IS NULL ) ),

    CONSTRAINT ROUTINES_PTF_FINISH_FOREIGN_KEY
      FOREIGN KEY ( FINISH_PROCEDURE_SPECIFIC_CATALOG,
                    FINISH_PROCEDURE_SPECIFIC_SCHEMA,
                    FINISH_PROCEDURE_SPECIFIC_NAME )
      REFERENCES ROUTINES,

    CONSTRAINT ROUTINES_PTF_FINISH_CHECK
      CHECK ( ROUTINE_TYPE = 'PTF'
         OR
                 ( FINISH_PROCEDURE_SPECIFIC_CATALOG,
                   FINISH_PROCEDURE_SPECIFIC_SCHEMA,
                   FINISH_PROCEDURE_SPECIFIC_NAME ) IS NULL ),

    CONSTRAINT ROUTINES_RETURNS_ONLY_PASS_THROUGH_CHECK
        CHECK ( ( ROUTINE_TYPE = 'PTF'
               AND RETURNS_ONLY_PASS-THROUGH IS NOT NULL )
             OR ( ROUTINE_TYPE <> 'PTF'
               AND RETURNS_ONLY_PASS-THROUGH IS NULL ) )
    )
```

2. *Rationale: Correct the description of a null value in the SECURITY_TYPE column.*

   Replace Description 18) with:

18) The values of SECURITY_TYPE have the following meanings:

DEFINER	The routine has the security characteristic DEFINER.
INVOKER	The routine has the security characteristic INVOKER.
IMPLEMEN-TATION DEFINED	The external routine has the security characteristic IMPLEMENTATION DEFINED.
null	Either the SQL-invoked routine is a polymorphic table function, or it is not an external routine and Feature T324, "Explicit security for SQL routines" is not implemented.

3. *Rationale: Correct the specification of column contents.*

   Replace the Description 19) with:

   19) Case:

   a) If the SQL-invoked routine being described is an external routine and has a to-sql routine
       for its result type, then TO_SQL_SPECIFIC_CATALOG, TO_SQL_SPECIFIC_SCHEMA, and
       TO_SQL_SPECIFIC_NAME are the catalog name, unqualified schema name, and qualified
       identifier, respectively, of the specific name of the to-sql routine for the result type of the
       SQL-invoked routine being described.

   b) Otherwise, the values of TO_SQL_SPECIFIC_CATALOG, TO_SQL_SPECIFIC_SCHEMA, and
       TO_SQL_SPECIFIC_NAME are the null value.

6.42   ROUTINE_ROUTINE_USAGE base table

1. *Rationale: Make the definition of a view match its description.*

   Replace the Definition with:

```
CREATE TABLE ROUTINE_ROUTINE_USAGE (
    SPECIFIC_CATALOG          INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SPECIFIC_SCHEMA           INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SPECIFIC_NAME             INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SUBJECT_ROUTINE_CATALOG   INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SUBJECT_ROUTINE_SCHEMA    INFORMATION_SCHEMA.SQL_IDENTIFIER,
    SUBJECT_ROUTINE_NAME      INFORMATION_SCHEMA.SQL_IDENTIFIER,

    CONSTRAINT ROUTINE_ROUTINE_USAGE_PRIMARY_KEY
      PRIMARY KEY ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME,
                    ROUTINE_CATALOG, ROUTINE_SCHEMA, ROUTINE_NAME),

    CONSTRAINT ROUTINE_ROUTINE_USAGE_CHECK_REFERENCES_ROUTINES
      CHECK ( SUBJECT_ROUTINE_CATALOG NOT IN
              ( SELECT CATALOG_NAME
                FROM SCHEMATA )
            OR
              ( SUBJECT_ROUTINE_CATALOG, SUBJECT_ROUTINE_SCHEMA,
                SUBJECT_ROUTINE_NAME ) IN
              ( SELECT SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME
                FROM ROUTINES ) ),

    CONSTRAINT ROUTINE_ROUTINE_USAGE_FOREIGN_KEY_ROUTINES
      FOREIGN KEY ( SPECIFIC_CATALOG, SPECIFIC_SCHEMA, SPECIFIC_NAME )
        REFERENCES ROUTINES
    )
```

2. *Rationale: Clarify the contents of columns.*

   Replace the Deescription 3) with:

3) The values of SUBJECT_ROUTINE_CATALOG, SUBJECT_ROUTINE_SCHEMA, and SUBJECT_ROU-TINE_NAME are the catalog name, unqualified schema name, and qualified identifier, respectively, of the specific name of *R1*.