



INTRO TO BACKEND DEVELOPMENT

DAY 5

03/29/2021
Instructor - Casey Wilson
TA - Kevin Dublin

What is a Database?

- Any collection of integrated Data
- Models the Real World
 - Entities (ex: students, courses, etc)
 - Relationships (ex: Kevin is the TA for Intro to Backend Dev)



2 Types of Databases

- SQL Databases
 - Relational
- NoSQL Databases
 - Document
 - Graph
 - Key-Value

TO SQL OR NOSQL



THAT'S THE QUERY
Intelligent Data

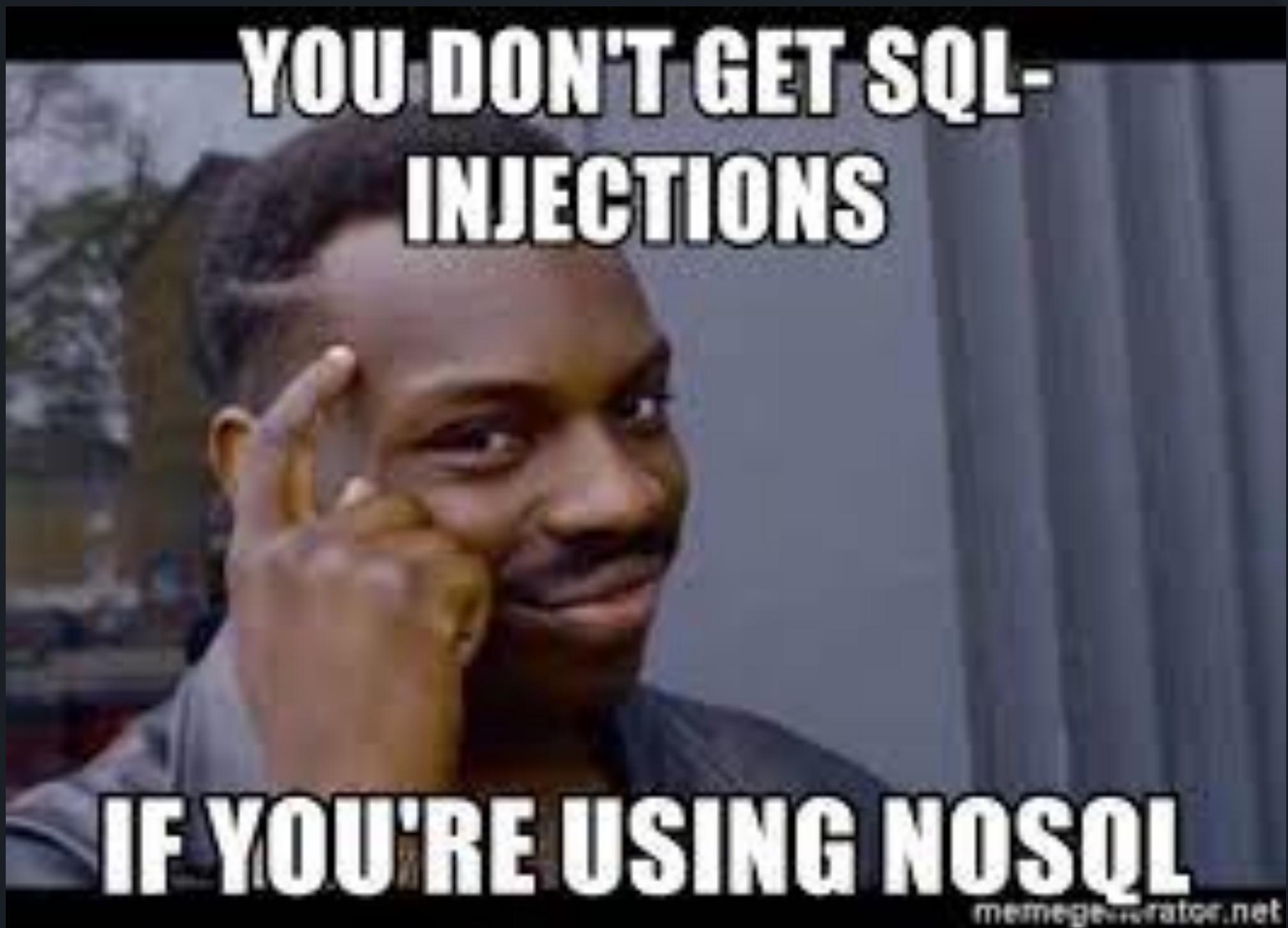
Why SQL DB?

