SQL standards

SQL (originally: Structured Query Language) is an internationally-recognized programming language for defining and maintaining relational databases.

The sql standard includes the following parts:

- SQL/Framework, SQL/Foundation, SQL/Bindings, SQL/Object
- New parts addressing temporal, transaction, and other aspects
- SQL/CLI(Call Level Interface)
- SQL/PSM(Persistent Stored Modules)

The latest revision of the standard is SQL:2011

SQL 1999

SQL:1999 (also called SQL 3) was the fourth revision of the SQL database query language. It introduced a large number of new features, many of which required clarifications in the subsequent SQL:2003.

The SQL/Object specification in SQL-99 extends SQL-92 to include object-oriented capabilities. Some of the features are:

- Type constructors
  - Complex types
  - User defined types - UDTs
- Object Identifiers using references
- Encapsulation of Operations (related methods for UDTs)
- Inheritance and function overloading (create TYPE under another TYPE)
- Unstructured complex objects

SQL 2003

SQL standard adopted in July 2003 is often called SQL:2003. **SQL:2003** is the fifth revision of the SQL database query language.
The SQL:2003 standard makes minor modifications to all parts of SQL:1999 (also known as SQL3), and officially introduces a few new features such as:

- XML-related features (SQL/XML)
- Window functions
- the sequence generator, which allows standardized sequences
- two new column types: auto-generated values and identity-columns
- the new MERGE statement
- extensions to the CREATE TABLE statement, to allow "CREATE TABLE AS" and "CREATE TABLE LIKE"
- removal of the poorly implemented "BIT" and "BIT VARYING" data types
- OLAP capabilities (initially added in SQL:1999) were extended with a window function.

One part of the SQL standard, Part 14, SQL/XML (ISO/IEC 9075-14) was revised in 2006 and is often referenced as "SQL/XML:2006". The formal names of this standard, with the exception of SQL/XML, are:

- ANSI/ISO/IEC 9075:2003, "Database Language SQL", Parts 1 ("SQL/Framework"), 2 ("SQL/Foundation"), 3 ("SQL/CLI"), 4 ("SQL/PSM"), 9 ("SQL/MED"), 10 ("SQL/OLB"), 11("SQL/Schemata"), and 13 ("SQL/JRT")
- ISO/IEC 9075:2003, "Database Language SQL", Parts 1 ("SQL/Framework"), 2 ("SQL/Foundation"), 3 ("SQL/CLI"), 4 ("SQL/PSM"), 9 ("SQL/MED"), 10 ("SQL/OLB"), 11("SQL/Schemata"), and 13 ("SQL/JRT")

Object Data Management Group (ODMG) version 3.0 standards
The Object Data Management Group (ODMG) was formed in the 1991. It works on specifications for both object database and object-relational mapping products. ODMG 3.0 was published in book form in 2000. Major components of the ODMG 3.0 specification

Object Model This was based on the Object Management Group's Object Model. The OMG core model was designed to be a common denominator for object request brokers, object database systems, object programming languages, etc. The ODMG designed a profile by adding components to the OMG core object model.
Object Specification Languages The ODMG Object Definition Language (ODL) was used to define the object types that conform to the ODMG Object Model. The ODMG Object Interchange Format (OIF) was used to dump and load the current state to or from a file or set of files.
Object Query Language (OQL) The ODMG OQL was a declarative (nonprocedural) language for query and updating. It used SQL as a basis, where possible, though OQL supports more powerful object-oriented capabilities.
C++ Language Binding This defined a C++ binding of the ODMG ODL and a C++ Object Manipulation Language (OML). The C++ ODL was expressed as a library that provides classes and functions to implement the concepts defined in the ODMG Object Model. The C++ OML syntax and semantics are those of standard C++ in the context of the standard class library. The C++ binding also provided a mechanism to invoke OQL.
Smalltalk Language Binding This defined the mapping between the ODMG ODL and Smalltalk, which was based on the OMG Smalltalk binding for the OMG Interface Definition Language (IDL). The Smalltalk binding also provided a mechanism to invoke OQL.
Java Language Binding This defined the binding between the ODMG ODL and the Java programming language as defined by the Java 2 Platform. The Java binding also provided a mechanism to invoke OQL.

Web Services
The term Web services describes a standardized way of integrating Web-based applications using the XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone. XML is used to tag the data, SOAP is used to transfer the data, WSDL is used for describing the services available and UDDI is used for listing what services are available. Used primarily as a means for businesses to communicate with each other and with clients, Web services allow organizations to communicate data without intimate knowledge of each other's IT systems behind the firewall. Unlike traditional client/server models, such as a Web server/Web page system, Web services do not provide the user with a GUI. Web services instead share business logic, data and processes through a programmatic interface across a network. The applications interface, not the users. Developers can then add the Web service to a GUI (such as a Web page or an executable program) to offer specific functionality to users.

SOAP
Short for Simple Object Access Protocol, a lightweight XML-based messaging protocol used to encode the information in Web service request and response messages before sending them over a network. SOAP messages are independent of any operating system or protocol and may be transported using a variety of Internet protocols, including SMTP, MIME, and HTTP.
SOAP 1.1 was originally submitted to the W3C in May 2000. Official submitters included large companies such as Microsoft, IBM, and Ariba, and smaller companies such as UserLand Software and DevelopMentor. In July 2001, the XML Protocol Working Group released a "working draft" of SOAP 1.2. Within the W3C, this document is officially a work in progress, meaning that the document is likely to be updated many times before it is finalized.

