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

**Part 9:  
Online analytic processing (OLAP)  
capabilities (Guide/OLAP)**

*Langages de bases de données utilisés dans les technologies de  
l'information — Recommandations pour l'utilisation du langage de  
base de données SQL —*

*Partie 9: Capacités de traitement analytique en ligne (OLAP), (Guide/  
OLAP)*

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<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>

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## Tables

<b>Table</b>		<b>Page</b>
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

## Examples

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

## 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.

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

This first edition of ISO/IEC 19075-9 cancels and replaces ISO/IEC TR 19075-9:2020.

This document is intended to be used in conjunction with the following editions of the parts of the ISO/IEC 9075 series:

- ISO/IEC 9075-1, sixth edition or later;
- ISO/IEC 9075-2, sixth edition or later;
- ISO/IEC 9075-3, sixth edition or later;
- ISO/IEC 9075-4, seventh edition or later;
- ISO/IEC 9075-9, fifth edition or later;
- ISO/IEC 9075-10, fifth edition or later;
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## Introduction

This document discusses the syntax and semantics for including online analytic processing (OLAP) capabilities in SQL, as defined in ISO/IEC 9075-2.

The organization of this document is as follows:

- 1) **Clause 1, “Scope”**, specifies the scope of this document.
- 2) **Clause 2, “Normative references”**, identifies standards that are referenced as part of requirements by this document.
- 3) **Clause 3, “Terms and definitions”**, defines the terms and definitions used in this document.
- 4) **Clause 5, “Windows”**, discusses Feature T611, “Elementary OLAP operations” and Feature T612, “Advanced OLAP operations”, introducing the concept of a window in an SQL query.
- 5) **Clause 6, “Window functions”**, further discusses Feature T611, “Elementary OLAP operations” and Feature T612, “Advanced OLAP operations”, as well as Feature T614, “NTILE function”, Feature T615, “LEAD and LAG functions”, Feature T616, “Null treatment option for LEAD and LAG functions”, Feature T617, “FIRST\_VALUE and LAST\_VALUE functions”, and Feature T618, “NTH\_VALUE function”.
- 6) **Clause 7, “Nested window functions”**, discusses the additional window functionality in Feature T619, “Nested window functions”.
- 7) **Clause 8, “Enhanced aggregate functions”**, discusses Feature T621, “Enhanced numeric functions” and its introduction of enhanced aggregate functions in SQL.

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

Part 9:

## Online analytic processing (OLAP) capabilities (Guide/OLAP)

### 1 Scope

This document discusses the syntax and semantics for including online analytic processing (OLAP) capabilities in SQL, as defined in [ISO/IEC 9075-2](#).

It discusses the following features regarding OLAP capabilities of the SQL language:

- Feature T611, “Elementary OLAP operations”,
- Feature T612, “Advanced OLAP operations”,
- Feature T614, “NTILE function”,
- Feature T615, “LEAD and LAG functions”,
- Feature T616, “Null treatment option for LEAD and LAG functions”,
- Feature T617, “FIRST\_VALUE and LAST\_VALUE functions”,
- Feature T618, “NTH\_VALUE function”,
- Feature T619, “Nested window functions”,
- Feature T620, “WINDOW clause: GROUPS option”,
- Feature T621, “Enhanced numeric functions”

## 2 Normative references

There are no normative references in this document.

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### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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## 4 Example data

### 4.1 Introduction to example data

The examples in this document are based on several tables.

The order in which the rows of all sample tables are displayed is immaterial.

### 4.2 Table sales history

Table 1, “Table sales\_history”, contains information on a business spread over several territories with total sales accumulated monthly in each territory. Table 1, “Table sales\_history”, shows sample data for Subclause 4.2, “Table sales history”:

**Table 1 — Table sales\_history**

Territory	Month	Sales
East	199812	11
West	199811	12
West	199901	11
East	199811	4
East	199810	10
West	199810	8
East	199902	10
East	199901	7
West	199812	7
West	199902	6

SQL to create and populate Subclause 4.2, “Table sales history”.

```
CREATE TABLE Sales_History
(Territory CHARACTER (10),
 Month INTEGER,
 Sales INTEGER)

INSERT INTO Sales_History VALUES ('East', 199812, 11)
INSERT INTO Sales_History VALUES ('West', 199811, 12)
INSERT INTO Sales_History VALUES ('West', 199901, 11)
INSERT INTO Sales_History VALUES ('East', 199811, 4)
INSERT INTO Sales_History VALUES ('East', 199810, 10)
INSERT INTO Sales_History VALUES ('West', 199810, 8)
INSERT INTO Sales_History VALUES ('East', 199902, 10)
INSERT INTO Sales_History VALUES ('East', 199901, 7)
```

```
INSERT INTO Sales_History VALUES ('West', 199812, 7)
INSERT INTO Sales_History VALUES ('West', 199902, 6)
```

### 4.3 Table stock1

The next examples are two variants of a stock table containing information on stock transactions for a particular account. Columns in Table 2, “Table stock1”, include transaction ID, trade day, and type, as well as the share amount and ticker symbol. Subclause 4.4, “Table stocks”, covers the columns ticker, tradeday, and price.

Table 2 — Table stock1

Acno	Tid	Tradeday	TType	Amount	Ticker
123	1	1	buy	1000	cscoc
123	2	1	buy	400	inpr
123	3	2	buy	2000	symc
123	4	2	buy	1200	cscoc
123	5	2	buy	500	inpr
123	6	4	buy	200	cscoc
123	7	4	buy	100	cscoc
123	9	5	buy	400	inpr
123	10	5	buy	200	goog
123	11	5	buy	1000	inpr
123	12	5	buy	4000	inpr
123	13	8	buy	2000	hpq

SQL to create and populate Table 2, “Table stock1”.

```
CREATE TABLE Stock1
(Acno INTEGER,
Tid INTEGER,
Tradeday INTEGER,
TType CHARACTER (10),
Amount INTEGER,
Ticker CHARACTER (10))

INSERT INTO Stock1 VALUES (123, 1, 1, 'buy', 1000, 'cscoc')
INSERT INTO Stock1 VALUES (123, 2, 1, 'buy', 400, 'inpr')
INSERT INTO Stock1 VALUES (123, 3, 2, 'buy', 2000, 'symc')
INSERT INTO Stock1 VALUES (123, 4, 2, 'buy', 1200, 'cscoc')
INSERT INTO Stock1 VALUES (123, 5, 2, 'buy', 500, 'inpr')
INSERT INTO Stock1 VALUES (123, 6, 4, 'buy', 200, 'cscoc')
INSERT INTO Stock1 VALUES (123, 7, 4, 'buy', 100, 'cscoc')
INSERT INTO Stock1 VALUES (123, 9, 5, 'buy', 400, 'inpr')
INSERT INTO Stock1 VALUES (123, 10, 5, 'buy', 200, 'goog')
INSERT INTO Stock1 VALUES (123, 11, 5, 'buy', 1000, 'inpr')
INSERT INTO Stock1 VALUES (123, 12, 5, 'buy', 4000, 'inpr')
INSERT INTO Stock1 VALUES (123, 13, 8, 'buy', 2000, 'hpq')
```