
**Information technology — Remote
Database Access for SQL**

*Technologies de l'information — Accès à la base de données à distance
pour SQL*

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ISO/IEC 9579:1999

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Printed in Switzerland

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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 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management services*.

This edition cancels and replaces ISO/IEC 9579-1:1993, ISO/IEC 9579-2:1988 and ISO/IEC 9579-3:1996, which have been technically revised.

Annexes A to E form an integral part of this International Standard. Annexes F and G are for information only.

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Introduction

Remote Database Access for SQL (RDA/SQL) International Standard is a member of a set of International Standards produced to facilitate the interworking of computer systems. This International Standard conforms to the model defined in ISO/IEC 10032, *Information technology – Reference Model of Data Management*.

Remote Database Access for SQL can be used to provide remote data access to a database management system conforming to ISO/IEC 9075 (Database Language SQL).

The goal of Remote Database Access for SQL is to allow, with a minimum of technical agreement outside this International Standard, 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 this International Standard can be used to support multi-database system interworking.

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Information technology — Remote Database Access for SQL

1 Scope

This International Standard, Remote Database Access for SQL (RDA), defines a model for the remote interaction of an SQL-client and one or more SQL-servers through communication media, and defines the encoding of messages, the semantics of messages and associated facilities for mediating the interaction between one SQL-client and one SQL-server.

This International Standard also defines a mapping of the RDA Protocol to the specific communication infrastructures TCP/IP and Transport Layer Security (TLS).

This International Standard relies upon the facilities provided by ISO/IEC 9075 (SQL) and ISO/IEC 9075-3 (SQL/CLI).

Normative annexes provide:

- a Conformance Proforma,
- an optional language independent Application Programming Interface defined in the notational conventions of ISO/IEC 9075-3 (SQL/CLI) for invoking RDA Operations,
- an optional mapping of ISO/IEC 9075-3 (SQL/CLI) functions to RDA Operations,
- definitions of optional SQL-servers, the RDA Location Server and the RDA Support Server, to facilitate interoperability and data distribution in a heterogeneous environment.

Informative annexes provide:

- an ASN.1 specification for the RDA Protocol,
- an ASN.1 specification for the encoding of multiple rows.

This International Standard does not constrain:

- conforming RDA-client environments to be implemented using any particular processor decomposition,
- conforming RDA-server environments to be implemented using any particular processor decomposition.

This International Standard does not define:

- algorithms for query decomposition or for the combining of results in a distributed database environment,
- recovery mechanisms in the event that transaction co-ordination fails.

2 Normative References

The following standards contain provisions, which through reference in this text constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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.

2.1 International Standards

- ISO/IEC 8824-1:1995 *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*
- ISO/IEC 8825-1:1995 *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*
- ISO/IEC 8825-2:1996 *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*
- ISO/IEC 9075:1992 *Information technology – Database Languages SQL*
- ISO/IEC 9075-3:1995 *Information technology – Database Languages SQL – Part 3: Call Level Interface*
- ISO/IEC 9075-4:1996 *Information technology – Database Languages SQL – Part 4: Persistent Stored Modules*
- ISO/IEC 10032:1995 *Information technology – Reference Model of Data Management*
- ISO/IEC 10646-1:1993 *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

2.2 Internet Engineering Task Force

- RFC 791 *Internet Protocol*
- RFC 793 *Transmission Control Protocol*
- RFC 819 *The Domain Naming Convention for Internet User Applications*
- RFC 1122 *Requirements for Internet Hosts – Communication Layers*
- RFC 1123 *Requirements for Internet Hosts – Application and Support*
- RFC 2246 *The TLS Protocol*

Internet Engineering Task Force standards may be obtained in electronic form from the InterNIC Directory and Database Services at <http://www.internic.net> and <ftp://ftp.internic.net>.

2.3 Institute of Electrical and Electronics Engineers

IEEE 754-1985 *Standard for Binary Floating-Point Arithmetic*

Institute of Electrical and Electronic Engineers (IEEE) standards may be obtained from *IEEE Customer Service, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA* or ordered electronically from <http://www.ieee.org>.

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3.1 Interoperability between implementations

3 Interoperability

This clause defines the compatibility of RDA-client or RDA-server implementations of the Operations and Protocol defined by this edition of this International Standard with RDA-server or RDA-client implementations respectively of the Operations and Protocol defined by this and other editions of this International Standard.

3.1 Interoperability between implementations

An RDA-client or RDA-server implementation that conforms to this International Standard will interoperate with any other RDA-server or RDA-client that conforms to this International Standard provided that the implementations use the same Transport Mapping.

Where protected access is required, the RDA-client and RDA-server need to share common authentication mechanisms to inter-operate.

NOTE 1 – There are circumstances under which the RDA Protocol and RDA Operations defined by this International Standard require that RDA Messages between interoperating implementations are rejected. These circumstances include the failure to satisfy authentication requirements and the use by one implementation of an encoding that is not supported by the other (the Default Encoding is always supported).

3.2 Interoperability with conforming Edition 2 implementations

The second edition of this International Standard published in 1997 maps the Service and Protocol to an OSI transport provider. This third edition of this International Standard maps the RDA Protocol to a TCP/IP transport provider. Edition 2 implementations can therefore co-exist with edition 3 implementations but cannot directly interoperate.

3.3 Interoperability with future editions

Features have been included in this version of the Protocol to permit server implementations to detect which version of the protocol a client has implemented and to behave appropriately.

Future editions of this International Standard will be compatible with this edition to the extent that:

- RDA Operations and Protocol defined by this edition will be retained in future editions using the same encodings.
- Changes to the Operations, Protocols and encodings in future editions will be extensions that are recognised by implementations of this edition and discarded after raising an exception.

4 Definitions, Conventions and Notations

4.1 Definitions

For the purposes of this International Standard, the definitions given in ISO/IEC 9075 (SQL) and ISO/IEC 9075-3 (SQL/CLI) and the following definitions apply.

The following terms are defined in RFC 791, RFC 793, RFC 819, RFC 1122, RFC 1123:

- i) IP Address,
- ii) Local Socket,
- iii) Foreign Socket,
- iv) Port Number,
- v) Push.

The following term is defined in ISO/IEC 10032:

Distribution Controller.

In addition, the following definitions apply:

RDA Message: a protocol element as defined by this International Standard exchanged between an RDA-client and an RDA-server. (standards.iteh.ai)

RDA Operation: a facility that is accessible remotely provided by an RDA-server, together with the means of invoking the facility through a protocol, the encoding of parameters that influence or result from an invocation of the facility, and rules governing the invocation of the facility.

RDA Programming Interface: a language independent Application Programming Interface defined in the notational conventions of ISO/IEC 9075-3 (SQL/CLI) for invoking RDA Operations.

RDA Protocol: the set of permissible exchanges of requests and responses between an RDA-client and an RDA-server, together with the encoding of the exchange, and rules governing the exchange.