



INTRO TO BACKEND DEVELOPMENT

DAY 8

04/07/2021
Instructor - Casey Wilson
TA - Kevin Dublin

Check In Time



SQL Challenge #4

- Return a query for the amount of sales for each year/month in the DB (hint 3 columns should be returned)



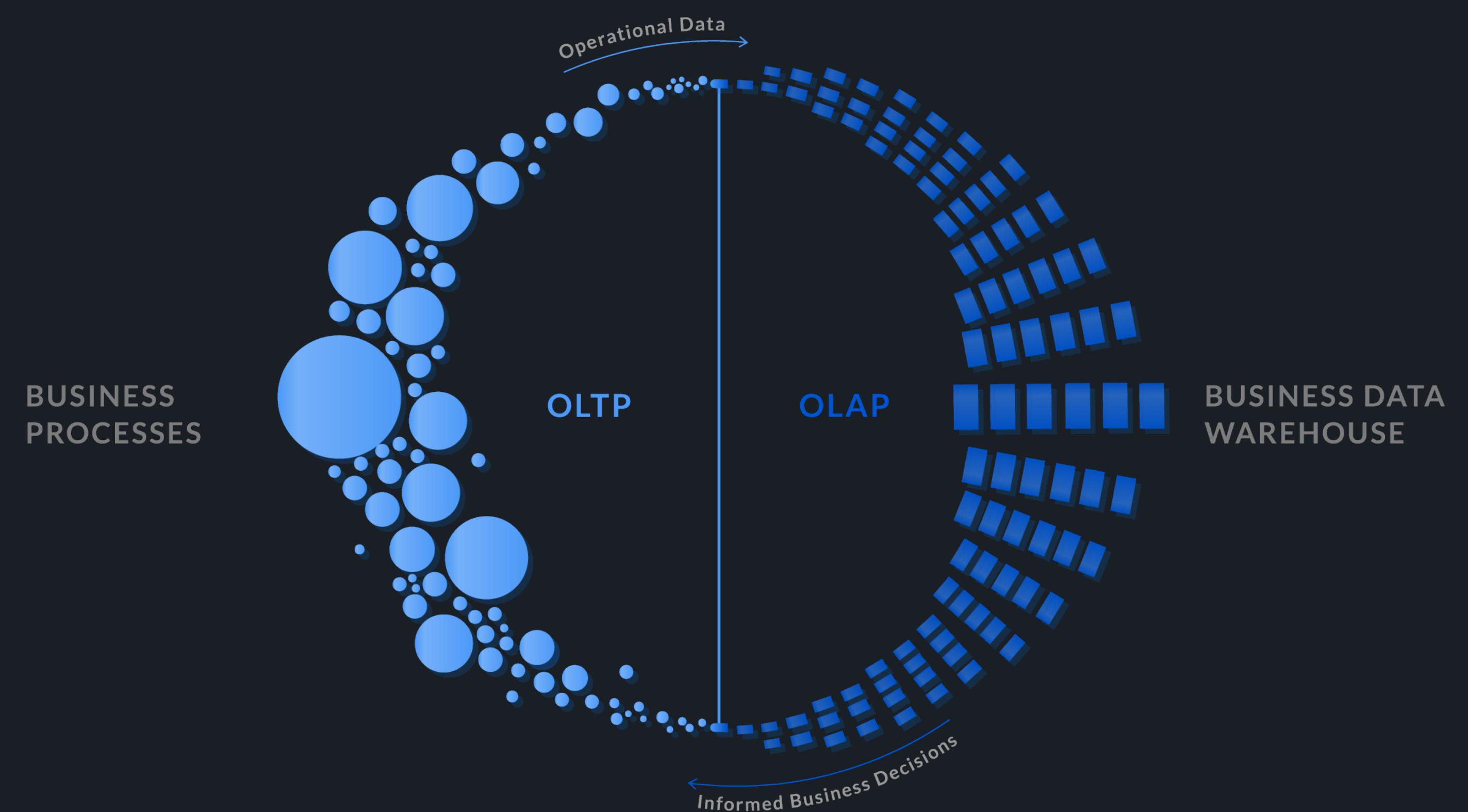
SQL Challenge #5

- Return a query for the amount of tracks purchased for each day of the week, for each genre
- Hint: Data should look like this
- Genre | Day | # of tracks purchased
- Jazz | Monday | 90 tracks
- Jazz | Tuesday | 120 tracks



