

# ISO/IEC 9075-13:2023-06 (E)

## Information technology - Database languages SQL - Part 13: SQL Routines and types using the Java <sup>TM</sup> programming language (SQL/JRT)

---

Contents	Page
Foreword.....	vii
Introduction.....	ix
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>2</b>
<b>3 Terms and definitions.....</b>	<b>3</b>
<b>4 Concepts.....</b>	<b>6</b>
4.1 Notations and conventions.....	6
4.1.1 Notations.....	6
4.1.2 Specification of built-in procedures.....	6
4.1.3 Specification of deployment descriptor files.....	6
4.2 Java programming language.....	7
4.3 SQL-invoked routines.....	8
4.3.1 Characteristics of SQL-invoked routines.....	8
4.4 Java class name resolution.....	9
4.5 SQL result sets.....	10
4.6 Parameter mapping.....	10
4.7 Unhandled Java exceptions.....	11
4.8 Data types.....	11
4.8.1 Host language data types.....	11
4.9 User-defined types.....	12
4.9.1 Introduction to user-defined types.....	12
4.9.2 User-defined type comparison and assignment.....	13
4.9.3 User-defined type descriptor.....	13
4.9.4 Accessing static fields.....	14
4.9.5 Converting objects between SQL and Java.....	15
4.9.5.1 Introduction to conversion of objects between SQL and Java.....	15
4.9.5.2 SERIALIZABLE.....	15
4.9.5.3 SQLDATA.....	15
4.9.5.4 Developing for portability.....	16
4.10 Built-in procedures.....	16
4.11 Basic security model.....	16
4.11.1 Privileges.....	16
4.12 JARs.....	17
4.12.1 Introduction to JARs.....	17
4.12.2 Deployment descriptor files.....	17
<b>5 Lexical elements.....</b>	<b>19</b>
5.1 <token> and <separator>.....	19
5.2 Names and identifiers.....	20

<b>6</b>	<b>Scalar expressions</b>	<b>22</b>
6.1	<method invocation>	22
6.2	<new specification>	23
<b>7</b>	<b>Predicates</b>	<b>24</b>
7.1	<comparison predicate>	24
<b>8</b>	<b>Additional common rules</b>	<b>26</b>
8.1	Invoking an SQL-invoked routine	26
8.2	Execution of array-returning functions	35
<b>9</b>	<b>Additional common elements</b>	<b>42</b>
9.1	<language clause>	42
9.2	<Java parameter declaration list>	43
9.3	<SQL Java path>	44
9.4	<routine invocation>	46
9.5	Java routine signature determination	47
<b>10</b>	<b>Schema definition and manipulation</b>	<b>55</b>
10.1	<drop schema statement>	55
10.2	<table definition>	56
10.3	<view definition>	57
10.4	<user-defined type definition>	58
10.5	<attribute definition>	62
10.6	<alter type statement>	65
10.7	<drop data type statement>	66
10.8	<SQL-invoked routine>	67
10.9	<alter routine statement>	70
10.10	<drop routine statement>	71
10.11	<user-defined ordering definition>	72
10.12	<drop user-defined ordering statement>	73
<b>11</b>	<b>Access control</b>	<b>74</b>
11.1	<grant privilege statement>	74
11.2	<privileges>	75
11.3	<revoke statement>	76
<b>12</b>	<b>Built-in procedures</b>	<b>77</b>
12.1	SQLJ.INSTALL_JAR procedure	77
12.2	SQLJ.REPLACE_JAR procedure	79
12.3	SQLJ.REMOVE_JAR procedure	81
12.4	SQLJ.ALTER_JAVA_PATH procedure	83
<b>13</b>	<b>Java topics</b>	<b>85</b>
13.1	Java facilities supported by this document	85
13.1.1	Package java.sql	85
13.1.2	System properties	85
13.2	Deployment descriptor files	86
<b>14</b>	<b>Information Schema</b>	<b>89</b>
14.1	Information Schema digital artifact	89
14.2	JAR_JAR_USAGE view	89
14.3	JARS view	90

14.4	METHOD_SPECIFICATIONS view. ....	91
14.5	ROUTINE_JAR_USAGE view. ....	92
14.6	TYPE_JAR_USAGE view. ....	93
14.7	USER_DEFINED_TYPES view. ....	94
14.8	Short name views. ....	95
<b>15</b>	<b>Definition Schema. ....</b>	<b>96</b>
15.1	Definition Schema digital artifact. ....	96
15.2	JAR_JAR_USAGE base table. ....	96
15.3	JARS base table. ....	98
15.4	METHOD_SPECIFICATIONS base table. ....	99
15.5	ROUTINE_JAR_USAGE base table. ....	101
15.6	ROUTINES base table. ....	102
15.7	TYPE_JAR_USAGE base table. ....	103
15.8	USAGE_PRIVILEGES base table. ....	104
15.9	USER_DEFINED_TYPES base table. ....	105
<b>16</b>	<b>Status codes. ....</b>	<b>107</b>
16.1	SQLSTATE. ....	107
<b>17</b>	<b>Conformance. ....</b>	<b>108</b>
17.1	Claims of conformance to SQL/JRT. ....	108
17.2	Additional conformance requirements for SQL/JRT. ....	108
17.3	Implied feature relationships of SQL/JRT. ....	108
<b>Annex A</b>	<b>(informative) SQL conformance summary. ....</b>	<b>109</b>
<b>Annex B</b>	<b>(informative) Implementation-defined elements. ....</b>	<b>115</b>
<b>Annex C</b>	<b>(informative) Implementation-dependent elements. ....</b>	<b>121</b>
<b>Annex D</b>	<b>(informative) SQL optional feature taxonomy. ....</b>	<b>123</b>
<b>Annex E</b>	<b>(informative) Deprecated features. ....</b>	<b>125</b>
<b>Annex F</b>	<b>(informative) Incompatibilities with ISO/IEC 9075:2016. ....</b>	<b>126</b>
<b>Annex G</b>	<b>(informative) Defect Reports not addressed in this edition of this document. ....</b>	<b>127</b>
	<b>Bibliography. ....</b>	<b>128</b>
	<b>Index. ....</b>	<b>129</b>