XML Documents
The Extensible Markup Language (XML) is a subset of SGML.
A cluster of specifications closely related to XML have been developed, starting soon after the initial publication of XML 1.0. It is frequently the case that the term "XML" is used to refer to XML together with one or more of these other technologies which have come to be seen as part of the XML core.

- XML Namespaces enable the same document to contain XML elements and attributes taken from different vocabularies, without any naming collisions occurring. Although XML Namespaces are not part of the XML specification itself, virtually all XML software also supports XML Namespaces.
- XML Base defines the xml:base attribute, which may be used to set the base for resolution of relative URI references within the scope of a single XML element.
- The XML Information Set or XML infoset describes an abstract data model for XML documents in terms of information items. The infoset is commonly used in the specifications of XML languages, for convenience in describing constraints on the XML constructs those languages allow.
- xml:id Version 1.0 asserts that an attribute named xml:id functions as an "ID attribute" in the sense used in a DTD.
- XPath defines a syntax named XPath expressions which identifies one or more of the internal components (elements, attributes, and so on) included in an XML document. XPath is widely used in other core-XML specifications and in programming libraries for accessing XML-encoded data.
- XSLT is a language with an XML-based syntax that is used to transform XML documents into other XML documents, HTML, or other, unstructured formats such as plain text or RTF. XSLT is very tightly coupled with XPath, which it uses to address components of the input XML document, mainly elements and attributes.
- XSL Formatting Objects, or XSL-FO, is a markup language for XML document formatting which is most often used to generate PDFs.
- XQuery is an XML-oriented query language strongly rooted in XPath and XML Schema. It provides methods to access, manipulate and return XML, and is mainly conceived as a query language for XML databases.
- XML Signature defines syntax and processing rules for creating digital signatures on XML content.

- XML Encryption defines syntax and processing rules for encrypting XML content.
- Some other specifications conceived as part of the "XML Core" have failed to find wide adoption, including XInclude, XLink, and XPointer.

XML DTD

The XML document type declaration contains or points to markup declarations that provide a grammar for a class of documents. This grammar is known as a document type definition, or DTD. The document type declaration can point to an external subset (a special kind of external entity) containing markup declarations, or can contain the markup declarations directly in an internal subset, or can do both. The DTD for a document consists of both subsets taken together.

A markup declaration is an element type declaration, an attribute-list declaration, an entity declaration, or a notation declaration. These declarations may be contained in whole or in part within parameter entities, for the well-formedness and validity constraints.

XML Schema

An XML Schema is a language for expressing constraints about XML documents. There are several different schema languages in widespread use, but the main ones are Document Type Definitions (DTDs), Relax-NG, Schematron and W3C XSD (XML Schema Definitions). From this page you can find out more about DTDs and W3C XSD, since those are the primary schema languages defined at W3C.

A Schema can be used:

- to provide a list of elements and attributes in a vocabulary;
- to associate types, such as integer, string, etc., or more specifically such as hatsize, sock_colour, etc., with values found in documents;
- to constrain where elements and attributes can appear, and what can appear inside those elements, such as saying that a chapter title occurs inside a chapter, and that a chapter must consist of a chapter title followed by one or more paragraphs of text;
- to provide documentation that is both human-readable and machine-processable;
- to give a formal description of one or more documents.

XML Query

XQuery provides the means to extract and manipulate data from XML documents or any data source that can be viewed as XML, such as relational databases or office documents.

XQuery contains a superset of XPath expression syntax to address specific parts of an XML document. It supplements this with a SQL-like "FLWOR expression" for performing joins. A FLWOR expression is constructed from the five clauses after which it is named: FOR, LET, WHERE, ORDER BY, RETURN.

The language also provides syntax allowing new XML documents to be constructed. Where the element and attribute names are known in advance, an XML-like syntax can be used; in other cases, expressions referred to as dynamic node constructors are available. All these constructs are defined as expressions within the language, and can be arbitrarily nested.

The language is based on the XQuery and XPath Data Model (XDM) which uses a tree-structured model of the information content of an XML document, containing seven kinds of nodes: document nodes, elements, attributes, text nodes, comments, processing instructions, and namespaces.

XDM also models all values as sequences (a singleton value is considered to be a sequence of length one). The items in a sequence can either be XML nodes or atomic values. Atomic values may be integers, strings, booleans, and so on: the full list of types is based on the primitive types defined in XML Schema.

XQuery 1.0 does not include features for updating XML documents or databases; it also lacks full text search capability. These features are both under active development for a subsequent version of the language. However, the new standards such as XQuery Update Facility 1.0 supports update feature and XQuery and XPath Full Text 1.0 support full text search in XML documents.

XQuery is a programming language that can express arbitrary XML to XML data transformations with the following features:

- Logical/physical data independence
- Declarative
- High level
- Side-effect free
- Strongly typed

XML Xpath

XPath is a language that describes a way to locate and process items in Extensible Markup Language (XML) documents by using an addressing syntax based on a path through the document's logical structure or hierarchy. This makes writing programming expressions easier than if each expression had to understand typical XML markup and its sequence in a document. XPath also allows the programmer to deal with the document at a higher level of abstraction. XPath is a language that is used by and specified as part of both the Extensible Stylesheet Language Transformations (XSLT) and by XPointer (SML Pointer Language). It uses the information abstraction defined in the XML Information Set (Infoset). Since XPath does not use XML syntax itself, it could be used in contexts other than those of XML.