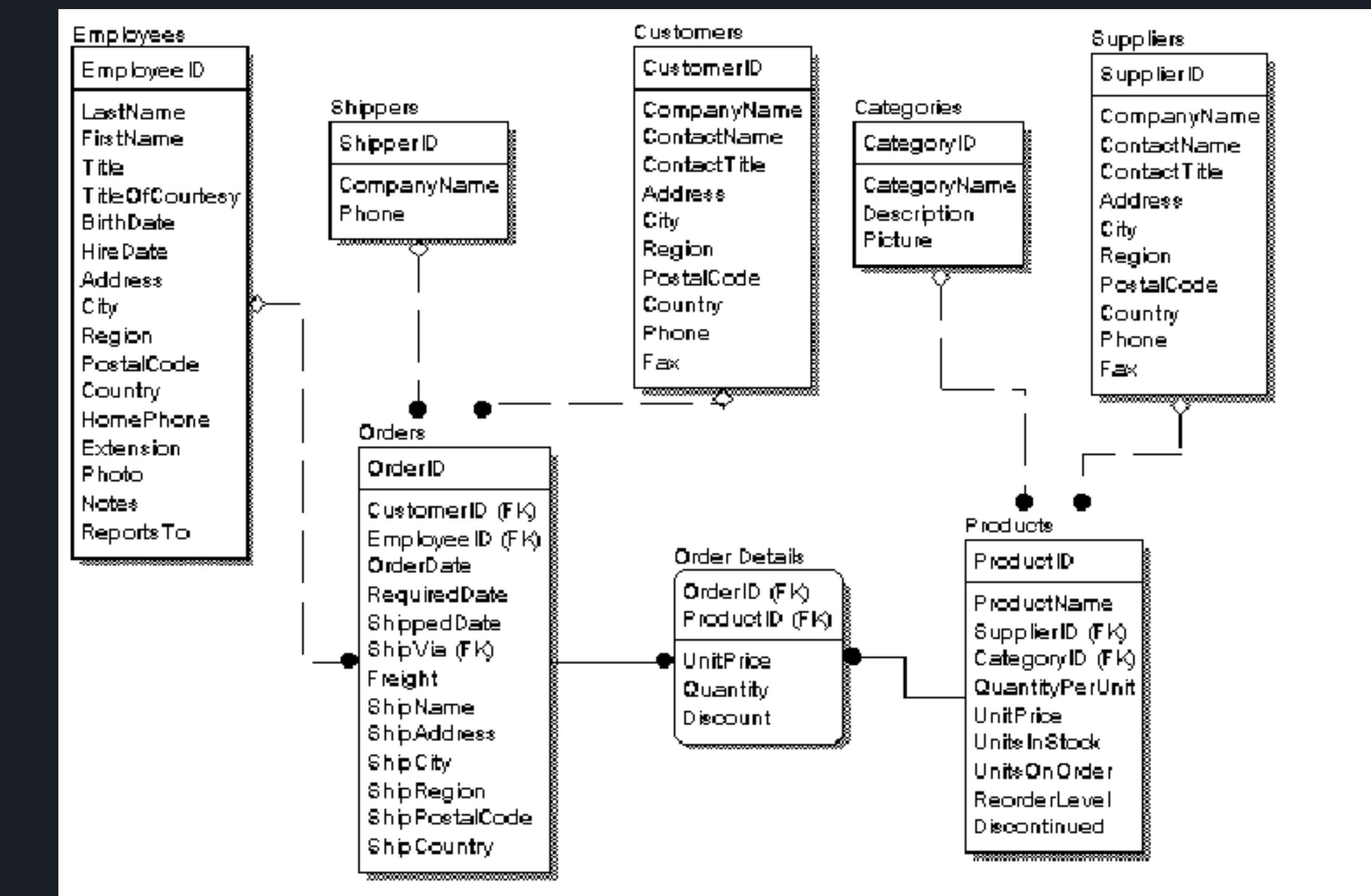
SQL DBs → 2 Types

- OLTP
 - Online transaction processing
- OLAP
 - Online analytical processing



