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

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

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Foreword

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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.

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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”

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2 Normative references

There are no normative references in this document.

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3 Terms and definitions

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— IEC Electropedia: available at http://www.electropedia.org/

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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

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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)
```


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```
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	csco
123	2	1	buy	400	inpr
123	3	2	buy	2000	symc
123	4	2	buy	1200	csco
123	5	2	buy	500	inpr
123	6	4	buy	200	csco
123	7	4	buy	100	csco
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

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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, 'csco')
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, 'csco')
INSERT INTO Stock1 VALUES (123, 5, 2, 'buy', 500, 'inpr')
INSERT INTO Stock1 VALUES (123, 6, 4, 'buy', 200, 'csco')
INSERT INTO Stock1 VALUES (123, 7, 4, 'buy', 100, 'csco')
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')
```

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