

## New Edition of Database Language SQL Standard Published

On December 14, 2016, ISO/IEC published nine parts of the newest edition of the SQL Database Language standard. The parts are:

Reference	Document title
ISO/IEC 9075-1	Information technology -- Database languages -- SQL -- Part 1: Framework (SQL/Framework)
ISO/IEC 9075-2	Information technology -- Database languages -- SQL -- Part 2: Foundation (SQL/Foundation)
ISO/IEC 9075-3	Information technology -- Database languages -- SQL -- Part 3: Call-Level Interface (SQL/CLI)
ISO/IEC 9075-4	Information technology -- Database languages -- SQL -- Part 4: Persistent stored modules (SQL/PSM)
ISO/IEC 9075-9	Information technology -- Database languages -- SQL -- Part 9: Management of External Data (SQL/MED)
ISO/IEC 9075-10	Information technology -- Database languages -- SQL -- Part 10: Object language bindings (SQL/OLB)
ISO/IEC 9075-11	Information technology -- Database languages -- SQL -- Part 11: Information and definition schemas (SQL/Schemata)
ISO/IEC 9075-13	Information technology -- Database languages -- SQL -- Part 13: SQL Routines and types using the Java programming language (SQL/JRT)
ISO/IEC 9075-14	Information technology -- Database languages -- SQL -- Part 14: XML-Related Specifications (SQL/XML)

The major new features in SQL:2016 are:

- Row Pattern Recognition
- Support for Java Script Object Notation (JSON) objects
- Polymorphic Table Functions
- Additional analytics

### Row Pattern Recognition

Row Pattern Recognition enhances FROM clause with MATCH\_RECOGNIZE clause which specifies a pattern (regular expression) across a sequence of rows. There are two MATCH\_RECOGNIZE variants, ONE ROW PER MATCH and ALL ROWS PER MATCH.

ONE ROW PER MATCH returns single summary row for each match of the pattern, while ALL ROWS PER MATCH returns one row for each row of each match.

Row Pattern Recognition is useful for analyzing time-series data such as stock ticker and event logs.

## Support for Java Script Object Notation (JSON) objects

JSON Objects consist of tags and data. For some applications, they provide a great deal of flexibility. SQL:2016 provides support to:

- Store and Retrieve JSON objects
- Present JSON objects as SQL data
- Present SQL data as JSON objects

Adding SQL support for JSON objects allow the JSON data to be integrated with existing applications a data. This supports improved security, integration with database transactions, and increased developer productivity.

## Polymorphic Table Functions

Polymorphic Table Functions (PTF) are user-defined functions that can be invoked in the FROM clause. They are capable of processing tables whose row type is not declared at definition time and producing a result table whose row type may or may not be declared at definition time. Polymorphic Table Functions allow application developers to leverage the long-defined dynamic SQL capabilities to create powerful and complex custom functions.

## Additional analytics

SQL:2016 adds support for additional analytical capabilities including Trigonometric and Logarithm functions. The Trigonometric functions included are sine, cosine, tangent, hyperbolic sine, hyperbolic cosine, hyperbolic tangent, inverse sine, inverse cosine, and inverse tangent. The logarithm functions support general logarithms, common logarithms, and natural logarithms.

These analytical functions allow complex calculations in existing SQL applications and provide support for future work to support multi-dimensional arrays.