INTERNATIONAL STANDARD

ISO/IEC 9075-10

Third edition
2008-07-15

Information technology — Database languages — SQL —

Part 10: Object Language Bindings (SQL/OLB)

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

Partie 10: Liaisons de langage objet (SQL/OLB)

This document is a preview generated by EVS

Reference number
ISO/IEC 9075-10:2008(E)

© ISO/IEC 2008

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

 © ISO/IEC 2008 – All rights reserved

This document is a preview generated by EVS

Contents

Page

Foreword . . . xix
Introduction . . . xx
1 Scope . . . 1
2 Normative references . . . 3
2.1 ISO and IEC standards . . . 3
2.2 Other international standards . . . 3
3 Definitions, notations, and conventions . . . 5
3.1 Definitions . . . 5
3.1.1 Definitions provided in Part 10 . . . 5
3.2 Conventions . . . 6
3.2.1 Use of terms . . . 7
3.2.1.1 Other terms . . . 7
3.2.2 Specification of translator-generated classes . . . 7
4 Concepts . . . 9
4.1 Embedded syntax . . . 9
4.2 Character strings . . . 9
4.2.1 Unicode support . . . 9
4.2.2 Character sets . . . 10
4.3 Introduction to SQLJ . . . 10
4.3.1 Overview . . . 10
4.3.2 SQL constructs . . . 10
4.3.3 SQLJ clauses . . . 11
4.3.4 Binary portability . . . 11
4.3.4.1 Binary portability requirements . . . 11
4.3.4.2 Components of binary portable applications . . . 13
4.3.5 Profile overview . . . 13
4.3.5.1 EntryInfo overview . . . 14
4.3.5.2 TypeInfo overview . . . 17
4.3.5.3 SQLJ datatype properties . . . 18
4.3.6 Host variables . . . 20
4.3.7 Host expressions . . . 20
4.3.8 Connection contexts . . . 21
4.3.9 Default connection context . . . 21
4.3.10 Schema checking using exemplar schemas . . . 22
4.3.11 Using multiple SQLJ contexts and connections . . . 22

© ISO/IEC 2008 – All rights reserved

4.3.12 Dynamic SQL and JDBC/SQLJ Connection interoperability. . . . 22
4.3.12.1 Creating an SQLJ ConnectionContext from a `java.sql.Connection` object. . . . 23
4.3.12.2 Obtaining a `java.sql.Connection` object from an SQLJ ConnectionContext. . . . 23
4.3.12.3 Connection sharing. . . . 23
4.3.12.4 Connection resource management. . . . 23
4.3.13 SQL execution control and status. . . . 24
4.3.14 Iterators. . . . 24
4.3.15 Input and output assignability. . . . 26
4.3.16 Multiple `java.sql.ResultSet` objects from SQL-invoked procedure calls. . . . 39
4.3.16.1 Resource management with multiple results. . . . 39
4.3.17 JDBC/SQLJ ResultSet interoperability. . . . 39
4.3.17.1 Creating an SQLJ iterator from a `java.sql.ResultSet` object. . . . 39
4.3.17.2 Obtaining a `java.sql.ResultSet` object from an SQLJ iterator object. . . . 40
4.3.17.3 Obtaining a `java.sql.ResultSet` object from an untyped iterator object. . . . 40
4.3.17.4 Iterator and `java.sql.ResultSet` object resource management. . . . 40
4.3.18 Multi-threading considerations. . . . 41
4.3.19 User-defined data types. . . . 41
4.3.20 Batch updates. . . . 42
4.3.20.1 Batchable statements and batch compatibility. . . . 42
4.3.20.2 Statement batching API. . . . 43
4.3.20.3 Execution status and update counts. . . . 43
4.3.20.4 Program semantics and exceptions. . . . 44
4.3.20.5 Batch cancellation and disabling. . . . 45
4.3.20.6 Specification of a batching limit. . . . 45
4.3.21 SQLJ language elements. . . . 46
4.3.21.1 <cursor name>. . . . 46
4.3.21.2 SQL-schema, SQL-data, and SQL-transaction statements. . . . 46
4.3.21.3 <SQL dynamic statement>. . . . 46
4.3.21.4 <SQL connection statement>. . . . 47
4.3.21.5 <host variable definition>. . . . 47
4.3.21.6 <embedded exception declaration>. . . . 47
4.3.21.7 <SQL diagnostics statement>. . . . 48
4.3.21.8 Cursor declaration. . . . 48
4.3.21.9 Input parameters to SQL-statements. . . . 48
4.3.21.10 Extracting column values from SQLJ iterators. . . . 48
4.3.21.11 <open statement> and cursors. . . . 49
4.3.22 SQLJ, JDBC, and SQLExceptions and SQLWarnings. . . . 49
4.3.23 Profile generation and naming. . . . 49
4.3.24 SQLJ application packaging. . . . 50
4.3.25 Profile customizer interface. . . . 51
4.3.26 Customization interface. . . . 52
4.3.26.1 Customization usage. . . . 52
4.3.26.2 Customization registration. . . . 53

