Data Definition Language (DDL)

.NET

A software system used to maintain a relational database is called a Relational Database Management System (RDBMS). Many relational database systems use ***Structured Query Language (SQL)*** *for querying and maintaining a database.*

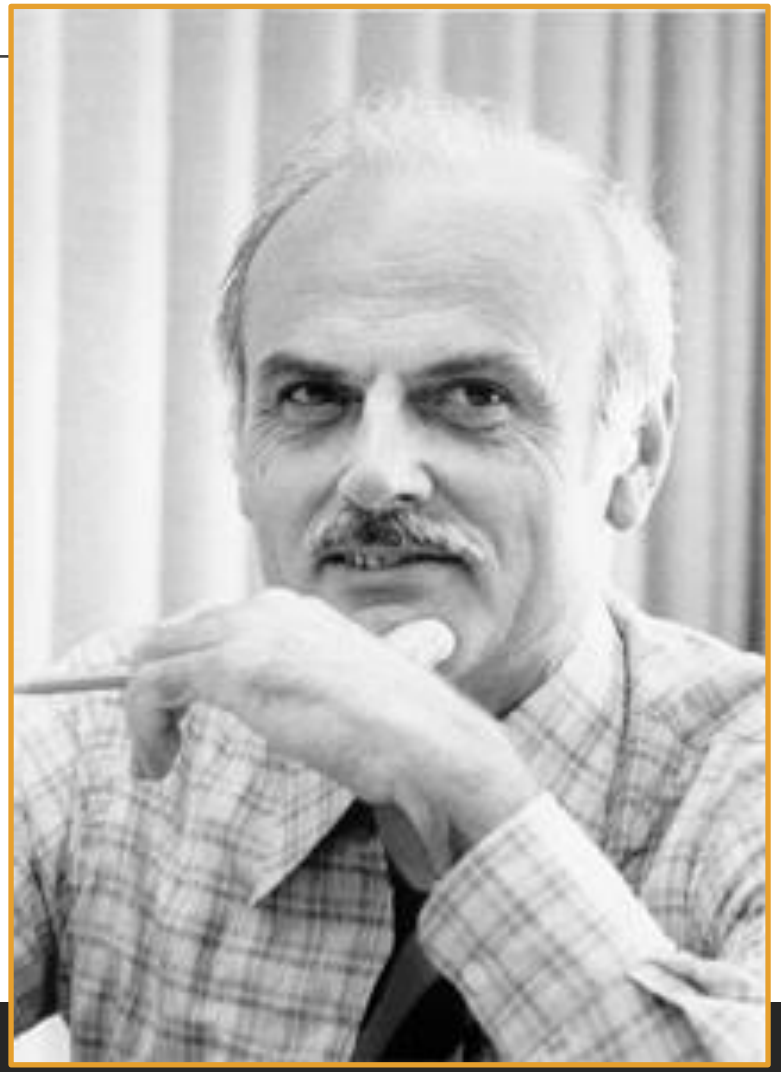
HTTPS://DOCS.MICROSOFT.COM/EN-US/SQL/T-SQL/LANGUAGE-REFERENCE?

(RDBMS) Relational Database Management System – History

https://en.wikipedia.org/wiki/Relational_database

Relational databases are based on the relational model of data, as proposed by E. F. Codd in 1970.

Edgar Frank "Ted" Codd (August 23, 1923 – April 18, 2003) was a British computer scientist and winner of the 1981 Turing Award.