- Manages complex data with ease
- Transaction-Based (ACID Compliant)
- Data Consistency / Data Integrity
- Encourages Normalization



Why NoSQL DB?

- Can develop with many changing specs
- Faster development (fits agile structure)
- Highly scalable (handles massive datasets)
- Easy deployment / management



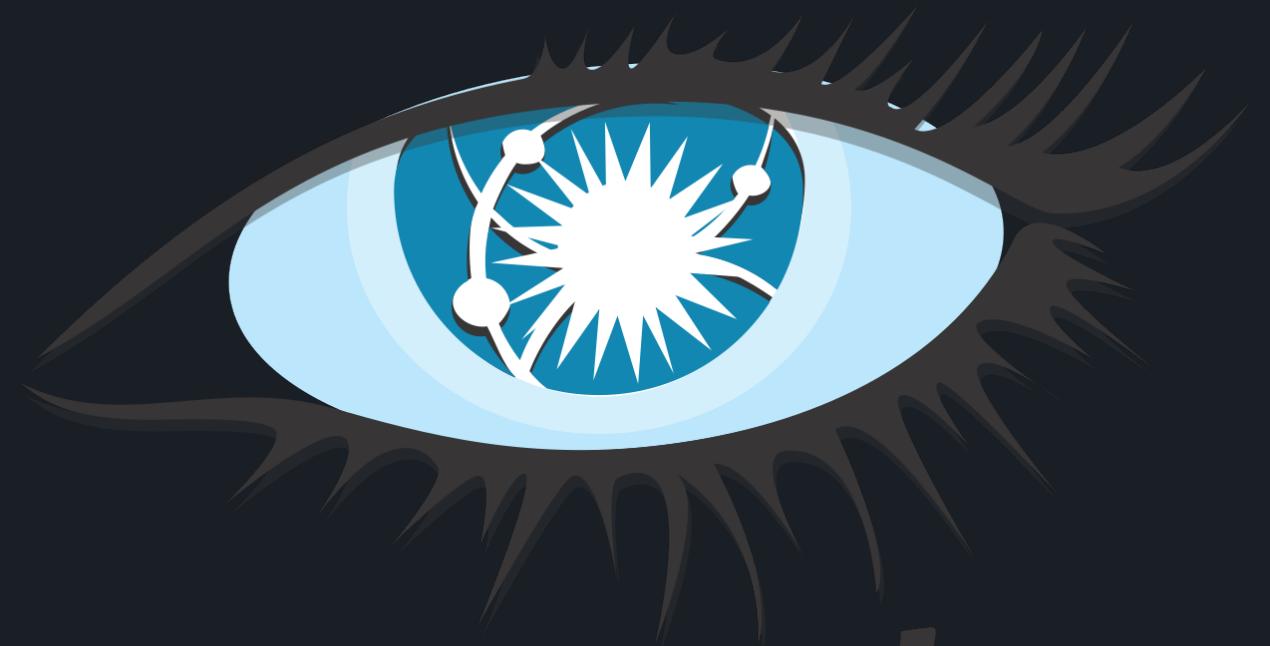
Examples of SQL Databases



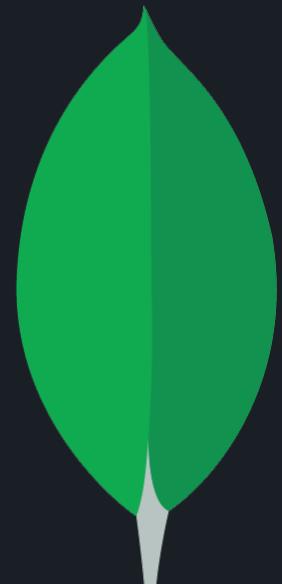
Examples of NoSQL Databases



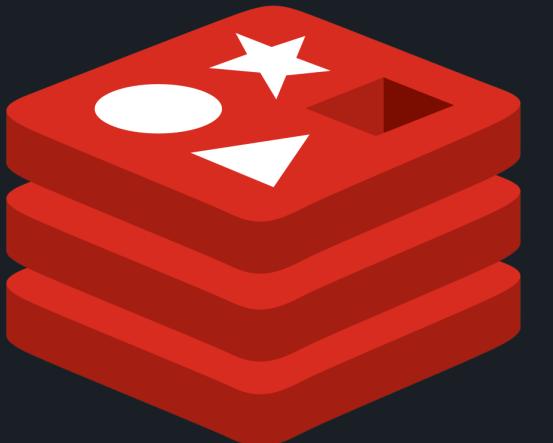
Firebase



cassandra

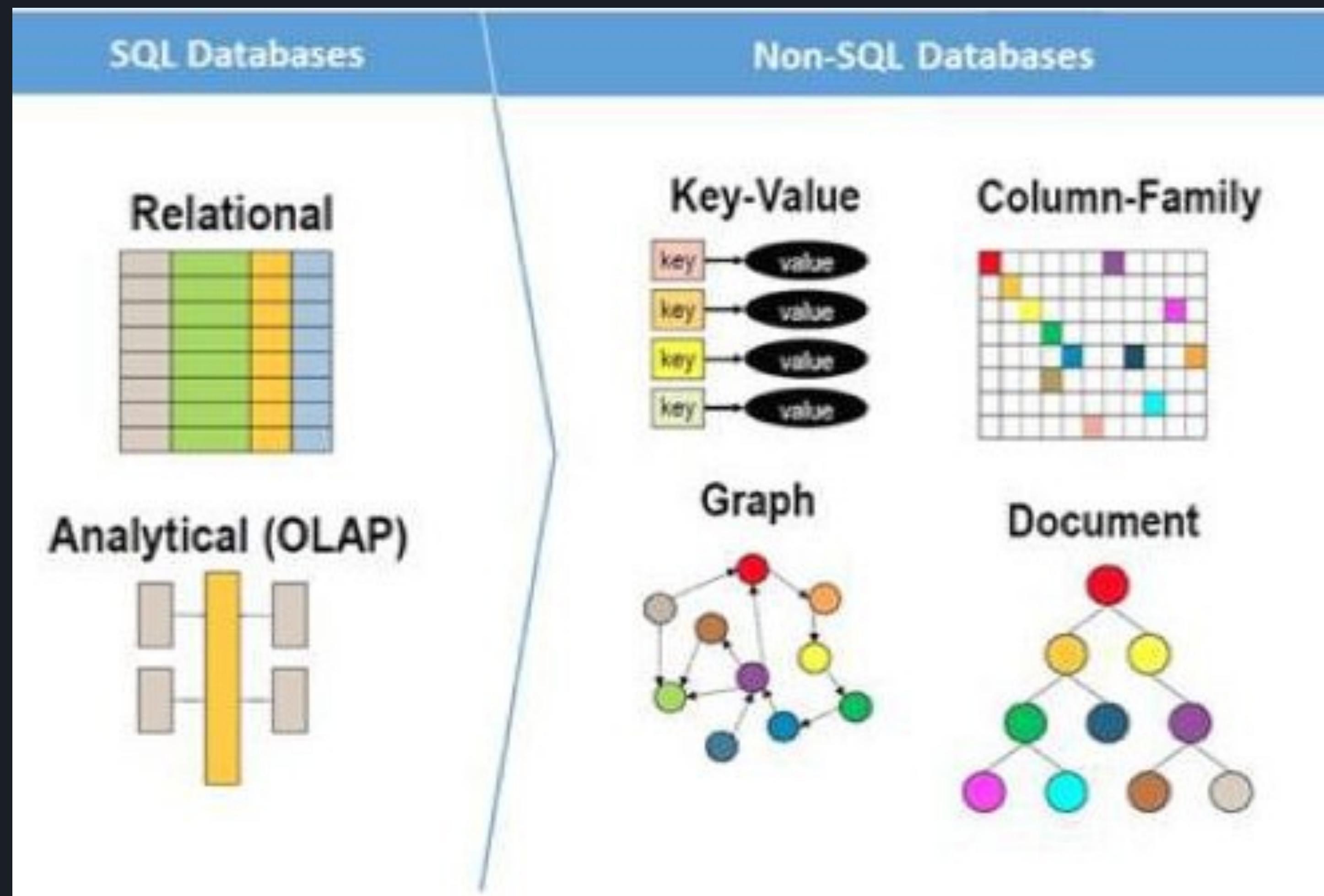


mongoDB®



redis

SQL vs NoSQL



Let's Talk Database

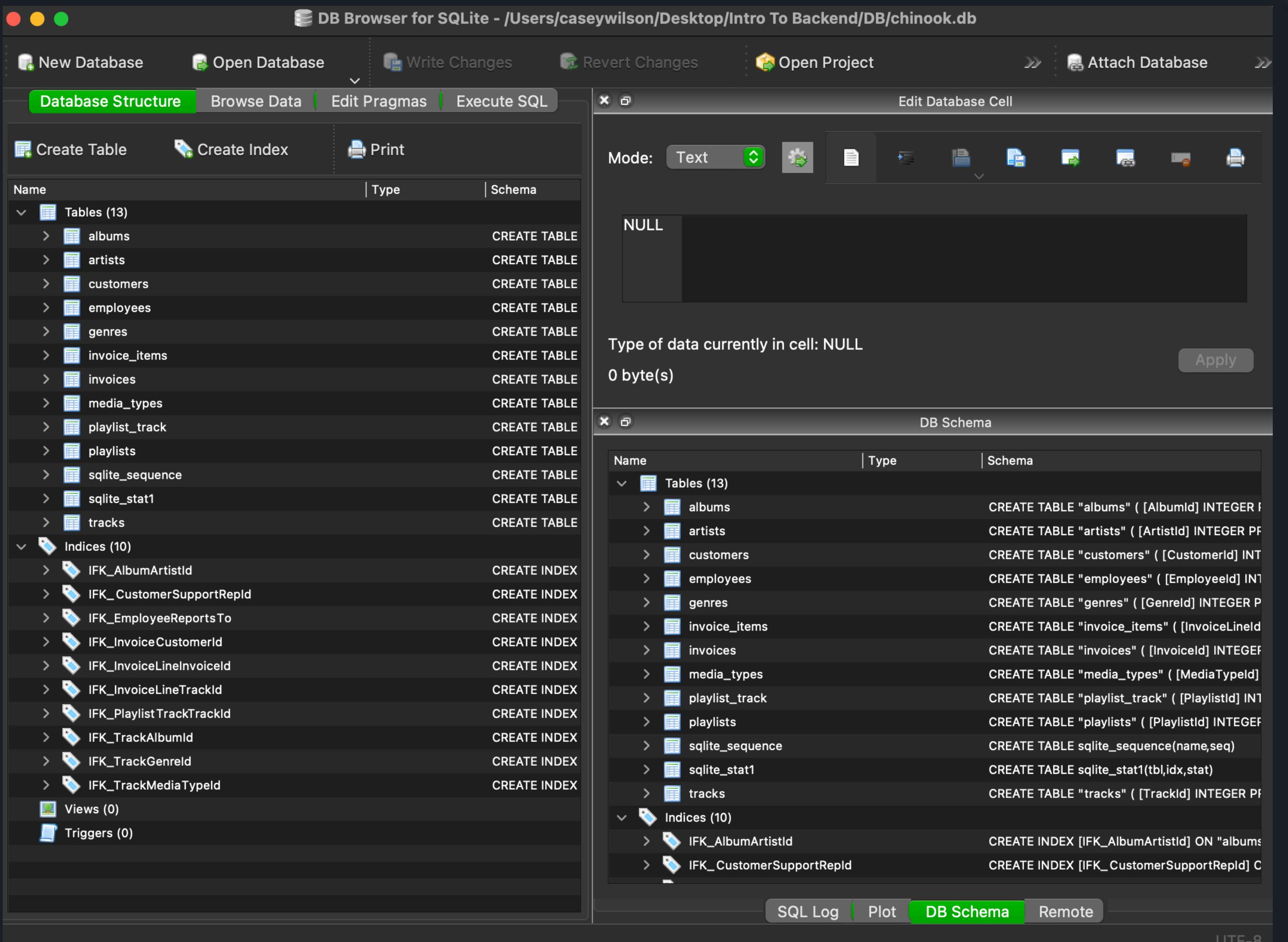


DAILY CHALLENGE -> Setup



What you will need?

- DB Browser
- Sample SQL Lite DB



Database Terms - ACID

- ACID Compliancy (SQL DBs)
 - Atomicity - All atoms at linked together
 - Consistency - Must comply with the rules
 - Isolation - Transactions do not affect each other
 - Durability - Weather the storm

Database Terms - Overview

- DBMS - Database Management System
- Database - The actually container for the data
- Database Server - The networking component for access a database
- Entity - A model of an object
- Relationship - How models relate to each other

Database Terms - Table

- Table - The container for one entity (ex: Students)
- Column - Describes an attribute of an entity (ex: student name)
- Row - Contains all information on a singular entity (ex: Kevin)
- Primary Key - The identifier of a singular entity
- Foreign Key - The identifier of how one entity relates to another

Database Terms - Views

- View - A stored query for use again the future
 - Executes at runtime
- Materlized View
 - Executes prior to runtime
 - Must be refreshed

Database Terms - DDL

- DDL - Database Definition Language (design a database)
 - Create - Make something new
 - Alter - Modify something existing
 - Truncate - Delete data
 - Drop - Delete data + container

