# Relational DataBase

...

- Database, Data warehouse, Data lake
- SQL
- SSIS
- DQS

# SQL

...

Structured Query Language

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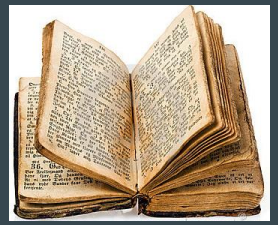
# History

The need to keep information

- To remember
- To pass to next generation
- To calculate





# History

The need to share information

We need centralized controlled database

- Managing file size
- backup restore
- ...
- indexing
- transaction

# RDBMS

Stand on Relational DataBase Management System

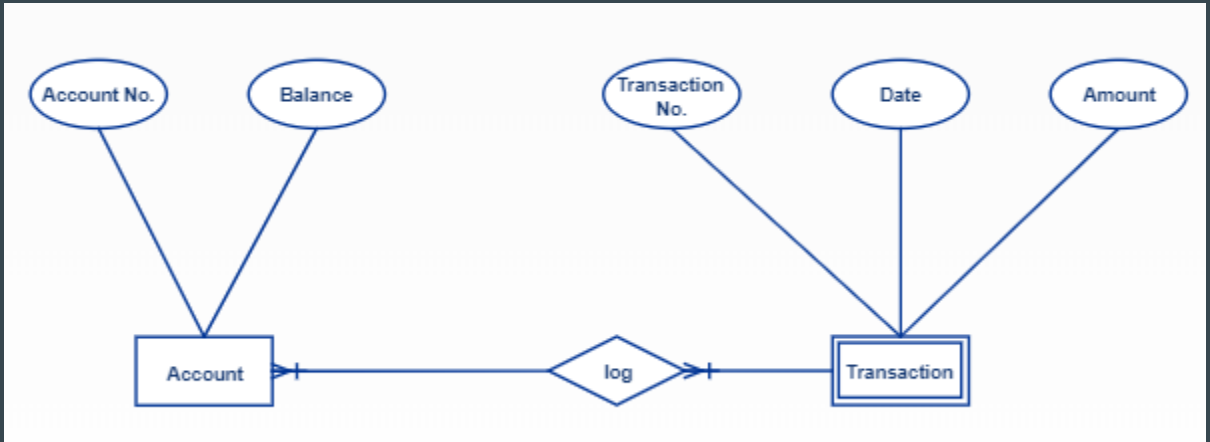
> System software for creating and managing databases. A DBMS makes it possible for end users to create, read, update and delete data in a database

Such as Oracle, MS SQL Server, DB2, MySQL ...

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

# Design

ER Diagram




https://creately.com/diagram/example/ijxshs852/banking+system+database+design?utm_source=pinterest&utm_medium=social&utm_campaign=pinerd

# Normalization

**First Normal Form**

- Eliminate repeating groups in individual tables.
- Create a separate table for each set of related data.
- Identify each set of related data with a primary key.

**Second Normal Form**

- Create separate tables for sets of values that apply to multiple records.
- Relate these tables with a foreign key.

**Third Normal Form**

- Eliminate fields that do not depend on the key.

https://support.microsoft.com/en-ca/help/283878/description-of-the-database-normalization-basics

# Normalization Cont.

## First Normal Form

Unnormalized table

| Student# | Advisor | Adv-Room | Class1 | Class2 | Class3 |
|---|---|---|---|---|---|
| 1022 | Jones | 412 | 101-07 | 143-01 | 159-02 |
| 4123 | Smith | 216 | 201-01 | 211-02 | 214-01 |

First normal form

| Student# | Advisor | Adv-Room | Class# |
|---|---|---|---|
| 1022 | Jones | 412 | 101-07 |
| 1022 | Jones | 412 | 143-01 |
| 1022 | Jones | 412 | 159-02 |
| 4123 | Smith | 216 | 201-01 |
| 4123 | Smith | 216 | 211-02 |
| 4123 | Smith | 216 | 214-01 |

https://support.microsoft.com/en-ca/help/283878/description-of-the-database-normalization-basics

# Normalization Cont.

## Second Normal Form

Students

| Student# | Advisor | Adv-Room |
|---|---|---|
| 1022 | Jones | 412 |
| 4123 | Smith | 216 |

Registration

| Student# | Class# |
|---|---|
| 1022 | 101-07 |
| 1022 | 143-01 |
| 1022 | 159-02 |
| 4123 | 201-01 |
| 4123 | 211-02 |
| 4123 | 214-01 |

https://support.microsoft.com/en-ca/help/283878/description-of-the-database-normalization-basics

# Normalization Cont.

## Third Normal Form

Students

| Student# | Advisor |
|---|---|
| 1022 | Jones |
| 4123 | Smith |

Faculty

| Name | Room | Dept |
|---|---|---|
| Jones | 412 | 42 |
| Smith | 216 | 42 |

https://support.microsoft.com/en-ca/help/283878/description-of-the-database-normalization-basics

# Design

De-Normalization

Step backward for optimazation

# Syntax

SQL server -> T-SQL (Transact SQL)

Oracle -> PL/SQL

- DDL - Data Definition Language
  - Alter
  - Collations
  - Drop
  - Disable Trigger
  - Create
  - Update STATICS
  - Enable Trigger
  - Rename
- DML - Data Manipulation Language
  - Bulk Insert
  - Merge
  - Delete
  - Truncate Table
  - Update

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

# Syntax cont.

DDL - Data Definition Language

DML - Data Manipulation Language

DQL - Data Query Language
- Select

DCL - Data Control Language
- Grant
- Revoke

TCL - Transaction Control Language
- Commit
- Rollback

# Database vs Schema

| Database | Structured Data |
| --- | --- |
| DBMS | software that manage database like SSMS (SQL Server Management Studio) |
| Schema | objects (table, view, …) in database belong to different groups (at least one : dbo) and could be seen and are accessible by users of that schema. |

## The dbo User Account

The dbo, or database owner, is a user account that has implied permissions to perform all activities in the database.

https://docs.microsoft.com/en-us/dotnet/framework/data/adonet/sql/server-and-database-roles-in-sql-server