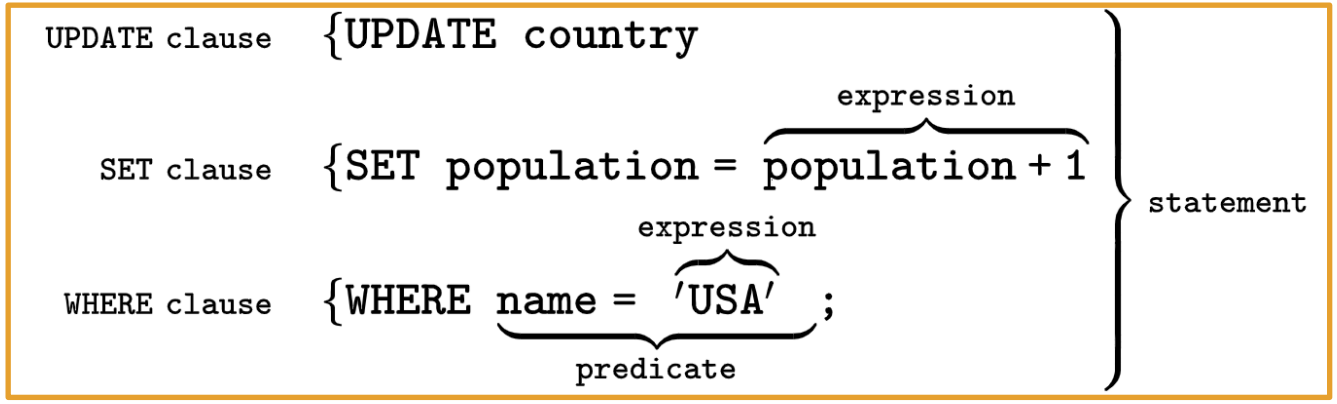
SQL (Structured Query Language)

https://en.wikipedia.org/wiki/SQL

SQL was originally based upon relational algebra and tuple relational calculus. SQL is a declarative language. We say what data we want, not how to get it. We cannot manage how SQL obtains the data.
The scope of SQL includes data query, data manipulation (insert, update and delete), data definition (schema creation and modification), and data access control.

SQL consists of two main types of statements:

- Data Definition Language (DDL)
- Data Manipulation Language (DML).



Microsoft and T-SQL

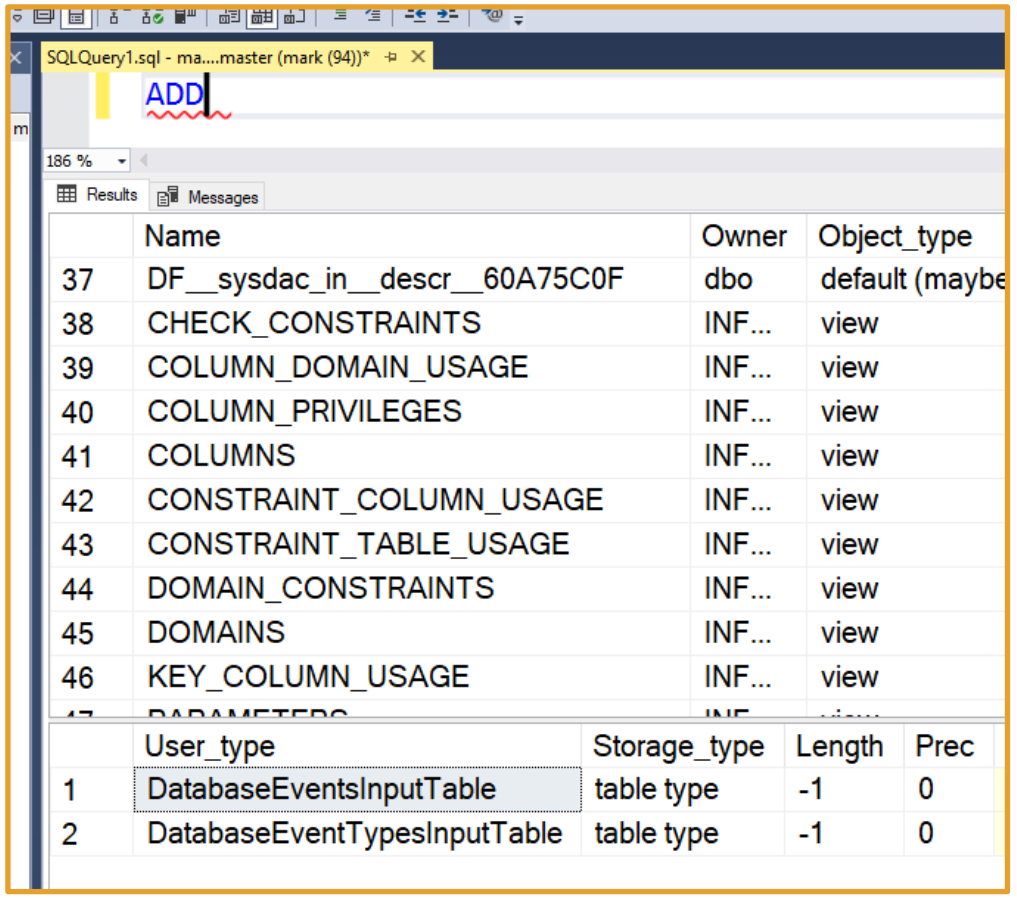
https://docs.microsoft.com/en-us/sql/t-sql/language-reference?view=sql-server-ver15#tools-that-use-t-sql

