SQL/PGQ & GQL STATUS

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Introduction

• Brief History of the SQL Standards
• ISO/IEC JTC1 process and structure
• How does SQL/PGQ and GQL fit in this structure?
• SQL/PGQ and GQL status and timing
• Summary
SQL Standards – a brief history

• ISO/IEC 9075 Database Language SQL
  • SQL-87 – Transactions, Create, Read, Update, Delete
  • SQL-89 – Referential Integrity
  • SQL-92 – Internationalization, etc.
  • SQL:1999 – User Defined Types
  • SQL:2003 – XML
  • SQL:2008 – Expansions and corrections
  • SQL:2011 – Temporal
  • SQL:2016 – JSON, RPR, PTF, MDA (2019)

• 30 years of support and expansion of the standard
SQL:2016 Major Features

• Row Pattern Recognition
  • Regular Expressions across sequences of rows

• Support for Java Script Object Notation (JSON) objects
  • Store, Query, and Retrieve JSON objects

• Polymorphic Table Functions
  • parameters and function return value can be tables whose shape is not known until compile time

• Additional analytics
  • Trigonometric and Logarithm functions

• Multi-dimensional Arrays (2019)
# SQL:2016 Parts

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<th>Reference</th>
<th>Document title</th>
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<tr>
<td>ISO/IEC 9075-1</td>
<td>Information technology -- Database languages -- SQL -- Part 1: Framework (SQL/Framework)</td>
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<td>ISO/IEC 9075-2</td>
<td>Information technology -- Database languages -- SQL -- Part 2: Foundation (SQL/Foundation)</td>
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<td>Information technology -- Database languages -- SQL -- Part 3: Call-Level Interface (SQL/CLI)</td>
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<td>Information technology -- Database languages -- SQL -- Part 9: Management of External Data (SQL/MED)</td>
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<td>ISO/IEC 9075-11</td>
<td>Information technology -- Database languages -- SQL -- Part 11: Information and definition schemas (SQL/Schemata)</td>
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<td>ISO/IEC 9075-13</td>
<td>Information technology -- Database languages -- SQL -- Part 13: SQL Routines and types using the Java programming language (SQL/JRT)</td>
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<td>ISO/IEC 9075-14</td>
<td>Information technology -- Database languages -- SQL -- Part 14: XML-Related Specifications (SQL/XML)</td>
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SQL Technical Reports – 19075

- SQL Standards committees have accumulated a great deal of descriptive material
- Useful information (non-normative) but does not belong in the actual standard.
- Started creating Technical Reports from this material
  - First was published in 2011
  - Total of seven are now published
  - Eighth will be published soon
- Available from JTC1 Freely Available Standards page:
- Search for 19075
  - Must agree to single use license
- The current list of Technical Reports is:
# SQL Technical Reports

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<tr>
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<th>Publication Date</th>
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<tr>
<td>ISO/IEC TR 19075-5</td>
<td>Information technology -- Database languages -- SQL Technical Reports -- Part 5: Row Pattern Recognition in SQL</td>
<td>2016-12-14</td>
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<tr>
<td>ISO/IEC TR 19075-6</td>
<td>Information technology -- Database languages -- SQL Technical Reports -- Part 6: SQL support for JSON</td>
<td>2017-03-29</td>
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<tr>
<td>ISO/IEC TR 19075-7</td>
<td>Information technology -- Database languages -- SQL Technical Reports - Part 7: SQL Support for Polymorphic Table Functions</td>
<td>2017-03-29</td>
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<tr>
<td>ISO/IEC TR 19075-8</td>
<td>Information technology -- Database languages -- SQL Technical Reports -- Part 8: SQL Support for multi dimensional arrays</td>
<td>2019</td>
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ISO/IEC JTC1 Standardization Process

NWIP or Project Split

Development

Working Draft

Ready?

Yes

No

CD Ballot

Comment Resolution

Done?

Yes

No

DIS Ballot

Comment Resolution

Done?

Yes

No

FDIS Ballot

International Standard

Thanks to Jan Michels
International Standards Hierarchy

ISO
International Organization for Standardization

IEC
International Electrotechnical Commission

JTC 1
Information Technology

SC 32
Data Management and Interchange

WG 3
Database Languages
International Standards Hierarchy mirrored in the US

ISO
International Organization for Standardization

IEC
International Electrotechnical Commission

JTC 1
Information Technology

SC 32
Data Management and Interchange

WG 3
Database Languages

ANSI
American National Standards Institute

INCITS
InterNational Committee for Information Technology Standards

DM 32
Data Management and Interchange

DM 32.2
Database
International Standards Hierarchy mirrored in the US

ISO
International Organization for Standardization

JTC 1
Information Technology

SC 32
Data Management and Interchange

WG 3
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InterNational Committee for Information Technology Standards

DM 32
Data Management and Interchange

DM 32.2
Database

DM 32.2 Ad Hoc
specific short-term task(s)
SQL extensions for property graphs
SQL, SQL/PGQ, and GQL
SQL and SQL/PGQ

SQL Project

SQL/XML
SQL/PSM
SQL/Schemata
SQL/MDA
SQL/PGQ
SQL/Foundation
SQL/Framework

Arrows indicate dependencies
SQL and GQL Projects

SQL Project
- SQL/PGQ
- SQL/Schemata
- SQL/Foundation
- SQL/Framework

GQL Project
- GQL Proper
- Read GQL
- GQL Foundation

Arrows indicate dependencies

Thanks to Fred Zemke, Modified by WG3
SQL/PGQ Status

- Project Split exists – 9075-16 SQL/PGQ
  - 48 month project (maximum)
  - Timer starts when we have a working draft – June 2019
- Informal Working Draft exists
- Some detailed content exists
- More detailed contented needed
- Potential Timeframe?
GQL Status

- New project – Need New Work Item Proposal (NWIP)
  - Submitted by national body (USA) to SC32
  - Probably vote after June 2019 SC32 plenary
  - 48 Month project (maximum)
  - Timer starts when NWIP approved

- Outline of Working Draft exists
- List of potential Content exists
- Potential Timeframe?
From Cypher, PGQL, GSQL, SQL/PGQ to GQL

Simple Pattern Matching → Complex Pattern Matching (RPQs, Shortest/Cheapest Path, Macros)

Tables out only → Graphs, tables, scalars in/out

Single graph only → Multiple graphs & (parameterized) views

DML only → DML, Graph computation, Graph projection

No schema → Schema & advanced type system

All aligned with basic data types, infrastructure, and expressions of the SQL database
Support for basic tabular manipulation (projection, sorting, grouping etc)

http://tiny.cc/gql-scope-and-features
Summary

• Momentum is building to make this happen
Questions?

```
SELECT * FROM Graph
GRAPH_TABLE ( 
  MATCH(who:AudienceMember)
  -[has:Questions]
  ->(for:Speaker)
  COLUMNS who.name AS audience,
       who.question AS question,
       for.name as speaker );
```