Database Terms - DML

- DML - Database Manipulation Language (modify data)
 - Insert - Add new data
 - Update - Modify existing data
 - Delete - Remove data

Database Terms - DQL

- DQL - Database Query Language (find data)
 - Select - Fetch data
 - Buzzwords - SELECT, FROM, WHERE, HAVING, ORDER BY, LIMIT BY, FILTER, AGGREGATION, DISTINCT, IN

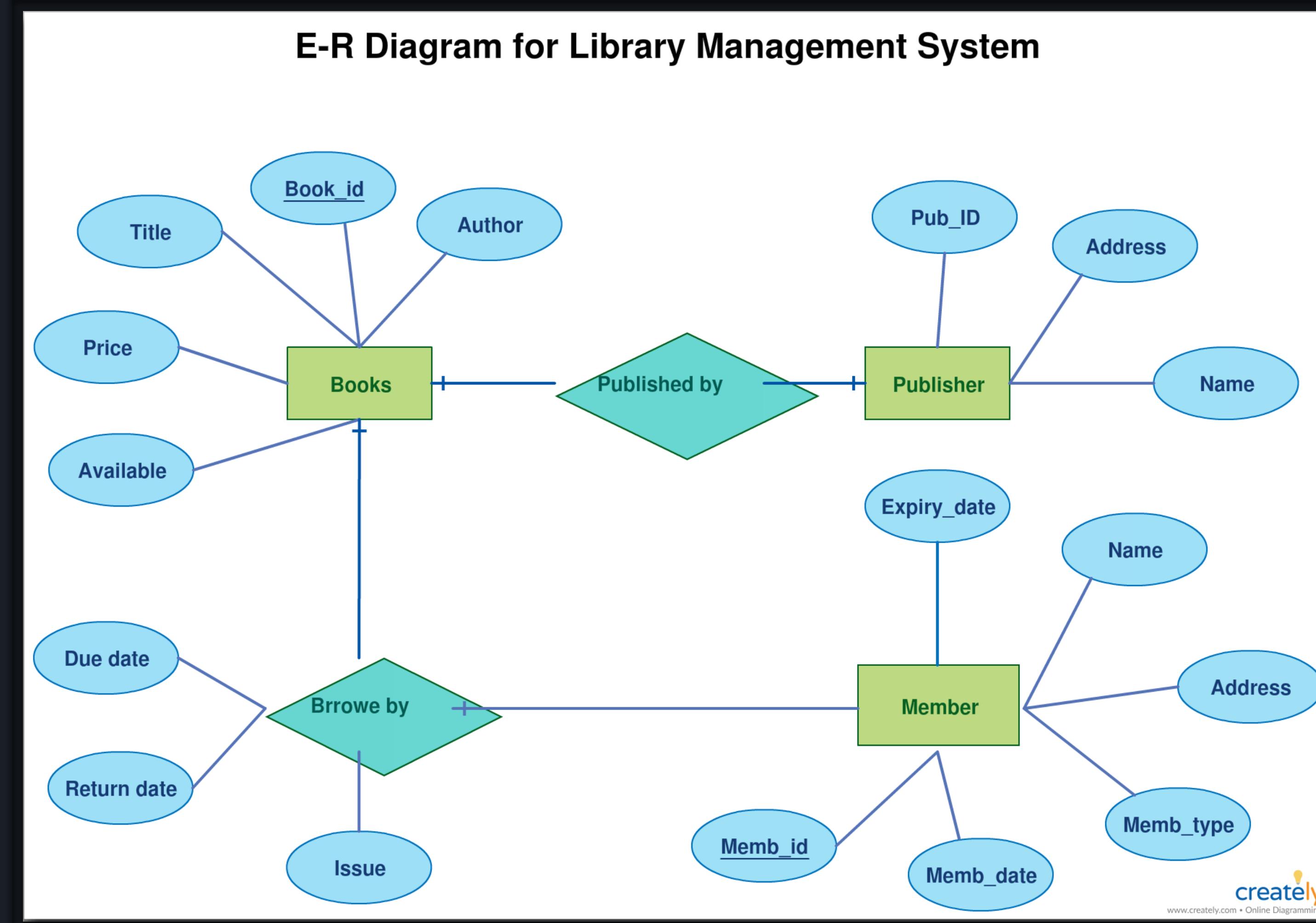
Database Terms - DCL

- DCL - Database Control Language (secure data)
 - Grant - Give access
 - Revoke - Remove access

