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Part 2: SQL specialization

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Partie 2: Spécialisation SQL

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9579-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*.

ISO/IEC 9579 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Remote Database Access*:

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— *Part 1: Generic Model, Service and Protocol*

— *Part 2: SQL specialization*

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Introduction

Remote Database Access (RDA) International Standards are members of a set of International Standards produced to facilitate the interworking of computer systems. The RDA International Standards are positioned in the Application Layer of the Reference Model of Open Systems Interconnection (OSI) and are related to other Open Systems International Standards in the set, as defined in ISO 7498.

The goal of Remote Database Access is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of applications and database systems:

- from different manufacturers;
- under different managements;
- of different levels of complexity;
- exploiting different technologies.

An application may itself be a database system and therefore an RDA Specialization standard can be used to support multi-database system interworking.

This part of ISO/IEC 9579 is to be used together with ISO/IEC 9579-1 to provide remote data access to a database management system conforming to ISO/IEC 9075 (Database Language SQL).

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Information technology — Open Systems Interconnection — Remote Database Access —

Part 2:
SQL specialization

Section 1: Introduction

1.1 Scope

This part of ISO/IEC 9579 specifies the functionality of a database server within a distributed open systems environment and specifies the communication service and protocol for accessing its capabilities. The communications capabilities are positioned in the Application Layer of the Reference Model of Open Systems Interconnection (OSI).

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This part of ISO/IEC 9579 complements ISO/IEC 9579-1 (RDA Generic) in order that the two parts together:

a) define the capabilities of an RDA SQL database server supporting dialogues with clients.

b) define a model of dialogues between the RDA SQL database server and remote users.

c) define a model of a dialogue between an RDA client and an RDA server.

d) define an abstract service for the RDA SQL ASE, which models the communications facilities supporting interaction between the RDA client and RDA server.

e) define the RDA SQL ASE protocol to support the RDA SQL Service.

f) define the characteristics of application-contexts which include the RDA SQL ASE.

g) define application-contexts that support remote database access using SQL:

   1) RDA Basic application-context
   2) RDA TP application-context

This part of ISO/IEC 9579 does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system.

This part of ISO/IEC 9579 does not define a programmatic interface. The RDA server includes a database capability as defined in ISO/IEC 9075 (Database Language SQL).

NOTES

1 The RDA client may contain an SQL application program but there is no requirement that the RDA client shall be an application program written to the ISO/IEC 9075 (Database Language SQL) application program interface.

2 ISO/IEC 9075:1989, the former International Standard for Database Language SQL, has been replaced by ISO/IEC 9075:1992. Both the current and former standards contain conformance rules, and the RDA SQL Specialization allows an RDA client to specify the desired level of conformance which it expects the RDA Server to support. Throughout this part of ISO/IEC 9579, "SQL" refers to the language statements permitted by the appropriate standard at the requested level of conformance.

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9579. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9579 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 8824:1990, *Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).*

ISO/IEC 8825:1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*

ISO/IEC 9075:1992, *Information technology - Database Languages SQL.*

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

1.3 Definitions

For the purposes of this part of ISO/IEC 9579, the definitions given in ISO/IEC 9579-1 and the following definitions apply.

1.3.1 Terms defined in ISO/IEC 9075 (Database Language SQL)

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This part of ISO/IEC 9579 uses the following terms defined in ISO/IEC 9075:1989 (Database Language SQL) or ISO/IEC 9075:1992 (Database Language SQL):

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a) **applicable privileges**

b) **Embedded SQL**

c) **SQL-data**

d) **SQLCODE**

e) **SQLSTATE**

In addition, this part of ISO/IEC 9579 references the following non-terminal production symbols from the SQL syntax, which represent a valid string of characters that can be derived from these production symbols according to the syntax rules in ISO/IEC 9075 (Database Language SQL) at the approriate level of conformance.

f) **< close statement >**

g) **< commit statement >**

h) **< cursor name >**

i) **< declare cursor >**

j) **< delete statement: positioned >**

k) **< delete statement: searched >**

l) **< embedded variable name >**

m) **< fetch statement >**

n) **< grant statement >**

o) **< host identifier >**

p) **< indicator variable >**

q) **< insert statement >**

r) **< low >**

s) < open statement >
t) < rollback statement >
u) < schema definition >
v) < select statement: single row >
w) < SQL conformance >
x) < SQL data statement >
y) < SQL edition >
z) < table definition >
aa) < update statement: positioned >
ab) < update statement: searched >
ac) < variable specification >
ad) < view definition >
ae) < 1987 >
af) < 1989 >
ag) < 1992 >

1.3.2 Terms defined in this part of ISO/IEC 9579

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1.3.2.1 SQL database resource: SQL-data and the schemas describing it, as defined in ISO/IEC 9075 (Database Language SQL).

1.3.2.2 RDA SQL statement: One of the non-terminals < schema definition >, < table definition >, < view definition >, < grant statement >, < SQL data statement >, < commit statement >, < rollback statement > and < declare cursor > as defined in ISO/IEC 9075 (Database Language SQL).

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1.4 Abbreviations

For the purposes of this part of ISO/IEC 9579, the abbreviations given in ISO/IEC 9075 and ISO/IEC 9579-1 apply.

1.5 Conventions

This part of ISO/IEC 9579 adopts the conventions established in ISO/IEC 9579-1.

The RDA SQL Specialization is formally defined in an ASN.1 Module that is derived from the RDA Specialization module template defined in ISO/IEC 9579-1. The RDA SQL Specialization module provides definitions for those types listed in the template as being undefined by the Generic part of ISO/IEC 9579.