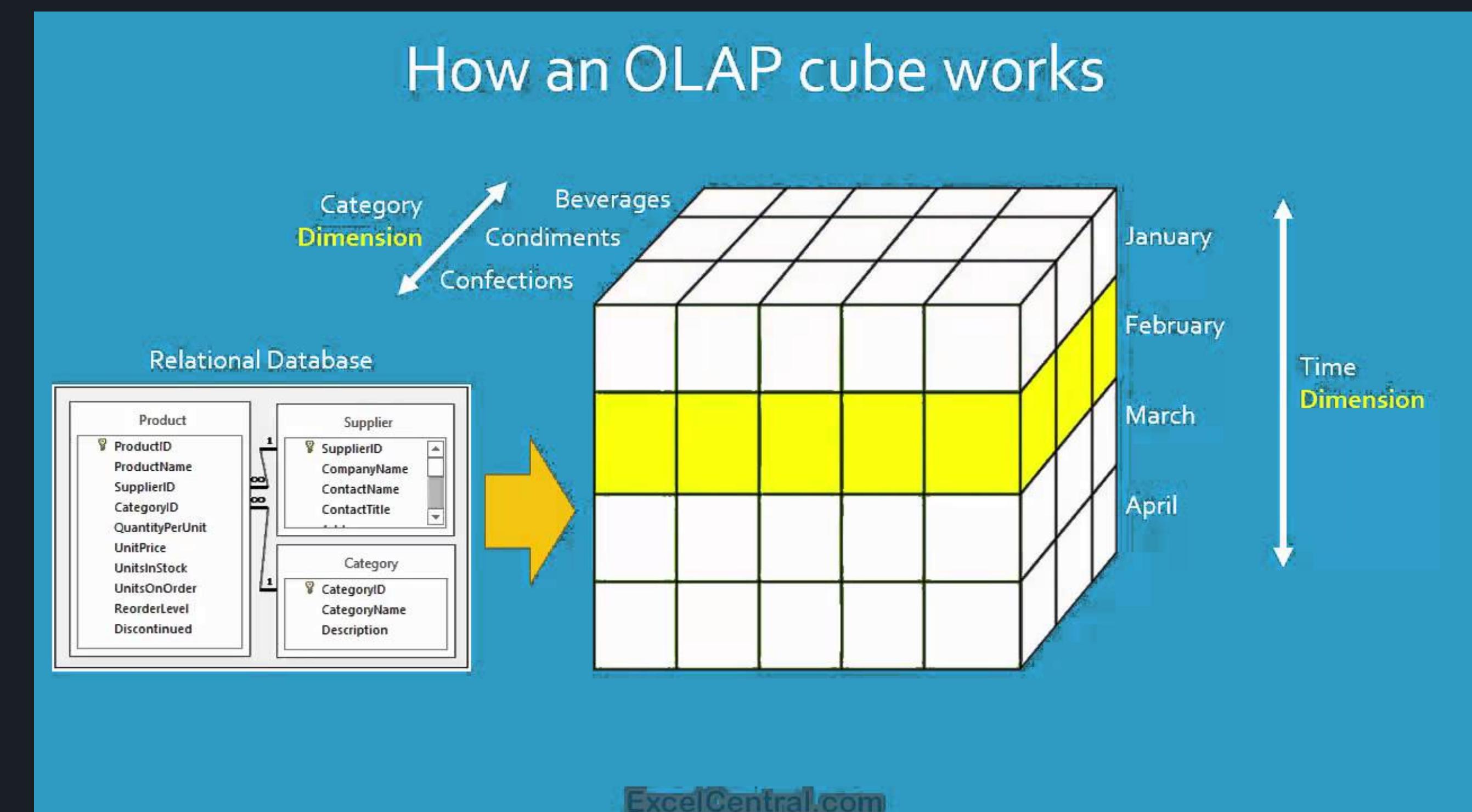
OLTP - Transactions

- Online transaction processing
- Real-Time Data
- Normalized
- Application Based
- CRUD