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

5 Lexical elements . . . 55
5.1 <SQL terminal character> . . . 55
5.2 <token> and <separator> . . . 56
6 Scalar expressions . . . 57
6.1 <value specification> and <target specification> . . . 57
7 Additional common elements . . . 59
7.1 <routine invocation> . . . 59
8 Embedded SQL . . . 61
8.1 <embedded SQL host program> . . . 61
8.2 <embedded SQL Java program> . . . 64
9 SQLJ reserved names . . . 65
9.1 Naming runtime library components . . . 65
9.2 Temporary variable names . . . 65
9.3 Class and resource file names . . . 66
9.3.1 Introduction . . . 66
9.3.2 Generated classes . . . 66
9.3.3 Resource files and profiles . . . 66
10 Common subelements . . . 67
10.1 <modifiers> . . . 67
10.2 <java class name> . . . 68
10.3 <java id> . . . 69
10.4 <java datatype> . . . 70
10.5 <java constant expression> . . . 71
10.6 <embedded Java expression> . . . 72
10.7 <implements clause> . . . 75
10.8 <declaration with clause> . . . 76
11 <SQLJ specific clause> and contents . . . 81
11.1 <SQLJ specific clause> . . . 81
11.2 <connection declaration clause> . . . 82
11.3 Generated connection class . . . 83
11.4 <iterator declaration clause> . . . 88
11.5 <positioned iterator> . . . 90
11.6 Generated positioned iterator class . . . 91
11.7 <named iterator> . . . 94
11.8 Generated named iterator class . . . 96
11.9 <executable clause> . . . 98
11.10 <context clause> . . . 105
11.11 <statement clause> . . . 107
11.12 <delete statement: positioned> . . . 109
11.13 <update statement: positioned> . . . 111
11.14 <select statement: single row> . . . 113
11.15 <fetch statement> . . . 117

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

11.16 <assignment statement>. . . . 120
11.17 <savepoint statement>. . . . 122
11.18 <release savepoint statement>. . . . 123
11.19 <commit statement>. . . . 124
11.20 <rollback statement>. . . . 125
11.21 <set transaction statement>. . . . 126
11.22 <call statement>. . . . 127
11.23 <assignment clause>. . . . 129
11.24 <query clause>. . . . 131
11.25 <function clause>. . . . 135
11.26 <iterator conversion clause>. . . . 138
11.27 <compound statement>. . . . 141
12 Package sqlj.runtime. . . . 143
12.1 Overview. . . . 143
12.2 SQLJ runtime interfaces. . . . 143
12.2.1 sqlj.runtime.ConnectionContext. . . . 143
12.2.1.1 Interface Overview. . . . 143
12.2.1.2 Variables. . . . 144
12.2.1.2.1 CLOSE_CONNECTION. . . . 144
12.2.1.2.2 KEEP_CONNECTION. . . . 145
12.2.1.3 Methods. . . . 145
12.2.1.3.1 close (). . . . 145
12.2.1.3.2 close (boolean). . . . 145
12.2.1.3.3 getConnectedProfile (Object). . . . 146
12.2.1.3.4 getConnection (). . . . 147
12.2.1.3.5 getExecutionContext (). . . . 147
12.2.1.3.6 getTypeMap (). . . . 147
12.2.1.3.7 isClosed (). . . . 148
12.2.2 sqlj.runtime.ForUpdate. . . . 148
12.2.2.1 Interface Overview. . . . 148
12.2.2.2 Methods. . . . 148
12.2.2.2.1 getCursorName (). . . . 148
12.2.3 sqlj.runtime.NamedIterator. . . . 149
12.2.4 sqlj.runtime.PositionedIterator. . . . 149
12.2.4.1 Interface Overview. . . . 149
12.2.4.2 Methods. . . . 150
12.2.4.2.1 endFetch (). . . . 150
12.2.5 sqlj.runtime.ResultSetIterator. . . . 150
12.2.5.1 Interface Overview. . . . 150
12.2.5.2 Variables. . . . 150
12.2.5.2.1 ASENSITIVE. . . . 150
12.2.5.2.2 FETCH_FORWARD. . . . 151
12.2.5.2.3 FETCH_REVERSE. . . . 151

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

12.2.5.2.4 FETCH_UNKNOWN. . . . 151
12.2.5.2.5 INSENSITIVE. . . . 151
12.2.5.2.6 SENSITIVE. . . . 151
12.2.5.3 Methods. . . . 151
12.2.5.3.1 clearWarnings (). . . . 152
12.2.5.3.2 close (). . . . 152
12.2.5.3.3 getFetchSize (). . . . 152
12.2.5.3.4 getResultSet (). . . . 153
12.2.5.3.5 getRow (). . . . 153
12.2.5.3.6 getSensitivity (). . . . 153
12.2.5.3.7 getWarnings (). . . . 154
12.2.5.3.8 isClosed (). . . . 155
12.2.5.3.9 next (). . . . 155
12.2.5.3.10 setFetchSize (int). . . . 155
12.2.6 sqlj.runtime.Scrollable. . . . 157
12.2.6.1 Interface Overview. . . . 157
12.2.6.2 Variables. . . . 157
12.2.6.3 Methods. . . . 157
12.2.6.3.1 absolute (int). . . . 157
12.2.6.3.2 afterLast (). . . . 158
12.2.6.3.3 beforeFirst (). . . . 158
12.2.6.3.4 first (). . . . 158
12.2.6.3.5 getFetchDirection (). . . . 159
12.2.6.3.6 isAfterLast (). . . . 159
12.2.6.3.7 isBeforeFirst (). . . . 159
12.2.6.3.8 isFirst (). . . . 160
12.2.6.3.9 isLast (). . . . 160
12.2.6.3.10 last (). . . . 160
12.2.6.3.11 previous (). . . . 161
12.2.6.3.12 relative (int). . . . 161
12.2.6.3.13 setFetchDirection (int). . . . 162
12.3 SQLJ Runtime Classes. . . . 163
12.3.1 sqlj.runtime.AsciiStream. . . . 163
12.3.1.1 Class Overview. . . . 163
12.3.1.2 Constructors. . . . 163
12.3.1.2.1 AsciiStream (InputStream). . . . 163
12.3.1.2.2 AsciiStream (InputStream, int). . . . 164
12.3.2 sqlj.runtime.BinaryStream. . . . 164
12.3.2.1 Class Overview. . . . 164
12.3.2.2 Constructors. . . . 165
12.3.2.2.1 BinaryStream (InputStream). . . . 165
12.3.2.2.2 BinaryStream (InputStream, int). . . . 165
12.3.3 sqlj.runtime.DefaultRuntime. . . . 165
12.3.3.1 Class Overview. . . . 165

