INTERNATIONAL STANDARD

ISO/IEC 19075-7

First edition
2021-08

Information technology — Guidance for the use of database language SQL —

Part 7: Polymorphic table functions

Technologies de l'information — Recommandations pour l'utilisation du langage de base de données SQL —

Partie 7: Fonctions de table polymorphes

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fdc2911-8c39-4fd2-8cab-0aab4d069dfc/iso-iec-19075-7-2021

Reference number
ISO/IEC 19075-7:2021(E)

© ISO/IEC 2021

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fdc2911-8c39-4fd2-8cab-0aab4d069dfc/iso-iec-19075-7-2021

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

 © ISO/IEC 2021 – All rights reserved

Contents

Page

Foreword . . . xii
Introduction . . . xiv
1 Scope . . . 1
2 Normative references . . . 2
3 Terms and definitions . . . 3
4 Introduction to polymorphic table functions . . . 4
4.1 Context of polymorphic table functions . . . 4
4.2 What is a polymorphic table function? . . . 4
4.3 Audiences . . . 4
4.4 Motivating examples . . . 5
4.4.1 Summary of motivating examples . . . 5
4.4.2 CSVreader . . . 5
4.4.3 Pivot . . . 6
4.4.4 Score . . . 8
4.4.5 TopNplus . . . 11
4.4.6 ExecR . . . 14
4.4.7 Similarity . . . 15
4.4.8 UDjoin . . . 17
4.4.9 MapReduce . . . 18
4.5 The life cycle of a PTF . . . 19
5 PTF processing model . . . 21
5.1 Introduction to the PTF processing model . . . 21
5.2 Processing phases . . . 21
5.3 Virtual processors . . . 21
5.4 PTF component procedures . . . 21
5.5 Input table characteristics . . . 22
5.6 Partitioning and ordering . . . 23
5.7 Flow of control . . . 24
5.8 Flow of information . . . 25
5.9 Flow of row types . . . 26
5.10 Pass-through columns . . . 27
5.11 Security model . . . 28
5.12 Conformance features . . . 29
6 Specification . . . 31
6.1 Introduction to the specification of PTFs . . . 31
6.2 Functional specification . . . 31
6.2.1 Introduction to the functional specification . . . 31
6.2.2 Parameter list . . . 31

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fde2911-8e39-4fd2-8eab-0aab4d069df6/iso-iec-19075-7-2021

© ISO/IEC 2021 – All rights reserved

6.2.3 Input table semantics. . . . 32
6.2.4 Prunability. . . . 33
6.2.5 Pass-through columns. . . . 33
6.2.6 Result row type. . . . 34
6.2.7 Determinism. . . . 34
6.2.8 SQL-data access. . . . 35
6.2.9 Documenting the PTF to the query author. . . . 35
6.3 Design specification. . . . 36
6.3.1 Introduction to the design specification. . . . 36
6.3.2 Name the component procedures. . . . 36
6.3.3 Private data. . . . 36
6.3.4 Routine characteristics of the component procedures. . . . 37
6.3.5 Component procedure signatures. . . . 38
7 Data definition language. . . . 43
7.1 Introduction to data definition language. . . . 43
7.2 PTF creation. . . . 43
7.3 PTF component procedures. . . . 45
7.4 Altering PTF component procedures and PTFs. . . . 45
7.5 Dropping a PTF and its component procedures. . . . 45
8 Implementation. . . . 46
8.1 Introduction to PTF implementation. . . . 46
8.2 PTF descriptor areas. . . . 46
8.2.1 Introduction to PTF descriptor areas. . . . 46
8.2.2 PTF descriptor area header. . . . 47
8.2.3 SQL item descriptor areas for row types. . . . 48
8.2.4 SQL item descriptor areas for partitioning. . . . 51
8.2.5 SQL item descriptor areas for ordering. . . . 51
8.3 PTF extended names. . . . 52
8.4 Reading a PTF descriptor area. . . . 52
8.5 Writing a PTF descriptor area. . . . 53
8.5.1 Introduction to writing a PTF descriptor area. . . . 53
8.5.2 Using DESCRIBE to populate a PTF descriptor area. . . . 53
8.5.3 Using SET DESCRIPTOR to populate a PTF descriptor area 54
8.5.4 Using COPY DESCRIPTOR to populate a PTF descriptor area 55
8.6 Reading a PTF input cursor. . . . 55
8.7 Outputting a row. . . . 56
9 Invocation. . . . 58
9.1 Introduction to PTF invocation. . . . 58
9.2 <table primary>. . . . 58
9.3 <PTF derived table>. . . . 58
9.4 Proper result correlation name and proper result column naming. . . . 58
9.5 <routine invocation>. . . . 59
9.6 <table argument>. . . . 60
9.7 <table argument proper>. . . . 60
9.7.1 Types of table arguments. . . . 60
9.7.2 <table or query name>. . . . 61