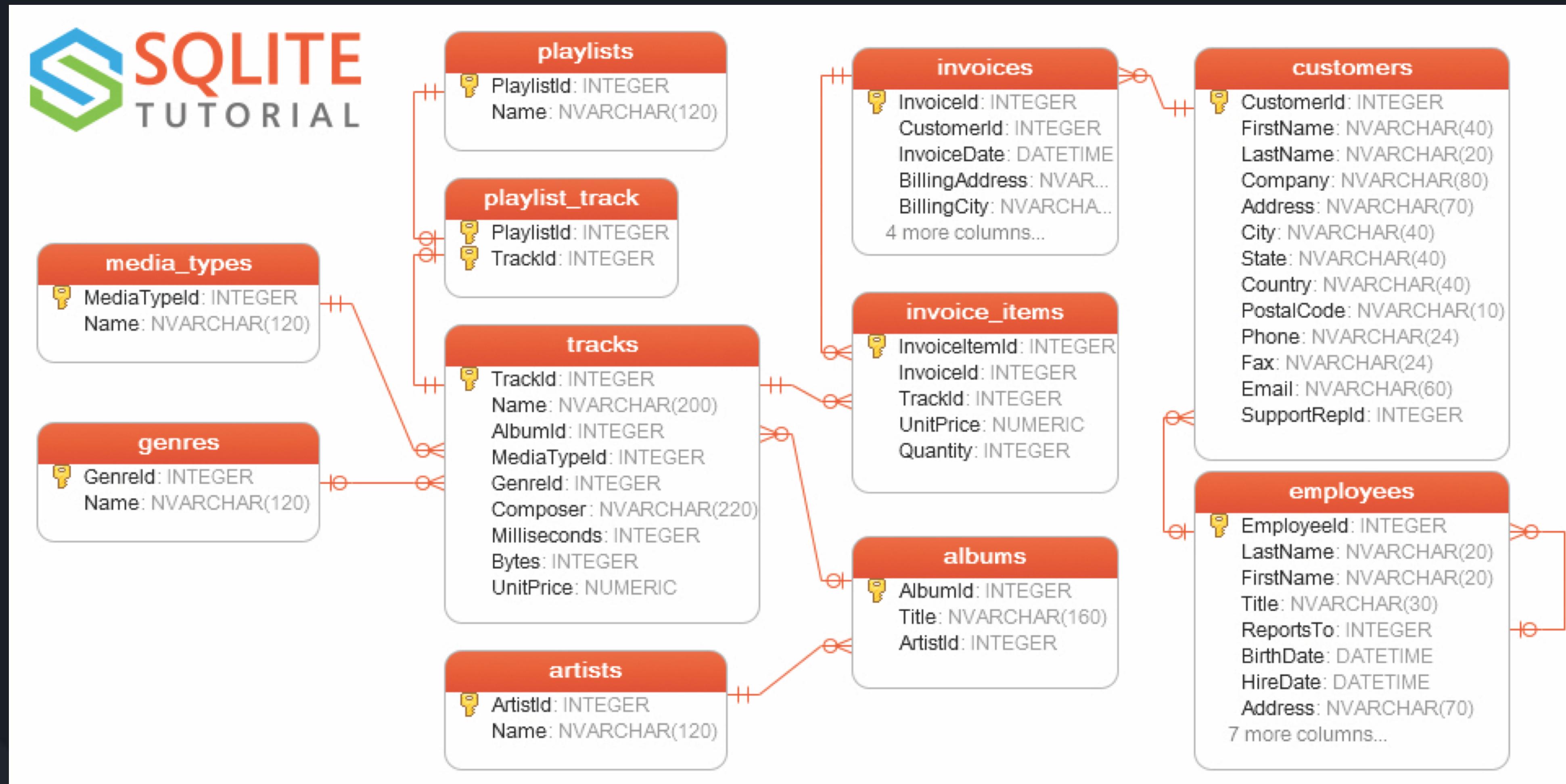
Database Terms - TCL

- TCL - Transaction Control Language (protect data transactions)
- Commit - Execute a transaction (are you sure you want to?)
- Savepoint - Create a point of time within a transaction
- Rollback - Time machine back to a save point
- Set Transaction - Make rules for how to insert data

Database Terms - ERD (Entity Relationship Diagram)