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

12.3.3.2 Constructors. . . . 166
12.3.3.2.1 DefaultRuntime (). . . . 166
12.3.3.3 Methods. . . . 166
12.3.3.3.1 getDefaultConnection (). . . . 166
12.3.3.3.2 getLoaderForClass (Class). . . . 166
12.3.4 sqlj.runtime.ExecutionContext. . . . 167
12.3.4.1 Class Overview. . . . 167
12.3.4.2 Variables. . . . 168
12.3.4.2.1 ADD_BATCH_COUNT. . . . 168
12.3.4.2.2 AUTO_BATCH. . . . 168
12.3.4.2.3 EXEC_BATCH_COUNT. . . . 168
12.3.4.2.4 EXCEPTION_COUNT. . . . 169
12.3.4.2.5 NEW_BATCH_COUNT. . . . 169
12.3.4.2.6 QUERY_COUNT. . . . 169
12.3.4.2.7 UNLIMITED_BATCH. . . . 170
12.3.4.3 Constructors. . . . 170
12.3.4.3.1 ExecutionContext (). . . . 170
12.3.4.4 Methods. . . . 170
12.3.4.4.1 cancel (). . . . 170
12.3.4.4.2 execute (). . . . 171
12.3.4.4.3 executeBatch (). . . . 172
12.3.4.4.4 executeQuery (). . . . 173
12.3.4.4.5 executeUpdate (). . . . 173
12.3.4.4.6 getBatchLimit (). . . . 174
12.3.4.4.7 getBatchUpdateCounts (). . . . 175
12.3.4.4.8 getFetchDirection (). . . . 175
12.3.4.4.9 getFetchSize (). . . . 175
12.3.4.4.10 getMaxFieldSize (). . . . 176
12.3.4.4.11 getMaxRows (). . . . 176
12.3.4.4.12 getNextResultSet (). . . . 177
12.3.4.4.13 getNextResultSet (int). . . . 177
12.3.4.4.14 getQueryTimeout (). . . . 178
12.3.4.4.15 getUpdateCount (). . . . 179
12.3.4.4.16 getWarnings (). . . . 179
12.3.4.4.17 isBatching (). . . . 180
12.3.4.4.18 registerStatement (ConnectionContext, Object, int). . . . 180
12.3.4.4.19 releaseStatement (). . . . 181
12.3.4.4.20 setBatching (boolean). . . . 182
12.3.4.4.21 setBatchLimit (int). . . . 182
12.3.4.4.22 setFetchDirection (int). . . . 183
12.3.4.4.23 setFetchSize (int). . . . 183
12.3.4.4.24 setMaxFieldSize (int). . . . 184
12.3.4.4.25 setMaxRows (int). . . . 184
12.3.4.4.26 setQueryTimeout (int). . . . 184

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

12.3.5 sqlj.runtime.RuntimeContext . . . 185
12.3.5.1 Class Overview . . . 185
12.3.5.2 Variables . . . 185
12.3.5.2.1 DEFAULT_DATA_SOURCE . . . 185
12.3.5.2.2 DEFAULT_RUNTIME . . . 186
12.3.5.2.3 PROPERTY_KEY . . . 186
12.3.5.3 Constructors . . . 186
12.3.5.3.1 RuntimeContext () . . . 186
12.3.5.4 Methods . . . 186
12.3.5.4.1 getDefaultConnection () . . . 186
12.3.5.4.2 getLoaderForClass (Class) . . . 187
12.3.5.4.3 getRuntime () . . . 187
12.3.6 sqlj.runtime.StreamWrapper . . . 188
12.3.6.1 Class Overview . . . 188
12.3.6.2 Constructors . . . 188
12.3.6.2.1 StreamWrapper (InputStream) . . . 188
12.3.6.2.2 StreamWrapper (InputStream, int) . . . 189
12.3.6.3 Methods . . . 189
12.3.6.3.1 getInputStream () . . . 189
12.3.6.3.2 getLength () . . . 189
12.3.6.3.3 setLength (int) . . . 190
12.3.7 sqlj.runtime.UnicodeStream . . . 190
12.3.7.1 Class Overview . . . 190
12.3.7.2 Constructors . . . 191
12.3.7.2.1 UnicodeStream (InputStream) . . . 191
12.3.7.2.2 UnicodeStream (InputStream, int) . . . 191
12.3.8 sqlj.runtime.CharacterStream . . . 191
12.3.8.1 Class Overview . . . 191
12.3.8.2 Constructors . . . 192
12.3.8.2.1 CharacterStream (Reader) . . . 192
12.3.8.2.2 CharacterStream (Reader, int) . . . 192
12.3.8.3 Methods . . . 193
12.3.8.3.1 getReader () . . . 193
12.3.8.3.2 getLength () . . . 193
12.3.8.3.3 setLength (int) . . . 193
12.3.9 sqlj.runtime.SQLNullException . . . 194
12.3.9.1 Class Overview . . . 194
12.3.9.2 Constructors . . . 194
12.3.9.2.1 SQLNullException () . . . 194
13 Package sqlj.runtime.profile . . . 195
13.1 Overview . . . 195
13.2 SQLJ sqlj.runtime.profile Interfaces . . . 195
13.2.1 sqlj.runtime.profile.BatchContext . . . 195

