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

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

**iTeh STANDARD PREVIEW  
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ISO/IEC TR 19075-9:2020

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

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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

## 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:

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

Subclause 4.2, “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   | cscs   |
| 123  | 2   | 1        | buy   | 400    | inpr   |
| 123  | 3   | 2        | buy   | 2000   | symc   |
| 123  | 4   | 2        | buy   | 1200   | cscs   |
| 123  | 5   | 2        | buy   | 500    | inpr   |
| 123  | 6   | 4        | buy   | 200    | cscs   |
| 123  | 7   | 4        | buy   | 100    | cscs   |
| 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, 'cscs')
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, 'cscs')
INSERT INTO Stock1 VALUES (123, 5, 2, 'buy', 500, 'inpr')
INSERT INTO Stock1 VALUES (123, 6, 4, 'buy', 200, 'cscs')
```

**4.3 Table stock1**

```

INSERT INTO Stock1 VALUES (123, 7, 4, 'buy', 100, 'csc0')
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')

```

**4.4 Table stocks****Table 3 — Table stocks**

| Ticker | Tradeday | Price |
|--------|----------|-------|
| ZYX    | 1        | 10    |
| ZYX    | 2        | 11    |
| ZYX    | 3        | 12    |
| ZYX    | 4        | 12    |
| ZYX    | 5        | 12    |
| ZYX    | 6        | 11    |
| ZYX    | 7        | 12    |
| ZYX    | 8        | 12    |

SQL to create and populate Subclause 4.4, “Table stocks”.

```

CREATE TABLE Stocks
(Ticker CHARACTER (10),
 Tradeday INTEGER,
 Price INTEGER)

```

```

INSERT INTO Stocks VALUES ('ZYX', 1, 10)
INSERT INTO Stocks VALUES ('ZYX', 2, 11)
INSERT INTO Stocks VALUES ('ZYX', 3, 12)
INSERT INTO Stocks VALUES ('ZYX', 4, 12)
INSERT INTO Stocks VALUES ('ZYX', 5, 12)
INSERT INTO Stocks VALUES ('ZYX', 6, 11)
INSERT INTO Stocks VALUES ('ZYX', 7, 12)
INSERT INTO Stocks VALUES ('ZYX', 8, 12)

```

**4.5 Table homes**

The final example is Table 4, “Table homes”, containing data concerning house prices and locations.

Table 4 — Table homes

| Area     | Address           | Price   |
|----------|-------------------|---------|
| Uptown   | 15 Peekaboo St.   | 456,000 |
| Uptown   | 27 Primrose Path  | 341,000 |
| Uptown   | 44 Shady Lane     | 341,000 |
| Uptown   | 23301 Highway 61  | 244,000 |
| Uptown   | 34 Desolation Rd. | 244,000 |
| Uptown   | 77 Sunset Strip   | 102,000 |
| Downtown | 72 Easy St.       | 509,000 |
| Downtown | 29 Wong Way       | 201,000 |
| Downtown | 45 Diamond Lane   | 201,000 |
| Downtown | 76 Blind Alley    | 201,000 |
| Downtown | 15 Tern Pike      | 199,000 |
| Downtown | 444 Kanga Rua     | 102,000 |

SQL to create and populate Table 4, "Table homes"

```
CREATE TABLE Homes
(Area CHARACTER (10),
Address CHARACTER (20),
Price INTEGER)
```

```
INSERT INTO Homes VALUES ('Uptown', '15 Peekaboo St.', 456000)
INSERT INTO Homes VALUES ('Uptown', '27 Primrose Path', 341000)
INSERT INTO Homes VALUES ('Uptown', '44 Shady Lane', 341000)
INSERT INTO Homes VALUES ('Uptown', '23301 Highway 61', 244000)
INSERT INTO Homes VALUES ('Uptown', '34 Desolation Rd.', 244000)
INSERT INTO Homes VALUES ('Uptown', '77 Sunset Strip', 102000)
INSERT INTO Homes VALUES ('Downtown', '72 Easy St.', 509000)
INSERT INTO Homes VALUES ('Downtown', '29 Wong Way', 201000)
INSERT INTO Homes VALUES ('Downtown', '45 Diamond Lane', 201000)
INSERT INTO Homes VALUES ('Downtown', '76 Blind Alley', 201000)
INSERT INTO Homes VALUES ('Downtown', '15 Tern Pike', 199000)
INSERT INTO Homes VALUES ('Downtown', '444 Kanga Rua', 102000)
```