T-SQL is central to using Microsoft SQL products and services. All tools that communicate with a SQL database send T-SQL commands. SQL works on top of T-SQL.

Some of the Microsoft tools that issue T-SQL commands are:

- SQL Server Management Studio (SSMS)
- SQL Server Data Tools (SSDT)
- Azure Data Studio

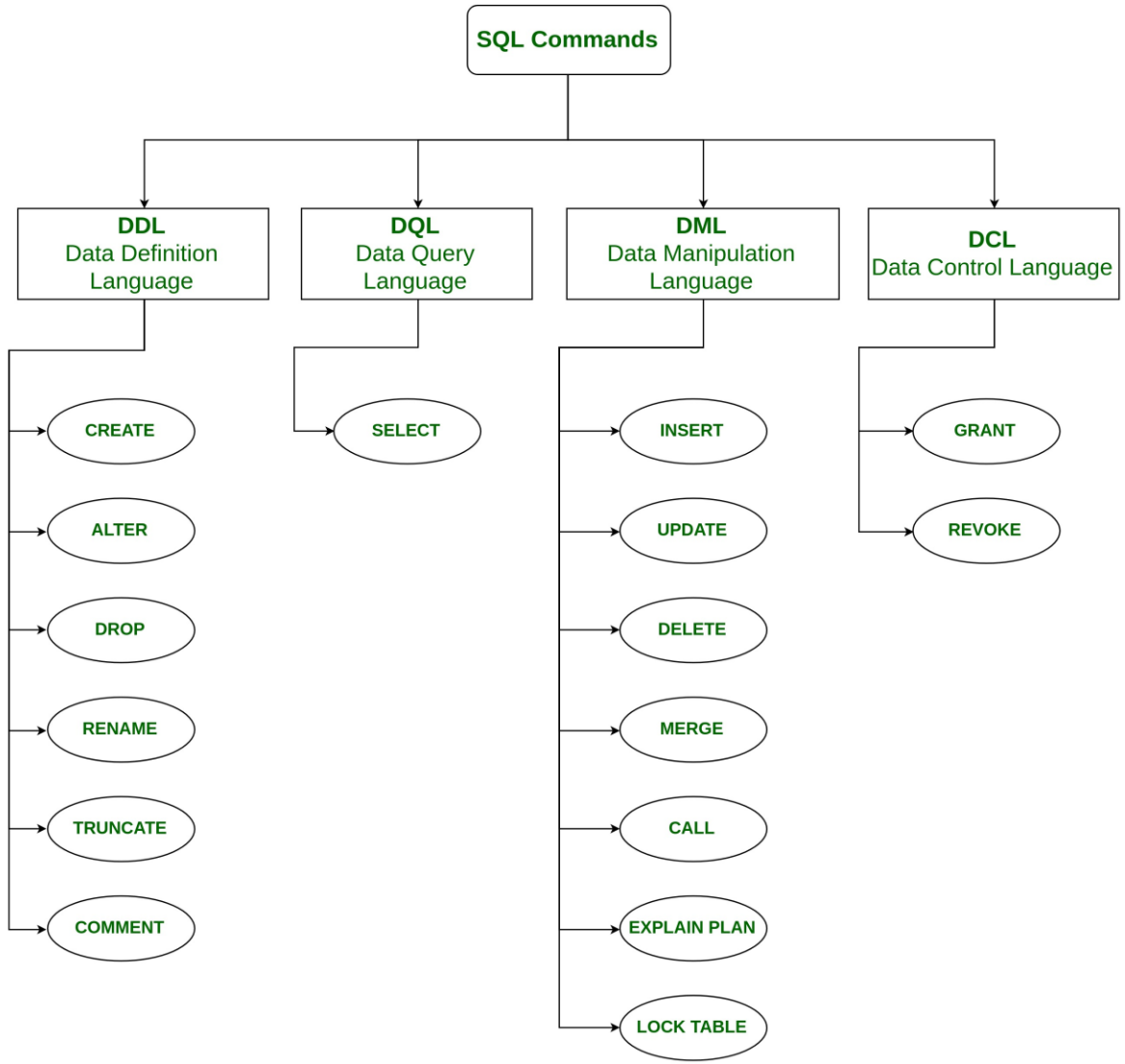
*You can type a T-SQL keyword in the SSMS Query Editor window and press F1 to get data about any T-SQL Keyword.