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fdc2911-8c39-41d2-8cab-0aab4d069d1c/iso-iec-19075-7-2021

 © ISO/IEC 2021 – All rights reserved

9.7.3 <table subquery>. . . . 61
9.7.4 Nested table function invocation. . . . 62
9.8 Table argument correlation name. . . . 62
9.9 Table argument column renaming. . . . 62
9.10 Range variables and column renaming in nested PTF. . . . 63
9.11 Partitioning. . . . 63
9.12 Pruning. . . . 64
9.13 Ordering. . . . 64
9.14 Co-partitioning. . . . 65
9.15 Cross products of partitions. . . . 66
9.16 <descriptor argument>. . . . 66

10 Compilation. . . . 67
10.1 Introduction to PTF compilation. . . . 67
10.2 Calling the describe component procedure. . . . 67
10.3 Inside the describe component procedure. . . . 67
10.4 Using the result of describe. . . . 68

11 Optimization. . . . 69

12 Execution. . . . 70
12.1 Introduction to PTF execution. . . . 70
12.2 Partitions and virtual processors. . . . 70
12.3 Calling the start component procedure. . . . 71
12.4 Inside the start component procedure. . . . 71
12.5 Calling the PTF fulfill component procedure. . . . 72
12.6 Inside the PTF fulfill component procedure. . . . 72
12.7 Closing cursors. . . . 72
12.8 Calling the PTF finish component procedure. . . . 72
12.9 Inside the PTF finish component procedure. . . . 73
12.10 Collecting the output. . . . 73
12.11 Cleanup on a virtual processor. . . . 73
12.12 Final result. . . . 73

13 Examples. . . . 74
13.1 Introduction to the examples. . . . 74
13.2 Projection. . . . 75
13.2.1 Overview. . . . 75
13.2.2 Functional specification of Projection. . . . 75
13.2.3 Design specification for Projection. . . . 76
13.2.4 Projection component procedures. . . . 76
13.2.5 Invoking Projection. . . . 78
13.2.6 Calling Projection_describe. . . . 78
13.2.7 Inside Projection_describe. . . . 80
13.2.8 Result of Projection_describe. . . . 82
13.2.9 Virtual processors for Projection. . . . 82
13.2.10 Calling Projection_fulfill. . . . 83
13.2.11 Inside Projection_fulfill. . . . 84
13.2.12 Collecting the results. . . . 84
13.2.13 Cleanup. . . . 85

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/0fdc2911-8e39-4fd2-8cab-0aab4d069df6/iso-iec-19075-7-2021