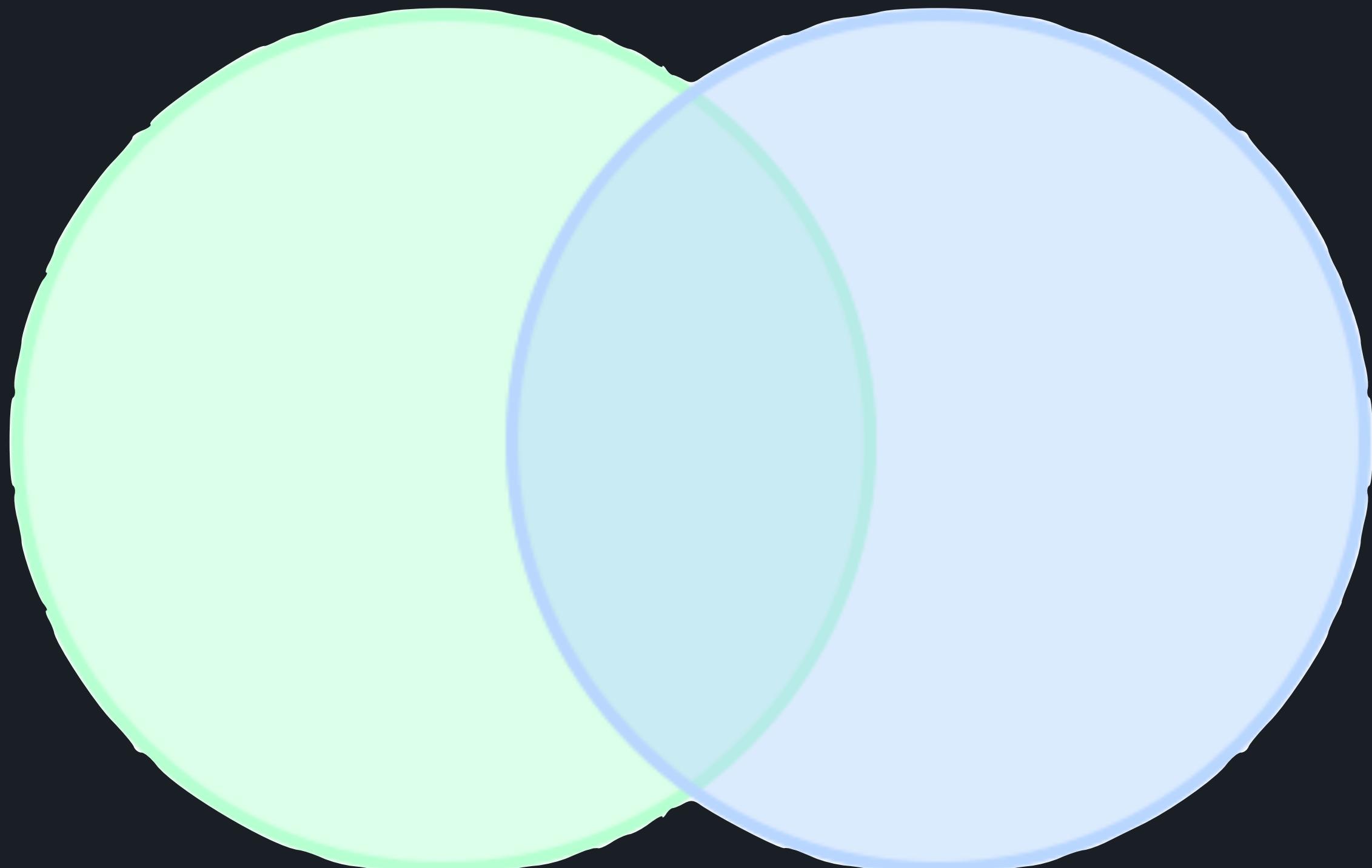


Database Terms - Database Schema



Database Terms - Joins

- Join - Grouping two or more entities together
 - UNION
 - UNION ALL
 - Left Outer
 - Right Outer
 - Inner Join



What is Normalization

- Reduce the complexity and duplicates of a database
 - 1NF (First Normal Form)
 - 2NF (Second Normal Form)
 - 3NF (Third Normal Form)
 - BCNF (Boyce-Codd Normal Form)
 - 4NF (Fourth Normal Form)
 - 5NF (Fifth Normal Form)
 - 6NF (Sixth Normal Form)

Normalization - 1NF

- RULE 1 - Each table cell should contain a single value.
- RULE 2 - Each record needs to be unique.

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3 rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.