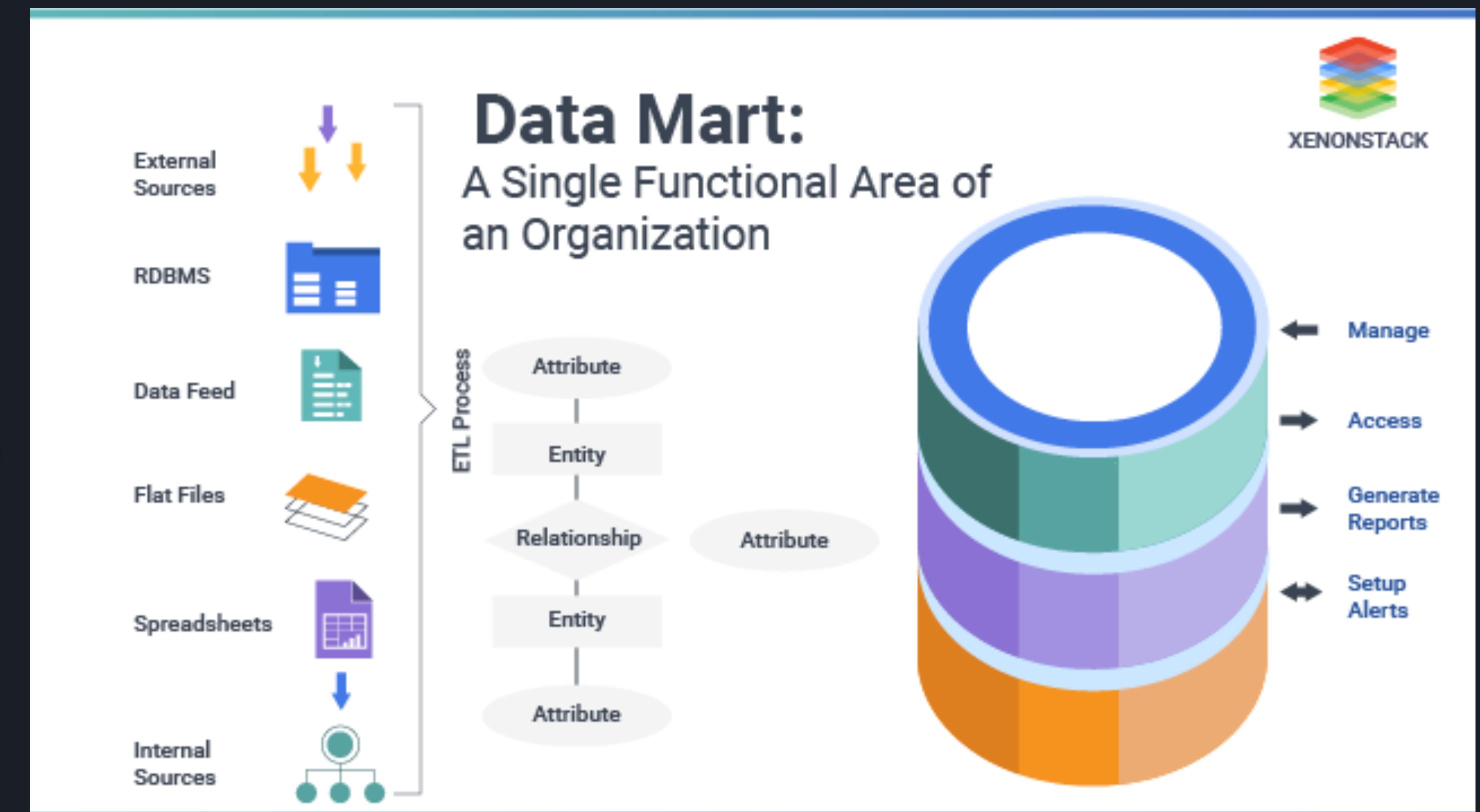
OLAP - Analytics

- Online analytical processing
- Multiple Sources
- Multidimensional
- Not Normalized
- Business Intelligence