	Name	Owner	Object_type
37	DF__sysdac_in__descr__60A75C0F	dbo	default (maybe
38	CHECK_CONSTRAINTS	INF...	view
39	COLUMN_DOMAIN_USAGE	INF...	view
40	COLUMN_PRIVILEGES	INF...	view
41	COLUMNS	INF...	view
42	CONSTRAINT_COLUMN_USAGE	INF...	view
43	CONSTRAINT_TABLE_USAGE	INF...	view
44	DOMAIN_CONSTRAINTS	INF...	view
45	DOMAINS	INF...	view
46	KEY_COLUMN_USAGE	INF...	view

	User_type	Storage_type	Length	Prec
1	DatabaseEventsInputTable	table type	-1	0
2	DatabaseEventTypesInputTable	table type	-1	0

Types of SQL Commands



Data Definition Language

https://docs.microsoft.com/en-us/sql/t-sql/statements/statements?view=sql-server-ver15#data-definition-language

Data Definition Language (DDL) statements define the structure of the DB. DDL statements create, alter, or drop the data structures (tables) of a database.

- ALTER - Modifies a table definition by altering, adding, or dropping columns and constraints.
- CREATE - creates a new database
- DROP - Removes one or more table definitions and all data, indexes, triggers, constraints, and permission specifications for those tables.

SQL – ***Create*** and ***Drop*** an empty DB

```
CREATE DATABASE databasename;
```

```
DROP DATABASE databasename;
```

*Deleting a database will result in complete loss of information stored in the database!

SQL – ***Create*** and ***Drop*** a table

```
CREATE TABLE table_name (
    column1 datatype,
    column2 datatype,
    column3 datatype,
   ....
);
```

```
CREATE TABLE Persons (
    PersonID int,
    LastName varchar(255),
    FirstName varchar(255),
    Address varchar(255),
    City varchar(255)
);
```

```
DROP TABLE table_name;
```

```
DROP TABLE Shippers;
```

*Deleting a table will result in complete loss of information stored in the table!