© ISO/IEC 2021 – All rights reserved

13.3 CSVreader . . . 86
13.3.1 Overview . . . 86
13.3.2 Functional specification of CSVreader . . . 86
13.3.3 Design specification for CSVreader . . . 86
13.3.4 CSVreader component procedures . . . 87
13.3.5 Implementation of CSVreader . . . 88
13.3.6 Invoking CSVreader . . . 88
13.3.7 Calling CSVreader_describe . . . 89
13.3.8 Inside CSVreader_describe . . . 91
13.3.9 Result of CSVreader_describe . . . 92
13.3.10 Virtual processor for CSVreader . . . 94
13.3.11 Calling CSVreader_start . . . 94
13.3.12 Inside CSVreader_start . . . 95
13.3.13 Calling CSVreader_fulfill . . . 95
13.3.14 Inside CSVreader_fulfill . . . 95
13.3.15 Collecting the output . . . 96
13.3.16 Calling CSVreader_finish . . . 96
13.3.17 Inside CSVreader_finish . . . 96
13.3.18 Cleanup . . . 97
13.4 Pivot . . . 98
13.4.1 Overview . . . 98
13.4.2 Functional specification of Pivot . . . 98
13.4.3 Design specification for Pivot . . . 98
13.4.4 Pivot component procedures . . . 99
13.4.5 Invoking Pivot . . . 100
13.4.6 Calling Pivot_describe . . . 100
13.4.7 Inside Pivot_describe . . . 104
13.4.8 Result of Pivot_describe . . . 105
13.4.9 Virtual processors for Pivot . . . 107
13.4.10 Calling Pivot_fulfill . . . 108
13.4.11 Inside Pivot_fulfill . . . 108
13.4.12 Collecting the results . . . 109
13.4.13 Cleanup . . . 109
13.5 Score . . . 110
13.5.1 Overview . . . 110
13.5.2 Functional specification of Score . . . 110
13.5.3 Design specification for Score . . . 110
13.5.4 Score component procedures . . . 111
13.5.5 Invoking Score . . . 112
13.5.6 Calling Score_describe . . . 112
13.5.7 Inside Score_describe . . . 115
13.5.8 Result of Score_describe . . . 116
13.5.9 Virtual processors for Score . . . 117
13.5.10 Calling Score_fulfill . . . 119
13.5.11 Inside Score_fulfill . . . 119
13.5.12 Collecting the output . . . 120
13.5.13 Cleanup . . . 121

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fdc2911-8e39-4fd2-8cab-0aabd4d069d6/iso-iec-19075-7-2021

© ISO/IEC 2021 – All rights reserved

13.6 TopNplus . . . 122
13.6.1 Overview . . . 122
13.6.2 Functional specification of TopNplus . . . 122
13.6.3 Design specification for TopNplus . . . 122
13.6.4 TopNplus component procedures . . . 123
13.6.5 Invoking TopNplus . . . 124
13.6.6 Calling TopNplus_describe . . . 124
13.6.7 Inside TopNplus_describe . . . 127
13.6.8 Result of TopNplus_describe . . . 129
13.6.9 Virtual processors for TopNplus . . . 129
13.6.10 Calling TopNplus_fulfill . . . 131
13.6.11 Inside TopNplus_fulfill . . . 131
13.6.12 Collecting the output . . . 132
13.6.13 Cleanup . . . 132
13.6.14 TopNplus using pass-through columns . . . 132
13.7 ExecR . . . 135
13.7.1 Overview . . . 135
13.7.2 Functional specification of ExecR . . . 135
13.7.3 Design specification for ExecR . . . 135
13.7.4 ExecR component procedures . . . 136
13.7.5 Invoking ExecR . . . 137
13.7.6 Calling ExecR_describe . . . 137
13.7.7 Inside ExecR_describe . . . 139
13.7.8 Result of ExecR_describe . . . 140
13.7.9 Virtual processors for ExecR . . . 140
13.7.10 Calling ExecR_start . . . 141
13.7.11 Inside ExecR_start . . . 141
13.7.12 Calling ExecR_fulfill . . . 142
13.7.13 Inside ExecR_fulfill . . . 142
13.7.14 Collecting the output . . . 142
13.7.15 Calling ExecR_finish . . . 143
13.7.16 Inside ExecR_finish . . . 143
13.7.17 Cleanup . . . 143
13.8 Similarity . . . 144
13.8.1 Overview . . . 144
13.8.2 Functional specification of Similarity . . . 144
13.8.3 Design specification for Similarity . . . 144
13.8.4 Similarity component procedures . . . 145
13.8.5 Invoking Similarity . . . 145
13.8.6 Calling Similarity_describe . . . 146
13.8.7 Inside Similarity_describe . . . 148
13.8.8 Result of Similarity_describe . . . 149
13.8.9 Virtual processors for Similarity . . . 149
13.8.10 Calling Similarity_fulfill . . . 153
13.8.11 Inside Similarity_fulfill . . . 153
13.8.12 Collecting the output . . . 154
13.8.13 Cleanup . . . 154

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/IEC 19075-7:2021
https://standards.iteh.ai/catalog/standards/iso/6fdc2911-8e39-4fd2-8cab-0aab4d069d6a/iso-iec-19075-7-2021