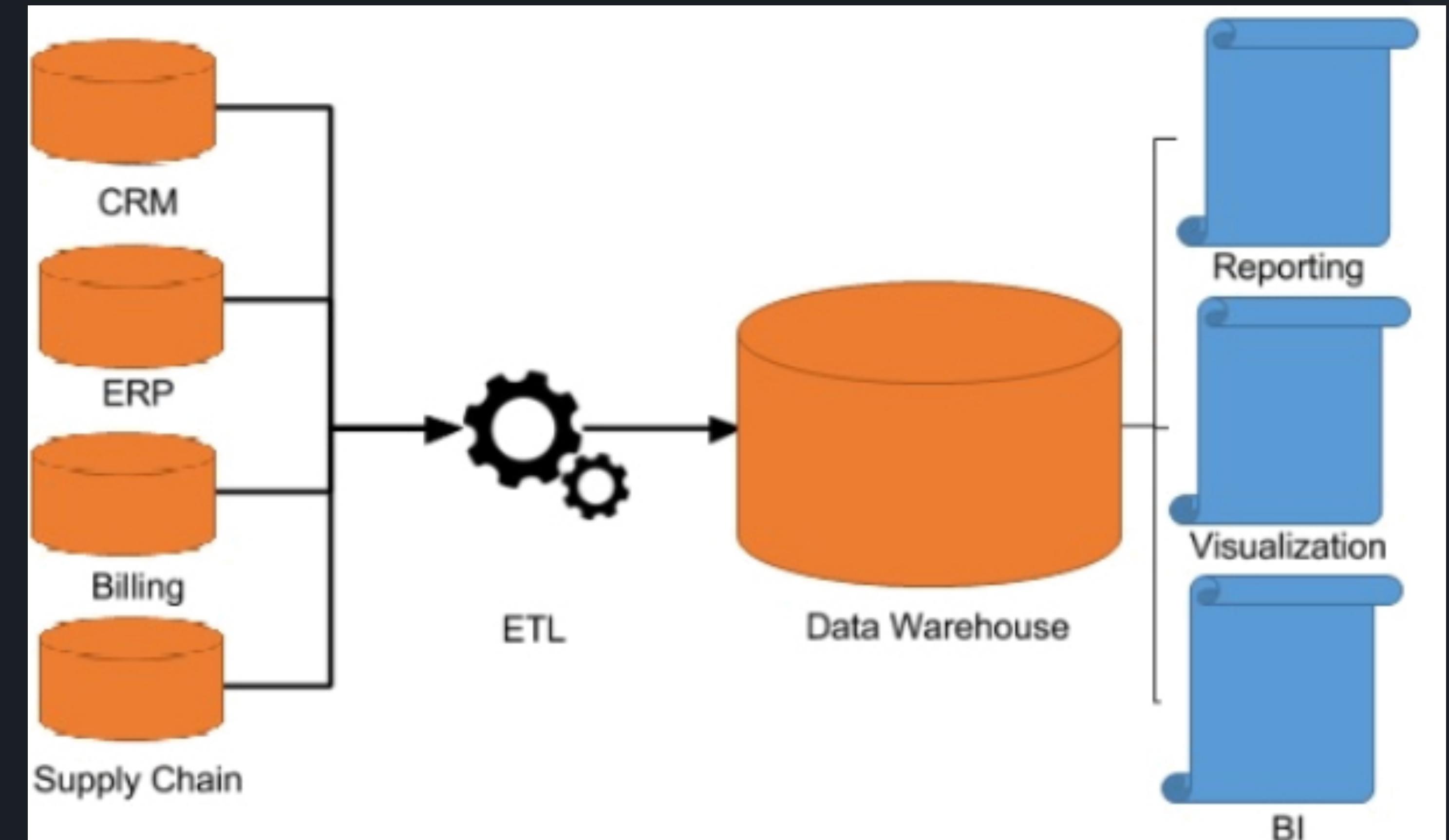
Database Terms - Data Mart

- Data Mart
 - OLAP
 - Transforms data sources
 - Subject-Oriented
 - Logical View