SQL with SQL Server

In ***SQL Server***, every table must be in a schema.

```
CREATE SCHEMA Poke;
GO
```

```
--CREATE TABLE Poke.Pokemon;
CREATE TABLE Poke.Pokemon (
    PokemonId INT NOT NULL IDENTITY(1000, 1),
    Name NVARCHAR(50) NOT NULL,
    Height DECIMAL(6,2) NULL,
    TypeId INT NOT NULL FOREIGN KEY REFERENCES Poke.Type (TypeId),
    DateModified DATETIME2 NOT NULL DEFAULT (GETDATE()),
    CONSTRAINT CK_Height_Nonnegative CHECK (Height IS NULL OR Height >= 0)
);
```

Create a Table in SQL Server

https://docs.microsoft.com/en-us/sql/t-sql/lesson-1-creating-database-objects?view=sql-server-ver15#create-a-table

To create a table, you must provide:

1. a name for the table
2. name of each column
3. data type of each column
4. a unique primary key.
5. Is the field nullable?

```
CREATE TABLE dbo.Products
   (ProductID int PRIMARY KEY NOT NULL,
   ProductName varchar(25) NOT NULL,
   Price money NULL,
   ProductDescription varchar(max) NULL)
GO
```

```
CREATE TABLE dbo.Products
    (ProductID int PRIMARY KEY NOT NULL,
    ProductName varchar(25) NOT NULL,
    Price money NULL,
    ProductDescription varchar(max) NULL)
GO
```

SQL – Table Constraints

https://docs.microsoft.com/en-us/sql/t-sql/statements/alter-table-table-constraint-transact-sql?view=sql-server-ver15

UNIQUE(columns)	Makes sure all the values in a column are unique.
REFERENCES tablename(colName)	Denotes the Primary Key that a Foreign Key column references. This is checked to maintain referential integrity when changing values.
CHECK(condition)	Enforces that some expression is true for every row in a column.
PRIMARY KEY(columns)	Allows you to define a primary key made up of multiple columns.

SQL – Column Constraints

https://docs.microsoft.com/en-us/sql/t-sql/statements/alter-table-table-constraint-transact-sql?view=sql-server-ver15

NOT NULL	Column does not accept NULL as a value
NULL	Column accepts NULL as a value. NULL will be the default value.
PRIMARY KEY	Value must be unique within this column.
UNIQUE	NOT NULL, UNIQUE, and by default sets a ***CLUSTERED INDEX***.
FOREIGN KEY	By default, sets a ***NONCLUSTERED INDEX***
DEFAULT(value)	Configures a default value for that column
IDENTITY(start, inc)	Sets up an auto-incrementing column and prevents insertion of a value. Default ***Clustered*** but not unique. You must also use PRIMARY KEY to ensure uniqueness.
EXCLUSION	Ensures that if any two rows are compared on the specified column, not all comparisons return TRUE. This is dependent on other constraints.

ALTER Table

https://docs.microsoft.com/en-us/sql/t-sql/statements/alter-table-transact-sql?view=sql-server-ver15

ALTER TABLE

- modifies a table definition by altering, adding, or dropping columns and constraints.
- reassigns and rebuilds partitions or disables and enables constraints and triggers.

```
ALTER TABLE Addresses
DROP COLUMN ZipCode;
```

```
ALTER TABLE Poke.Pokemon ADD
    Active BIT NOT NULL DEFAULT 1;
```

ON DELETE CASCADE

https://learn.microsoft.com/en-us/sql/relational-databases/tables/primary-and-foreign-key-constraints?view=sql-server-ver16

The ON DELETE CASCADE and ON UPDATE CASCADE clauses are used to ensure that changes made to one table are automatically propagated to the tables that reference that table.

Corresponding rows are updated or deleted in the referencing table when that row is updated or deleted in the parent table. CASCADE cannot be specified if a timestamp column is part of either the foreign key or the referenced key.

ON DELETE CASCADE cannot be specified for a table that has an INSTEAD OF DELETE trigger. ON UPDATE CASCADE cannot be specified for tables that have INSTEAD OF UPDATE triggers.

Definitions

Clustered / NonClustered Index - A clustered index defines the order in which data is physically stored in a table. Table data can be sorted in only way, therefore, there can be only one clustered index per table. In SQL Server, the primary key constraint automatically creates a clustered index on that particular column.