

# Database Systems

## SQL Basics

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# Topics

- ◆ Basic structure of SQL statements
- ◆ Basic element of SQL Language
  - Keywords
  - Data types
  - Expressions
- ◆ SQL's NULL value

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  - Expressions
- ◆ SQL's NULL value

# SQL Standards

- ◆ SQL Versions
  - SQL-86, SQL-89, **SQL-92 (SQL2)**
  - SQL:1999, SQL:2003, SQL:2008
- ◆ Vendors Implementation / Extension
  - Major vendor products support SQL1 (e.g. SQL Server, Oracle, etc.)
  - SQL2 – only partially supported
  - Oracle (for example):
    - Supports some variants of the JOIN statement
    - Does not support Domain / Assertion
    - Supports only simple Check constraints (Subquery not allowed in Check constraints)
  - Check out software documentation

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## Statements

- ◆ About 40 statements
- ◆ Data Definition Language DDL (e.g.)
  - Create / Alter / Drop Table
  - Create / Drop View
  - Create / Drop Index
  - Create / Drop Schema (not in all DBMSs)
  - Create / Alter / Drop Domain (not in all DBMSs)
- ◆ Data Manipulation Language DML (e.g.)
  - Select
  - Insert / Update / Delete
  - Merge

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## Statements

- ◆ Access Control (e.g.)
  - Grant / Revoke
- ◆ Transaction Control (e.g.)
  - Commit / Rollback
  - Set Transaction
- ◆ Programmatic SQL (e.g.)
  - Declare / Open / Fetch / Close (Cursor)
  - Prepare / Execute (Dynamic SQL)
  - Describe / Explain (Query access plan)

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## Statement Structure

- ◆ **DELETE**  
**FROM sales\_rep**  
**WHERE sales < 20000.00;**
- ◆ Verb
- ◆ Clause
- ◆ Keywords
- ◆ Table name
- ◆ Column name
- ◆ Constant
- ◆ Case insensitive in most implementations

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## Naming Conventions

- ◆ 1 to 18 characters, begin with a letter
- ◆ Can contain letters, digits and \_
- ◆ No spaces, no special characters (exceptions)
- ◆ SQL2 – max. to 128 characters
- ◆ Need a name for:
  - Table
  - Column
  - User
  - Schema
  - Constraint
  - Store procedure

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## Qualified Names

- ◆ Table names can be qualified by the table owner or schema name, separated by a period:  
e.g. Sam.Salesrep
- ◆ Some DBMS (e.g. SQL Server) supports  
server.database.schema.table
- ◆ Column names can be qualified by the table name (or alias), separated by a period:  
e.g. Salesrep.Sales or s.Sales (if s is specified as the alias for table Salesrep)

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## Data Types

- ◆ Varies, depending on DBMSs

Table 6.1 ISO SQL data types.

Data type		Declarations		
boolean		BOOLEAN		
character		CHAR	VARCHAR	
bit		BIT	BIT VARYING	
exact numeric		NUMERIC	DECIMAL	INTEGER SMALLINT
approximate numeric		FLOAT	REAL	DOUBLE PRECISION
datetime		DATE	TIME	TIMESTAMP
interval		INTERVAL		
large objects		CHARACTER LARGE OBJECT	BINARY LARGE OBJECT	

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## Constants

- ◆ Numeric  
21 -375 200.00 1.5E3
- ◆ String  
'New York' 'I can't'
- ◆ Date and time  
DBMS specific, date functions
- ◆ Symbolic  
CURRENT\_DATE SYSDATE  
DATE '2014-09-24'

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## Expressions

- ◆ For calculations  
(SALES \* 1.05) - (TARGET \* 0.95)
- ◆ 4 arithmetic operations:  
+ - \* /
- ◆ Parentheses can be used
- ◆ May be applicable to date/time (Oracle)
- ◆ Character concatenation  
Oracle : 'Jim' || 'Johnson'  
Other (SQL Server): 'Jim' + 'Johnson'

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## Built-in Functions

- ◆ Mostly vendor specific implementations  
- check out the vendor references
- ◆ SQL2 has incorporated some
- ◆ DBMS dependent (SQL chapter 5)
- ◆ Oracle: TO\_DATE  
TO\_CHAR  
TO\_NUMBER

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## NULL Value

- ◆ Missing / unknown data
- ◆ Indicator to SQL that data is missing or not applicable
- ◆ It is not a space nor zero, not even a null string
- ◆ Need to check for NULL explicitly  
IS NULL  
IS NOT NULL

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