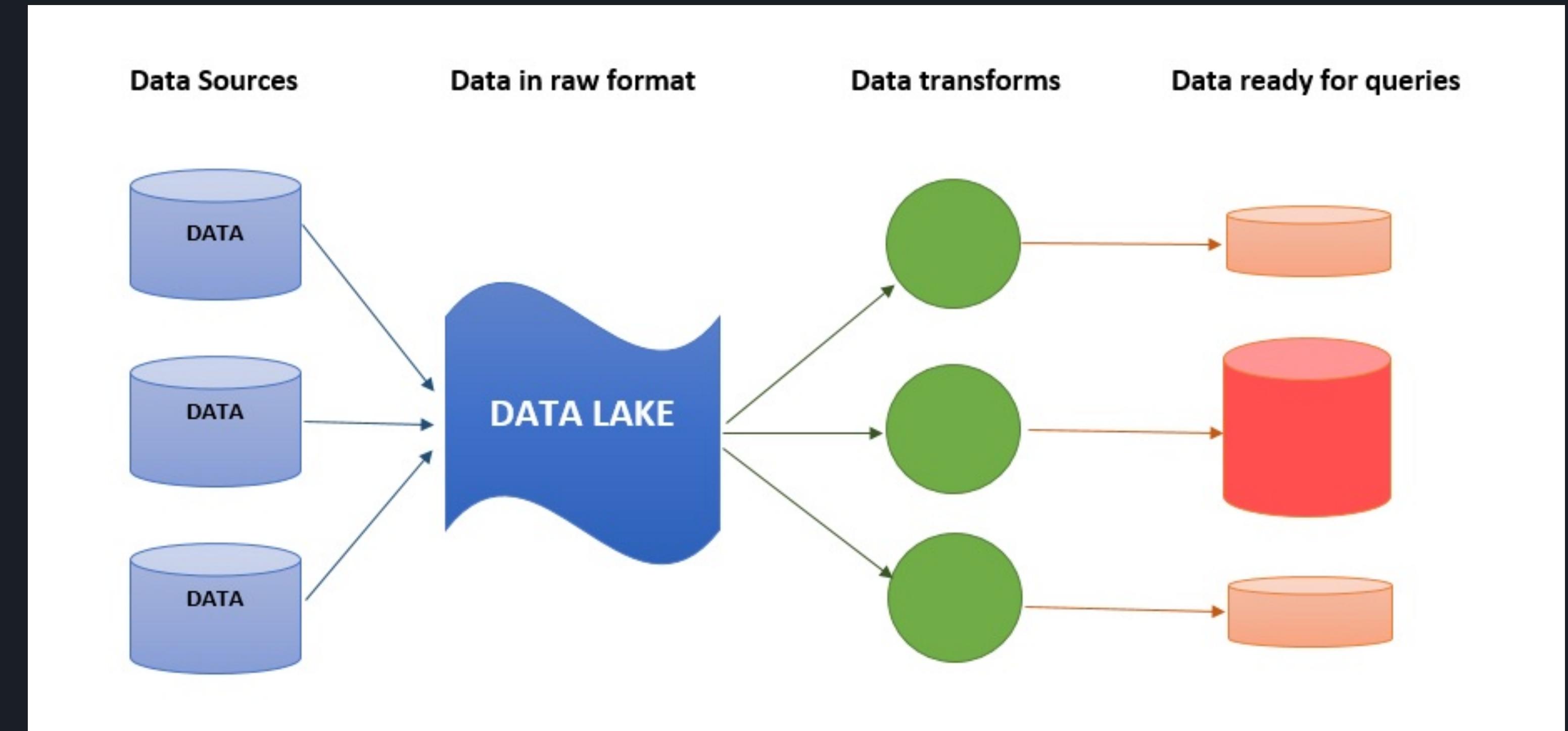
Database Terms - Data Warehouse

- Data Warehouse
 - OLAP
 - Multiple Data Marts
 - Multi-Dimensional
 - Multi-Origin