The structure of this part of ISO/IEC 9579 follows the requirements defined in ISO/IEC 9579-1 for defining specializations of the RDA Generic Service and Protocol.

In this part of ISO/IEC 9579, the RDA Generic parameters and data types named `specificXxxx...` and `SpecificXxxx...` are renamed to `sQLXxxx...` and to `SQLXxxx...`, respectively.

In the service parameter tables in 3.1, parameters which are defined by this specialization have values entered in the Req, Ind, Rsp or Cnf columns. Other service parameters in these tables which are copied from the RDA Generic to improve readability do not have entries in these columns.

The RDA SQL Specialization defines a means of communicating SQL database language statements and their parameters from an RDA client to an RDA server, and of returning the results of those statements. Database Language SQL is supported at various levels of conformance, determined by an object identifier defined in ISO/IEC 9075.

In this part of ISO/IEC 9579, the reference **"ISO/IEC 9075 (Database Language SQL)"** means any International Standard carrying the designation ISO/IEC 9075 and year of approval. The specific version (or versions) of that standard that is intended in each instance is determined, for the RDA client, by the SQL Conformance Level requested either when the RDA dialogue is initialized or when a data resource is opened, and, for the RDA server, by the SQL Conformance Level (or Levels) claimed in the Protocol Implementation Conformance Statement.

When the SQL Conformance Level specifies a year value of 1987 or 1989, the relevant International Standard is ISO/IEC 9075:1989; when the SQL Conformance Level specifies a year value of 1992, the relevant International Standard is ISO/IEC 9075:1992.

The term **"SQL"** is used throughout in a generic sense, intending to cover Database Language SQL at a particular conformance level as well as valid statements written within that conformance level.

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Section 2: Model

2.1 The RDA SQL Specialization Service model

2.1.1 Mapping to the general model of the RDA Service

This subclause relates the relevant concepts defined in section 2 of ISO/IEC 9579-1 to this RDA SQL Specialization.

The term **data resource**, defined in the ISO/IEC 9579-1, corresponds to SQL-data as defined in ISO/IEC 9075 (Database Language SQL). In this part of ISO/IEC 9579, this is called the **SQL database resource**.

The RDA client gains access to an SQL database resource at the RDA server by opening it. It is then available for use in requests for Database Language Services (see 3.1.5, "Database Language services" on page 10). Nested SQL database resources are not supported.

Closing an SQL database resource causes it to be made inaccessible to the RDA client; that is, unavailable for subsequent use in requests for Database Language Services.

An implementor shall provide an RDA server at which one or multiple SQL database resources are available.

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2.1.2 Mapping to the Concepts of Database Language SQL

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This subclause relates the relevant concepts defined in clause 4 of ISO/IEC 9075 (Database Language SQL) to the database model contained in the RDA server.

RDA SQL statements are executed by the database server exactly as if they were embedded in a host program local to the SQL database resource. Any exception condition or completion condition raised by the database server is returned to the RDA client.

NOTE – A <declare cursor> RDA SQL statement must have been executed or invoked at the RDA server prior to executing or invoking any <open statement> that uses the same cursor name.

Section 3: Service

3.1 The RDA SQL Specialization Service

This clause contains the expansion of the RDA Generic Service parameters which are specialization defined. These specifications are in addition to those specified in ISO/IEC 9579-1.

NOTE – The subclauses in this clause are elaborations of the corresponding subclauses in ISO/IEC 9579-1 and are numbered accordingly.

3.1.1 RDA Dialogue Management services

3.1.1.1 RDA Dialogue Initialization functional unit

3.1.1.1.1 R-Initialize Service

Table 1 lists the R-Initialize SQL Specific Service Parameters.

Table 1. R-Initialize SQL Specific Service Parameters

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	Req	Ind	Rsp	Cnf
Request Parameters				
sQLInitializeArgument	U	C(=)		
sQLConformanceLevelDefault	U	C(=)		
userData	C	C(=)		
Result Parameters				
sQLInitializeResult			U	C(=)
userData			C	C(=)

Request Parameters

sQLInitializeArgument:
This argument is used to negotiate the level of support desired by the RDA client.

sQLConformanceLevelDefault:
This parameter identifies the characteristics ("SQL level") of the Database Language SQL requested by the RDA client. The object identifiers specifying those characteristics are defined in ISO/IEC 9075:1992. This is the default SQL Conformance Level requested by the RDA client. If this parameter is omitted, there is no default established for the RDA client.

userData:
The meaning of this parameter is defined by the implementor of the RDA server.

Result Parameters

sQLInitializeResult:
This parameter contains information returned by the RDA server whose meaning is specific to this RDA SQL Specialization.

userData:
The meaning of this parameter is defined by the implementor of the RDA server.

Error Parameters

NOTE – None of the specific error parameters for this service are used in this Specialization.

3.1.1.2 RDA Dialogue Termination functional unit

3.1.1.2.1 R-Terminate Service

NOTE – None of the specific request, result or error parameters for this service are used in this Specialization.

3.1.2 RDA Transaction Management services

3.1.2.1 RDA Transaction Management functional unit

3.1.2.1.1 R-BeginTransaction Service

NOTE – There are no specific request, result or error parameters.

3.1.2.1.2 R-Commit Service

NOTE – There are no specific request, result or error parameters.

3.1.2.1.3 R-Rollback Service

NOTE – There are no specific request, result or error parameters.

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3.1.3 RDA Control services

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3.1.3.1 Cancel functional unit

3.1.3.1.1 R-Cancel Service

NOTE – None of the specific request, result or error parameters for this service are used in this Specialization.

3.1.3.2 Status functional unit

3.1.3.2.1 R-Status Service

NOTE – None of the specific request, result or error parameters for this service are used in this Specialization.