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

13.2.1.1 Interface Overview. . . . 195
13.2.1.2 Methods. . . . 195
13.2.1.2.1 clearBatch (). . . . 195
13.2.1.2.2 executeBatch (). . . . 196
13.2.1.2.3 setBatchLimit (int). . . . 196
13.2.2 sqlj.runtime.profile.ConnectedProfile. . . . 197
13.2.2.1 Interface Overview. . . . 197
13.2.2.2 Methods. . . . 198
13.2.2.2.1 close (). . . . 198
13.2.2.2.2 getConnection (). . . . 198
13.2.2.2.3 getProfileData (). . . . 198
13.2.2.2.4 getStatement (int, Map). . . . 199
13.2.2.2.5 getStatement (int, BatchContext, Map). . . . 199
13.2.3 sqlj.runtime.profile.Customization. . . . 200
13.2.3.1 Interface Overview. . . . 200
13.2.3.2 Methods. . . . 201
13.2.3.2.1 acceptsConnection (Connection). . . . 201
13.2.3.2.2 getProfile (Connection, Profile). . . . 201
13.2.4 sqlj.runtime.profile.Loader. . . . 202
13.2.4.1 Interface Overview. . . . 202
13.2.4.2 Methods. . . . 202
13.2.4.2.1 getResourceAsStream (String). . . . 202
13.2.4.2.2 loadClass (String). . . . 203
13.2.5 sqlj.runtime.profile.RTResultSet. . . . 204
13.2.5.1 Interface Overview. . . . 204
13.2.5.2 Methods. . . . 207
13.2.5.2.1 clearWarnings (). . . . 207
13.2.5.2.2 close (). . . . 207
13.2.5.2.3 findColumn (String). . . . 207
13.2.5.2.4 getArray (int). . . . 208
13.2.5.2.5 getAsciiStreamWrapper (int). . . . 209
13.2.5.2.6 getBigDecimal (int). . . . 210
13.2.5.2.7 getBinaryStreamWrapper (int). . . . 210
13.2.5.2.8 getBlob (int). . . . 211
13.2.5.2.9 getBooleanNoNull (int). . . . 212
13.2.5.2.10 getBooleanWrapper (int). . . . 213
13.2.5.2.11 getByteNoNull (int). . . . 214
13.2.5.2.12 getBytes (int). . . . 215
13.2.5.2.13 getByteWrapper (int). . . . 215
13.2.5.2.14 getCharacterStreamWrapper (int). . . . 216
13.2.5.2.15 getClob (int). . . . 217
13.2.5.2.16 getColumnCount (). . . . 218
13.2.5.2.17 getCursorName (). . . . 218
13.2.5.2.18 getDate (int). . . . 219

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

13.2.5.2.19 getDoubleNoNull (int). . . . 220
13.2.5.2.20 getDoubleWrapper (int). . . . 220
13.2.5.2.21 getFloatNoNull (int). . . . 221
13.2.5.2.22 getFloatWrapper (int). . . . 222
13.2.5.2.23 getIntNoNull (int). . . . 223
13.2.5.2.24 getIntWrapper (int). . . . 224
13.2.5.2.25 getJDBCResultSet (). . . . 224
13.2.5.2.26 getLongNoNull (int). . . . 225
13.2.5.2.27 getLongWrapper (int). . . . 226
13.2.5.2.28 getObject (int, Class). . . . 226
13.2.5.2.29 getRef (int). . . . 228
13.2.5.2.30 getShortNoNull (int). . . . 228
13.2.5.2.31 getShortWrapper (int). . . . 229
13.2.5.2.32 getString (int). . . . 230
13.2.5.2.33 getSQLXML(int). . . . 231
13.2.5.2.34 getTime (int). . . . 231
13.2.5.2.35 getTimestamp (int). . . . 232
13.2.5.2.36 getUnicodeStreamWrapper (int). . . . 233
13.2.5.2.37 getURL (int). . . . 234
13.2.5.2.38 getWarnings (). . . . 235
13.2.5.2.39 isClosed (). . . . 235
13.2.5.2.40 isValidRow (). . . . 235
13.2.5.2.41 next (). . . . 236
13.2.6 sqlj.runtime.profile.RTStatement. . . . 236
13.2.6.1 Interface Overview. . . . 236
13.2.6.2 Methods. . . . 242
13.2.6.2.1 cancel (). . . . 242
13.2.6.2.2 clearWarnings (). . . . 242
13.2.6.2.3 execute (). . . . 242
13.2.6.2.4 executeComplete (). . . . 243
13.2.6.2.5 executeRTQuery (). . . . 243
13.2.6.2.6 executeUpdate (). . . . 244
13.2.6.2.7 getArray (int). . . . 244
13.2.6.2.8 getBatchContext (). . . . 245
13.2.6.2.9 getBigDecimal (int). . . . 246
13.2.6.2.10 getBlob (int). . . . 247
13.2.6.2.11 getBooleanNoNull (int). . . . 248
13.2.6.2.12 getBooleanWrapper (int). . . . 248
13.2.6.2.13 getByteNoNull (int). . . . 249
13.2.6.2.14 getBytes (int). . . . 250
13.2.6.2.15 getByteWrapper (int). . . . 251
13.2.6.2.16 getClob (int). . . . 251
13.2.6.2.17 getDate (int). . . . 252
13.2.6.2.18 getDoubleNoNull (int). . . . 253