Normalization - 2NF

- Rule 1- Be in 1NF
- Rule 2- Single Column Primary Key

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

Normalization - 3NF

- Rule 1- Be in 2NF
- Rule 2- Has no transitive functional dependencies

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION ID
1	Janet Jones	First Street Plot No4	2
2	Robert Phil	3 rd Street 34	1
3	Robert Phil	5 th Avenue	1

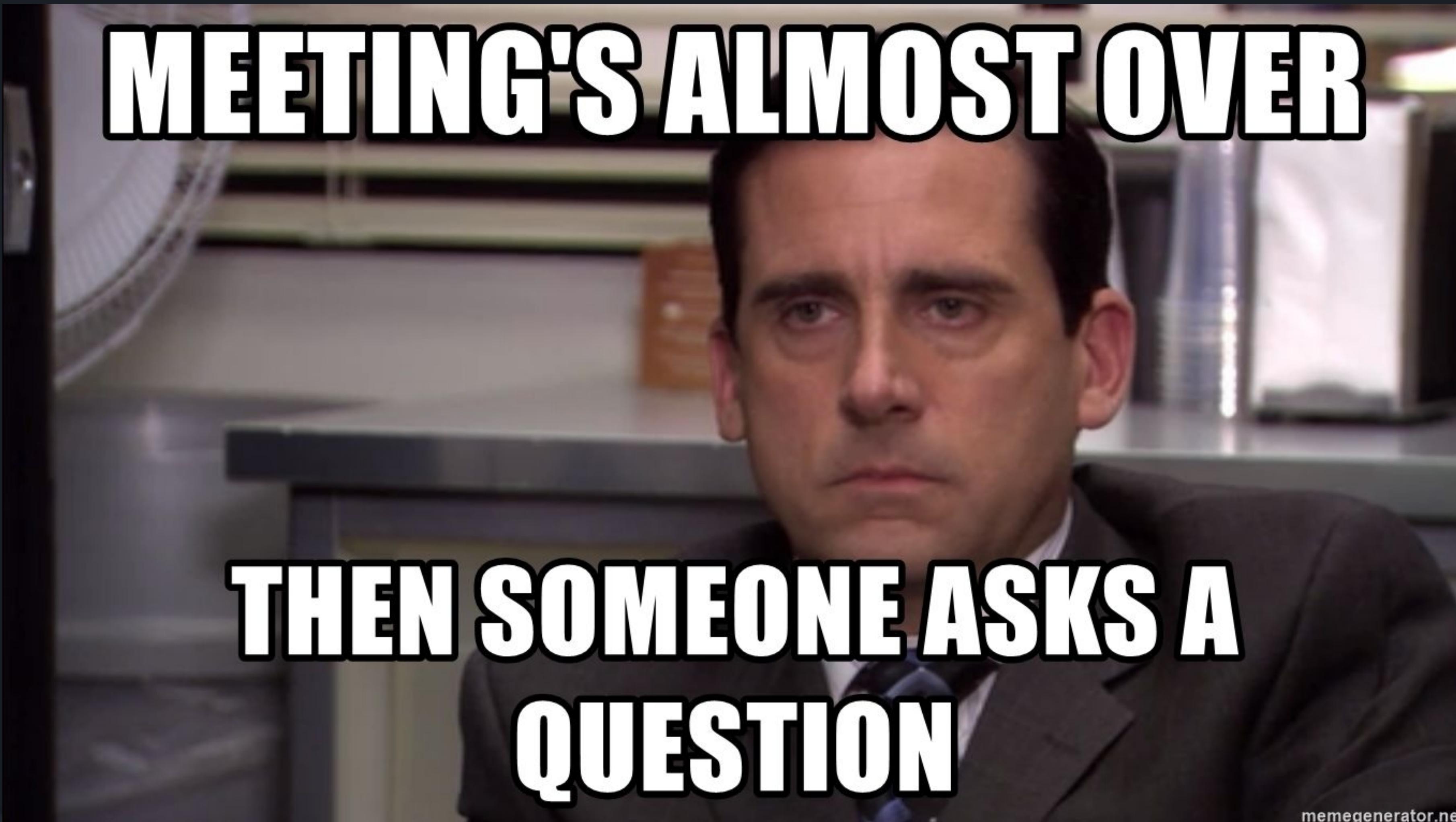
MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

SALUTATION ID	SALUTATION
1	Mr.
2	Ms.
3	Mrs.
4	Dr.

Normalization - All Others

- BCNF (Boyce-Codd Normal Form) aka 3.5NF
 - For any dependency $A \rightarrow B$, A should be a super key.
- 4NF (Fourth Normal Form)
 - The table should not have any Multi-valued Dependency.
- 5NF (Fifth Normal Form)
 - No lossless decomposition when broken into smaller tables
- 6NF (Sixth Normal Form)
 - Every join dependency on the relation is trivial

Questions?



Take Home Challenge

