

# ISO/IEC 19075-9:2022-10 (E)

## Information technology - Guidance for the use of database language SQL - Part 9: Online analytic processing (OLAP) capabilities (Guide/OLAP)

---

<b>Contents</b>	<b>Page</b>
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 Example data.....</b>	<b>4</b>
4.1 Introduction to example data.....	4
4.2 Table sales history.....	4
4.3 Table stock1.....	5
4.4 Table stocks.....	6
4.5 Table homes.....	6
<b>5 Windows.....</b>	<b>8</b>
5.1 Introduction to windows.....	8
5.2 Window definitions.....	8
5.2.1 Introduction to window definitions.....	8
5.2.2 Window partitioning.....	9
5.2.3 Window ordering.....	10
5.2.3.1 Introduction to window ordering.....	10
5.2.3.2 Null ordering and treatment.....	11
5.2.4 Window frames.....	12
5.2.4.1 Introduction to window frames.....	12
5.2.4.2 Physical window frames.....	13
5.2.4.3 Logical window frames.....	15
5.2.4.3.1 Introduction to logical window frames.....	15
5.2.4.3.2 RANGE window frames.....	15
5.2.4.3.3 GROUPS window frames.....	16
5.2.4.4 Window frame exclusions.....	17
5.3 Explicit vs. implicit window definitions.....	18
5.4 Multiple window definitions.....	19
<b>6 Window functions.....</b>	<b>20</b>
6.1 Introduction to window functions.....	20
6.2 Rank functions.....	20
6.3 Distribution functions.....	21
6.4 Row number function.....	22
6.5 Window aggregate functions.....	23
6.6 Ntile function.....	26
6.7 LEAD and LAG functions.....	27
6.8 FIRST_VALUE and LAST_VALUE functions.....	29
6.9 NTH_VALUE function.....	30
6.10 Null treatment.....	32

<b>7</b>	<b>Nested window functions.....</b>	<b>33</b>
7.1	Introduction to nested window functions.....	33
7.2	Row markers.....	34
7.3	Offsets.....	35
7.4	FRAME_ROW.....	36
7.5	Nested ROW_NUMBER function.....	37
7.6	Effects of EXCLUDE.....	38
<b>8</b>	<b>Enhanced aggregate functions.....</b>	<b>40</b>
8.1	Introduction to enhanced aggregate functions.....	40
8.2	Unary statistical aggregate functions.....	40
8.3	Binary statistical aggregate functions.....	41
8.4	Hypothetical rank and distribution aggregate functions.....	44
8.5	Inverse distribution functions.....	45
	<b>Bibliography.....</b>	<b>47</b>
	<b>Index.....</b>	<b>48</b>

## Table

Page

1	Table sales_history.....	4
2	Table stock1.....	5
3	Table stocks.....	6
4	Table homes.....	6
5	Result of window clause.....	10
6	Result of window clause ordering.....	11
7	Result of physical window frame, UNBOUNDED PRECEDING to CURRENT ROW.....	13
8	Result of physical window frame, 2 PRECEDING to 1 FOLLOWING.....	14
9	Result of logical window frame with RANGE.....	15
10	Result of logical window frame with GROUPS.....	16
11	Result of window frame exclusion 1.....	17
12	Result of window frame exclusion 2.....	18
13	Result of RANK and DENSE_RANK function.....	21
14	Result of PERCENT_RANK and CUME_DIST functions.....	22
15	Result of ROW_NUMBER function.....	23
16	Result of aggregate function (SUM) ordered.....	24
17	Result of aggregate function (SUM) unordered.....	24
18	Result of aggregate function (AVG).....	25
19	Result of aggregate function (NTILE) with partitioned query.....	26
20	Result of aggregate function (NTILE) in non-partitioned query.....	27
21	Result of aggregate function (LEAD).....	28
22	Result of aggregate function (LAG).....	28
23	Result of aggregate function (FIRST_VALUE).....	29
24	Result of aggregate function (LAST_VALUE).....	30
25	Result of aggregate function (NTH_VALUE).....	31
26	Result of row markers.....	34
27	Result of row markers (offsets).....	35
28	Result of window frames with row markers.....	36
29	Result of EXCLUDE.....	38
30	Result of hypothetical aggregate functions.....	44
31	Result of inverse distribution functions.....	45
32	Result of inverse distribution functions with ordering.....	46

## Example

Page

1	Window clause. . . . .	9
2	Window clause ordering. . . . .	11
3	Physical window frame, UNBOUNDED PRECEDING to CURRENT ROW. . . . .	13
4	Physical window frame, 2 PRECEDING to 1 FOLLOWING. . . . .	14
5	Logical window frame with RANGE. . . . .	15
6	Logical window frame with GROUPS. . . . .	16
7	Window frame exclusion 1. . . . .	17
8	Window frame exclusion 2. . . . .	17
9	Explicit window definition. . . . .	18
10	Implicit window definition. . . . .	19
11	Multiple window definitions. . . . .	19
12	Rank functions with explicit window. . . . .	20
13	Rank functions with implicit window. . . . .	21
14	Distribution functions. . . . .	22
15	Row number function. . . . .	23
16	Window aggregate function (SUM) ordered. . . . .	23
17	Window aggregate function (SUM) unordered. . . . .	24
18	Window aggregate moving average. . . . .	25
19	NTILE in partitioned query. . . . .	26
20	NTILE in non-partitioned query. . . . .	26
21	LEAD function. . . . .	28
22	LAG function. . . . .	28
23	FIRST_VALUE function. . . . .	29
24	LAST_VALUE function. . . . .	30
25	NTH_VALUE function usage. . . . .	31
26	Equivalent NTH_VALUE function usage. . . . .	31
27	Null treatment with LEAD function. . . . .	32
28	Null treatment with FIRST_VALUE function. . . . .	32
29	Null treatment with LAST_VALUE function. . . . .	32
30	Q1: CASE expression in a window query. . . . .	33
31	Q2: Complex join. . . . .	33
32	Q3: VALUE_OF function usage. . . . .	34
33	Q4: frame_row and current_row in value_of function. . . . .	37
34	Weight function. . . . .	38
35	Hypothetical aggregate function. . . . .	44
36	Inverse distribution function. . . . .	45
37	Inverse distribution function ordered. . . . .	46