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

13.2.6.2.19 getDoubleWrapper (int). . . . 254
13.2.6.2.20 getFloatNoNull (int). . . . 255
13.2.6.2.21 getFloatWrapper (int). . . . 255
13.2.6.2.22 getIntNoNull (int). . . . 256
13.2.6.2.23 getIntWrapper (int). . . . 257
13.2.6.2.24 getJDBCCallableStatement (). . . . 258
13.2.6.2.25 getJDBCPreparedStatement (). . . . 258
13.2.6.2.26 getLongNoNull (int). . . . 258
13.2.6.2.27 getLongWrapper (int). . . . 259
13.2.6.2.28 getMaxFieldSize (). . . . 260
13.2.6.2.29 getMaxRows (). . . . 260
13.2.6.2.30 getMoreResults (int). . . . 261
13.2.6.2.31 getObject (int, Class). . . . 262
13.2.6.2.32 getQueryTimeout (). . . . 263
13.2.6.2.33 getRef (int). . . . 263
13.2.6.2.34 getResultSet (). . . . 264
13.2.6.2.35 getShortNoNull (int). . . . 265
13.2.6.2.36 getShortWrapper (int). . . . 265
13.2.6.2.37 getString (int). . . . 266
13.2.6.2.38 getSQLXML (int). . . . 267
13.2.6.2.39 getTime (int). . . . 268
13.2.6.2.40 getTimestamp (int). . . . 268
13.2.6.2.41 getUpdateCount (). . . . 269
13.2.6.2.42 getURL (). . . . 270
13.2.6.2.43 getWarnings (). . . . 270
13.2.6.2.44 isBatchable (). . . . 271
13.2.6.2.45 isBatchCompatible (). . . . 272
13.2.6.2.46 aetArray (int, Array). . . . 272
13.2.6.2.47 setAsciiStreamWrapper (int, AsciiStream). . . . 273
13.2.6.2.48 setBigDecimal (int, BigDecimal). . . . 274
13.2.6.2.49 setBinaryStreamWrapper (int, BinaryStream). . . . 275
13.2.6.2.50 setBlob (int, Blob). . . . 275
13.2.6.2.51 setBoolean (int, boolean). . . . 276
13.2.6.2.52 setBooleanWrapper (int, Boolean). . . . 277
13.2.6.2.53 setByte (int, byte). . . . 277
13.2.6.2.54 setBytes (int, byte). . . . 278
13.2.6.2.55 setByteWrapper (int, Byte). . . . 279
13.2.6.2.56 setCharacterStreamWrapper (int, CharacterStream). . . . 279
13.2.6.2.57 setClob (int, Clob). . . . 280
13.2.6.2.58 setDate (int, Date). . . . 281
13.2.6.2.59 setDouble (int, double). . . . 281
13.2.6.2.60 setDoubleWrapper (int, Double). . . . 282
13.2.6.2.61 setFloat (int, float). . . . 283
13.2.6.2.62 setFloatWrapper (int, Float). . . . 284

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

13.2.6.2.63 setInt (int, int). . . . 284
13.2.6.2.64 setIntWrapper (int, Integer). . . . 285
13.2.6.2.65 setLong (int, long). . . . 286
13.2.6.2.66 setLongWrapper (int, Long). . . . 286
13.2.6.2.67 setMaxFieldSize (int). . . . 287
13.2.6.2.68 setMaxRows (int). . . . 287
13.2.6.2.69 setObject (). . . . 288
13.2.6.2.70 setQueryTimeout (int). . . . 289
13.2.6.2.71 setRef (int, Ref). . . . 289
13.2.6.2.72 setShort (int, short). . . . 290
13.2.6.2.73 setShortWrapper (int, Short). . . . 290
13.2.6.2.74 setString (int, String). . . . 291
13.2.6.2.75 setSQLXML (int, SQLXML). . . . 292
13.2.6.2.76 setTime (int, Time). . . . 293
13.2.6.2.77 setTimestamp (int, Timestamp). . . . 293
13.2.6.2.78 setUnicodeStreamWrapper (int, UnicodeStream). . . . 294
13.2.6.2.79 setURL (int, URL). . . . 295
13.2.7 sqlj.runtime.profile.SerializedProfile. . . . 295
13.2.7.1 Interface Overview. . . . 295
13.2.7.2 Methods. . . . 296
13.2.7.2.1 getProfileAsStream (). . . . 296
13.3 SQLJ sqlj.runtime.profile Classes. . . . 297
13.3.1 sqlj.runtime.profile.DefaultLoader. . . . 297
13.3.1.1 Class Overview. . . . 297
13.3.1.2 Constructors. . . . 297
13.3.1.2.1 DefaultLoader (ClassLoader). . . . 297
13.3.1.3 Methods. . . . 298
13.3.1.3.1 getResourceAsStream (String). . . . 298
13.3.1.3.2 loadClass (String). . . . 298
13.3.2 sqlj.runtime.profile.EntryInfo. . . . 299
13.3.2.1 Class Overview. . . . 299
13.3.2.2 Variables. . . . 299
13.3.2.2.1 BLOCK. . . . 299
13.3.2.2.2 CALL. . . . 299
13.3.2.2.3 CALLABLE_STATEMENT. . . . 300
13.3.2.2.4 COMMIT. . . . 300
13.3.2.2.5 EXECUTE. . . . 300
13.3.2.2.6 EXECUTE_QUERY. . . . 301
13.3.2.2.7 EXECUTE_UPDATE. . . . 301
13.3.2.2.8 ITERATOR_CONVERSION. . . . 301
13.3.2.2.9 NAMED_RESULT. . . . 302
13.3.2.2.10 NO_RESULT. . . . 302
13.3.2.2.11 OTHER. . . . 302
13.3.2.2.12 POSITIONED. . . . 303

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

13.3.2.2.13 POSITIONED_RESULT. . . . 303
13.3.2.2.14 PREPARED_STATEMENT. . . . 303
13.3.2.2.15 QUERY. . . . 304
13.3.2.2.16 QUERY_FOR_UPDATE. . . . 304
13.3.2.2.17 RELEASE_SAVEPOINT. . . . 304
13.3.2.2.18 ROLLBACK. . . . 305
13.3.2.2.19 SAVEPOINT. . . . 305
13.3.2.2.20 SET_TRANSACTION. . . . 305
13.3.2.2.21 SINGLE_ROW_QUERY. . . . 306
13.3.2.2.22 STATEMENT. . . . 306
13.3.2.2.23 UNTYPED_SELECT. . . . 306
13.3.2.2.24 VALUES. . . . 306
13.3.2.3 Constructors. . . . 307
13.3.2.3.1 EntryInfo (). . . . 307
13.3.2.4 Methods. . . . 307
13.3.2.4.1 executeTypeToString (int). . . . 307
13.3.2.4.2 getDescriptor (). . . . 307
13.3.2.4.3 getExecuteType (). . . . 308
13.3.2.4.4 getLineNumber (). . . . 309
13.3.2.4.5 getParamCount (). . . . 309
13.3.2.4.6 getParamInfo (int). . . . 309
13.3.2.4.7 getResultSetCount (). . . . 310
13.3.2.4.8 getResultSetInfo (int). . . . 310
13.3.2.4.9 getResultSetName (). . . . 311
13.3.2.4.10 getResultSetType (). . . . 311
13.3.2.4.11 getRole (). . . . 312
13.3.2.4.12 getSQLString (). . . . 313
13.3.2.4.13 getStatementType (). . . . 313
13.3.2.4.14 getTransactionDescriptor (). . . . 313
13.3.2.4.15 isDefinedRole (int). . . . 314
13.3.2.4.16 isValidDescriptor (Object, int). . . . 314
13.3.2.4.17 isValidExecuteType (int). . . . 315
13.3.2.4.18 isValidResultSetType (int). . . . 315
13.3.2.4.19 isValidRole (int). . . . 315
13.3.2.4.20 isValidStatementType (int). . . . 316
13.3.2.4.21 resultSetTypeToString (int). . . . 316
13.3.2.4.22 roleToString (int). . . . 317
13.3.2.4.23 statementTypeToString (int). . . . 317
13.3.2.4.24 validateObject (). . . . 318
13.3.3 sqlj.runtime.profile.Profile. . . . 318
13.3.3.1 Class Overview. . . . 318
13.3.3.2 Constructors. . . . 319
13.3.3.2.1 Profile (Loader). . . . 319
13.3.3.3 Methods. . . . 320

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

13.3.3.3.1 deregisterCustomization (Customization). . . . 320
13.3.3.3.2 getConnectedProfile (Connection). . . . 320
13.3.3.3.3 getContextName (). . . . 321
13.3.3.3.4 getCustomizations (). . . . 321
13.3.3.3.5 getJavaType (String). . . . 321
13.3.3.3.6 getJavaType (TypeInfo). . . . 322
13.3.3.3.7 getLoader (). . . . 323
13.3.3.3.8 getProfileData (). . . . 323
13.3.3.3.9 getProfileName (). . . . 323
13.3.3.3.10 getTimestamp (). . . . 323
13.3.3.3.11 instantiate (Loader, InputStream). . . . 324
13.3.3.3.12 instantiate (Loader, String). . . . 324
13.3.3.3.13 registerCustomization (Customization). . . . 326
13.3.3.3.14 registerCustomization (Customization, Customization). . . . 326
13.3.3.3.15 replaceCustomization (Customization, Customization). . . . 327
13.3.4 sqlj.runtime.profile.ProfileData. . . . 327
13.3.4.1 Class Overview. . . . 327
13.3.4.2 Constructors. . . . 328
13.3.4.2.1 ProfileData (). . . . 328
13.3.4.3 Methods. . . . 328
13.3.4.3.1 getEntryInfo (int). . . . 328
13.3.4.3.2 getProfile (). . . . 328
13.3.4.3.3 getSourceFile (). . . . 329
13.3.4.3.4 size (). . . . 329
13.3.5 sqlj.runtime.profile.SetTransactionDescriptor. . . . 329
13.3.5.1 Class Overview. . . . 329
13.3.5.2 Variables. . . . 330
13.3.5.2.1 READ_NONE. . . . 330
13.3.5.2.2 READ_ONLY. . . . 330
13.3.5.2.3 READ_WRITE. . . . 330
13.3.5.3 Constructors. . . . 331
13.3.5.3.1 SetTransactionDescriptor (int, int). . . . 331
13.3.5.4 Methods. . . . 331
13.3.5.4.1 getAccessMode (). . . . 331
13.3.5.4.2 getIsolationLevel (). . . . 332
13.3.6 sqlj.runtime.profile.TypeInfo. . . . 332
13.3.6.1 Class Overview. . . . 332
13.3.6.2 Variables. . . . 333
13.3.6.2.1 IN. . . . 333
13.3.6.2.2 INOUT. . . . 333
13.3.6.2.3 OUT. . . . 333
13.3.6.3 Constructors. . . . 334
13.3.6.3.1 TypeInfo (). . . . 334
13.3.6.4 Methods. . . . 334

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

13.3.6.4.1 getJavaTypeName ()... 334
13.3.6.4.2 getMarkerIndex ()... 335
13.3.6.4.3 getMode ()... 335
13.3.6.4.4 getName ()... 335
13.3.6.4.5 getSQLType ()... 336
13.3.6.4.6 getSQLTypeName ()... 337
13.3.6.4.7 isValidMode (int)... 337
13.3.6.4.8 isValidSQLType (int)... 337
13.3.6.4.9 modeToString (int)... 338
13.3.6.4.10 SQLTypeToString (int)... 338
13.3.6.4.11 validateObject ()... 339
14 sqlj.runtime.profile.util.ProfileCustomizer... 341
14.1 Interface Overview... 341
14.2 Methods... 343
14.2.1 acceptsConnection (Connection)... 343
14.2.2 customize (Profile, Connection, ErrorLog)... 343
15 Status codes... 345
15.1 SQLSTATE... 345
16 Conformance... 347
16.1 Claims of conformance to SQL/OLB... 347
16.2 Additional conformance requirements for SQL/OLB... 347
16.3 Implied feature relationships of SQL/OLB... 347
Annex A SQL Conformance Summary (informative)... **349**
Annex B Implementation-defined elements (informative)... **353**
Annex C Implementation-dependent elements (informative)... **357**
Annex D Deprecated features (infomative)... **361**
Annex E Incompatibilities with ISO/IEC 9075:2003 (informative)... **363**
Annex F SQL feature taxonomy (informative)... **365**
Annex G Defect reports not addressed in this edition of this part of ISO/IEC 9075 (informative)... **367**
Annex H SQLJ tutorial (informative)... **369**
H.1 Design goals... 369
H.2 Advantages of SQLJ over JDBC... 369
H.3 Consistency with existing embedded SQL languages... 370
H.4 Profile customization overview... 370
H.4.1 Profile customization process... 371
H.4.2 Profile customization utilities... 372
H.5 Examples... 372
H.5.1 Example of Profile generation and naming... 372
H.5.2 Example of a JAR manifest file... 373
H.5.3 Host variables... 373

This document is a preview generated by EVS

 © ISO/IEC 2008 – All rights reserved

H.5.4 Host expressions. . . . 373
H.5.5 SQLJ clauses. . . . 374
H.5.6 Connection contexts. . . . 374
H.5.7 Default connection context. . . . 374
H.5.8 Iterators. . . . 375
H.5.8.1 Positional bindings to columns. . . . 375
H.5.8.2 Named bindings to columns. . . . 376
H.5.8.3 Providing names for columns of queries. . . . 377
H.5.9 Invoking SQL-invoked routines. . . . 377
H.5.10 Using multiple SQLJ contexts and connections. . . . 378
H.5.11 SQL execution control and status. . . . 379
H.5.12 Multiple `java.sql.ResultSet` objects from SQL-invoked procedure calls. . . . 380
H.5.13 Creating an SQLJ iterator object from a `java.sql.ResultSet` object. . . . 381
H.5.14 Obtaining a `java.sql.ResultSet` object from an iterator object. . . . 381
H.5.15 Working with user-defined types. . . . 382
H.5.16 Batching. . . . 383
H.5.17 Example program. . . . 383
H.5.18 Host variable definition. . . . 384
Bibliography. . . . 387
Index. . . . 389

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

Tables

This document is a preview generated by EVS

Table

Page

1 Association of roles with SQLJ <executable clause>s. . . . 15
2 SQLJ type properties. . . . 18
3 SQLJ output assignability (part 1). . . . 26
4 SQLJ output assignability (part 2). . . . 28
5 SQLJ output assignability (part 3). . . . 29
6 SQLJ output assignability (part 4). . . . 31
7 SQLJ input assignability (part 1). . . . 33
8 SQLJ input assignability (part 2). . . . 34
9 SQLJ input assignability (part 3). . . . 36
10 SQLJ input assignability (part 4). . . . 37
11 Methods retained from java.sql.ResultSet. . . . 204
12 Methods not retained from java.sql.ResultSet. . . . 205
13 Additional methods unique to RTResultSet. . . . 206
14 Methods retained from java.sql.Statement. . . . 237
15 Methods not retained from java.sql.Statement. . . . 238
16 Methods retained from java.sql.PreparedStatement. . . . 238
17 Methods not retained from java.sql.PreparedStatement. . . . 239
18 Methods retained from java.sql.CallableStatement. . . . 240
19 Methods not retained from java.sql.CallableStatement. . . . 241
20 Additional methods unique to RTStatement. . . . 241
21 Customize Result Interpretation. . . . 342
22 SQLSTATE class and subclass values. . . . 345
23 Implied feature relationships of SQL/OLB. . . . 347
24 Feature taxonomy for optional features. . . . 365

© ISO/IEC 2008 – All rights reserved

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 9075-10 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

This third edition of ISO/IEC 9075-10 cancels and replaces the second edition (ISO/IEC 9075-10:2003), which has been technically revised. It also incorporates Technical Corrigendum ISO/IEC 9075-10:2003/Cor.2:2007.

ISO/IEC 9075 consists of the following parts, under the general title Information technology — Database languages — SQL:

— Part 1: Framework (SQL/Framework)

— Part 2: Foundation (SQL/Foundation)

— Part 3: Call-Level Interface (SQL/CLI)

— Part 4: Persistent Stored Modules (SQL/PSM)

— Part 9: Management of External Data (SQL/MED)

— Part 10: Object Language Bindings (SQL/OLB)

— Part 11: Information and Definition Schema (SQL/Schemata)

— Part 13: SQL Routines and Types Using the Java™ Programming Language (SQL/JRT)

— Part 14: XML-Related Specifications (SQL/XML)

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

This document is a preview generated by EVS

Introduction

The organization of this Part of this International Standard is as follows:

1) Clause 1, "Scope", specifies the scope of this part of ISO/IEC 9075.

2) Clause 2, "Normative references", identifies additional standards and publically-available specifications that, through reference in this part of ISO/IEC 9075, constitute provisions of this part of ISO/IEC 9075.

3) Clause 3, "Definitions, notations, and conventions", defines the notations and conventions used in this part of ISO/IEC 9075.

4) Clause 4, "Concepts", presents concepts used in the definition of the Object Language Bindings.

5) Clause 5, "Lexical elements", defines the lexical elements of the language.

6) Clause 6, "Scalar expressions", defines the elements of the language that produce scalar values.

7) Clause 7, "Additional common elements", defines additional language elements that are used in various parts of the language.

8) Clause 8, "Embedded SQL", defines the host language embeddings.

9) Clause 9, "SQLJ reserved names", defines the reserved names for SQLJ.

10) Clause 10, "Common subelements", defines the commonly used subelements for SQLJ.

11) Clause 11, "<SQLJ specific clause> and contents", defines the syntax and rules for SQLJ constructs.

12) Clause 12, "Package sqlj.runtime", specifies the SQLJ runtime package.

13) Clause 13, "Package sqlj.runtime.profile", specifies the SQLJ runtime profile package.

14) Clause 14, "sqlj.runtime.profile.util.ProfileCustomizer", specifies the SQLJ profile customizer class.

15) Clause 15, "Status codes", defines SQLSTATE values related to Object Language Bindings.

16) Clause 16, "Conformance", defines the criteria for conformance to this part of ISO/IEC 9075.

17) Annex A, "SQL Conformance Summary", is an informative Annex. It summarizes the conformance requirements of the SQL language.

18) Annex B, "Implementation-defined elements", is an informative Annex. It lists those features for which the body of this part of ISO/IEC 9075 states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or any other behavior is partly or wholly implementation-defined.

19) Annex C, "Implementation-dependent elements", is an informative Annex. It lists those features for which the body of this part of ISO/IEC 9075 states that the syntax, the meaning, the returned results, the effect on SQL-data and/or schemas, or any other behavior is partly or wholly implementation-dependent.

20) Annex D, "Deprecated features", is an informative Annex. It lists features that the responsible Technical Committee intend will not appear in a future revised version of this part of ISO/IEC 9075.

21) Annex E, "Incompatibilities with ISO/IEC 9075:2003", is an informative Annex. It lists incompatibilities with the previous version of this part of ISO/IEC 9075.

 © ISO/IEC 2008 – All rights reserved

22) Annex F, “SQL feature taxonomy”, is an informative Annex. It identifies features of the SQL language specified in this part of ISO/IEC 9075 by an identifier and a short descriptive name. This taxonomy is used to specify conformance and may be used to develop other profiles involving the SQL language.

23) Annex G, “Defect reports not addressed in this edition of this part of ISO/IEC 9075”, is an informative Annex. It describes the Defect Reports that were known at the time of publication of this part of this International Standard. Each of these problems is a problem carried forward from the previous edition of ISO/IEC 9075. No new problems have been created in the drafting of this edition of this International Standard.

24) Annex H, “SQLJ tutorial”, is an informative Annex. It contains tutorial information about the features of the SQL language that are specified in this part of ISO/IEC 9075.

In the text of this part of ISO/IEC 9075, Clauses begin a new odd-numbered page. Any resulting blank space is not significant.

All Clauses of this part of ISO/IEC 9075 are normative.

This document is a preview generated by EVS

© ISO/IEC 2008 – All rights reserved

This document is a preview generated by EVS

This document is a preview generated by EVS

Information technology — Database languages — SQL —

Part 10:
Object Language Bindings (SQL/OLB)

1 Scope

ISO/IEC 9075-2 specifies embedded SQL for the programming languages: Ada, C, COBOL, Fortran, MUMPS, Pascal, and PL/I. This part of ISO/IEC 9075 defines similar features of Database language SQL that support embedding of SQL-statements into programs written in the Java™ programming language (Java is a registered trademark of Sun Microsystems, Inc.). The embedding of SQL into Java is commonly known as "SQLJ". This part of ISO/IEC 9075 specifies the syntax and semantics of SQLJ, as well as mechanisms to ensure binary portability of resulting SQLJ applications. In addition, it specifies a number of Java packages and their contained classes (including methods).

Throughout this part of ISO/IEC 9075, the terms "SQLJ" and "SQL/OLB" are used synonymously.

© ISO/IEC 2008 – All rights reserved

This document is a preview generated by EVS

(Blank page)

 © ISO/IEC 2008 – All rights reserved

This document is a preview generated by EVS

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 ISO and IEC standards

[ISO9075-1] ISO/IEC 9075-1:2008, *Information technology — Database languages — SQL — Part 1: Framework (SQL/Framework)*.

[ISO9075-2] ISO/IEC 9075-2:2008, *Information technology — Database languages — SQL — Part 2: Foundation (SQL/Foundation)*.

2.2 Other international standards

[Unicode] The Unicode Consortium, *The Unicode Standard*. (Information about the latest version of the Unicode standard can be found by using the "Latest Unicode Version" link on the "Enumerated Versions of The Unicode Standard" page.)
`http://www.unicode.org/versions/enumeratedversions.html`

[Java] *The Java™ Language Specification, Third Edition*, James Gosling, Bill Joy, Guy Steele, and Gilad Bracha, Prentice Hall, June 14, 2005, ISBN 0-321-24678-0.

[JDBC] *JDBC™ 4.0 Specification*, Final v1.0, Lance Andersen, Sun Microsystems, Inc., November 7, 2006.

[JNDI] *Java Naming and Directory Interface™*, Sun Microsystems, Inc.
`http://java.sun.com/j2se/1.5.0/docs/guide/jndi/index.html`.

[JavaBeans] *The JavaBeans™ 1.01 Specification*
`http://java.sun.com/products/javabeans/docs/spec.html`

© ISO/IEC 2008 – All rights reserved