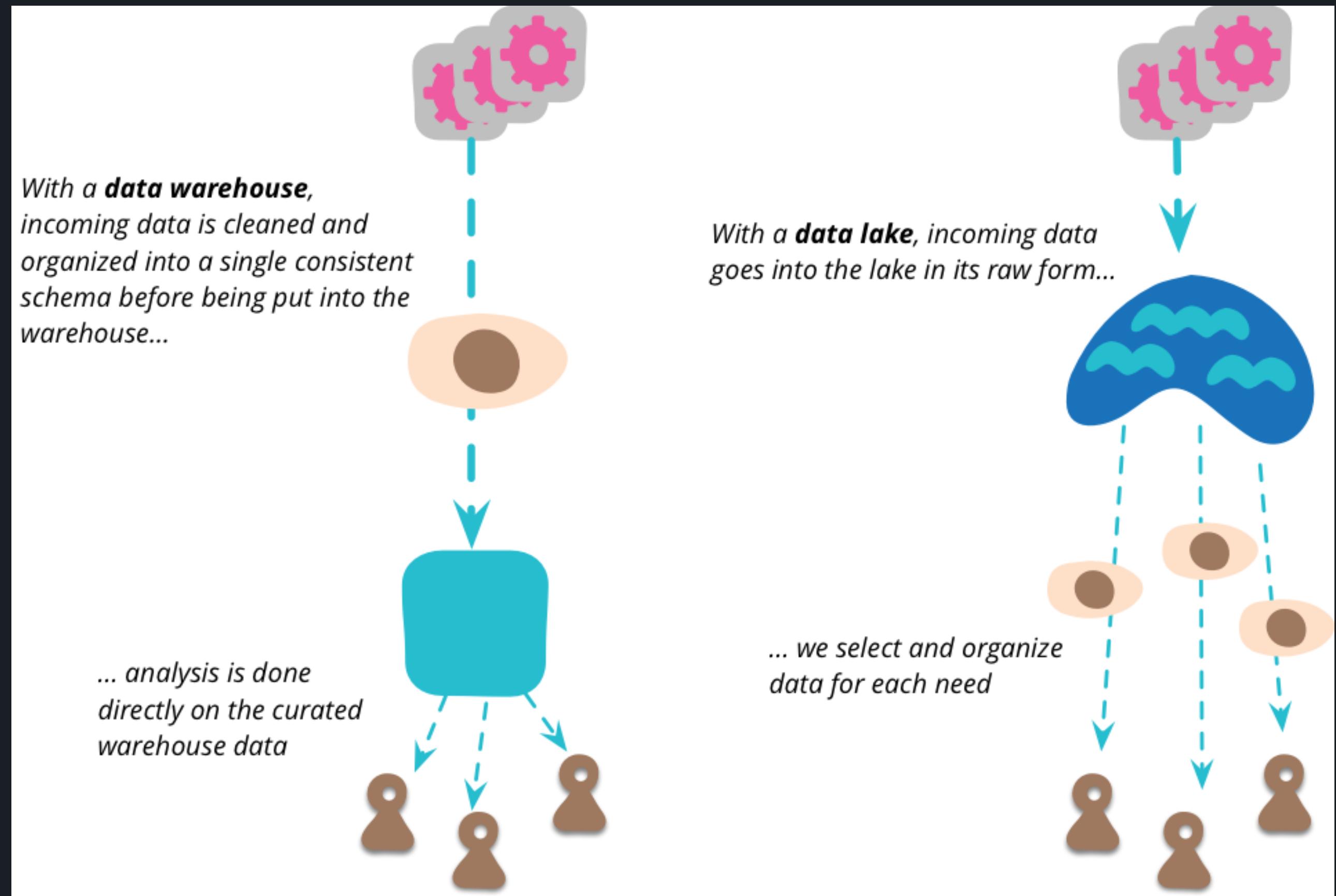
Database Terms - Data Lake

- ❖ Data Warehouse
 - ❖ OLAP
 - ❖ Multiple Data Sources
 - ❖ Multi-Dimensional
 - ❖ Logical Layered

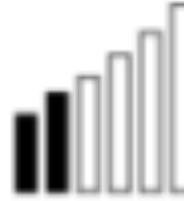


Data Warehouse vs Data Lake

- Data Warehouse
 - Pre-Formatted
 - Designed for End User
- Data Lake
 - Raw Data
 - Designed for Data Scientist



OLAP Summary

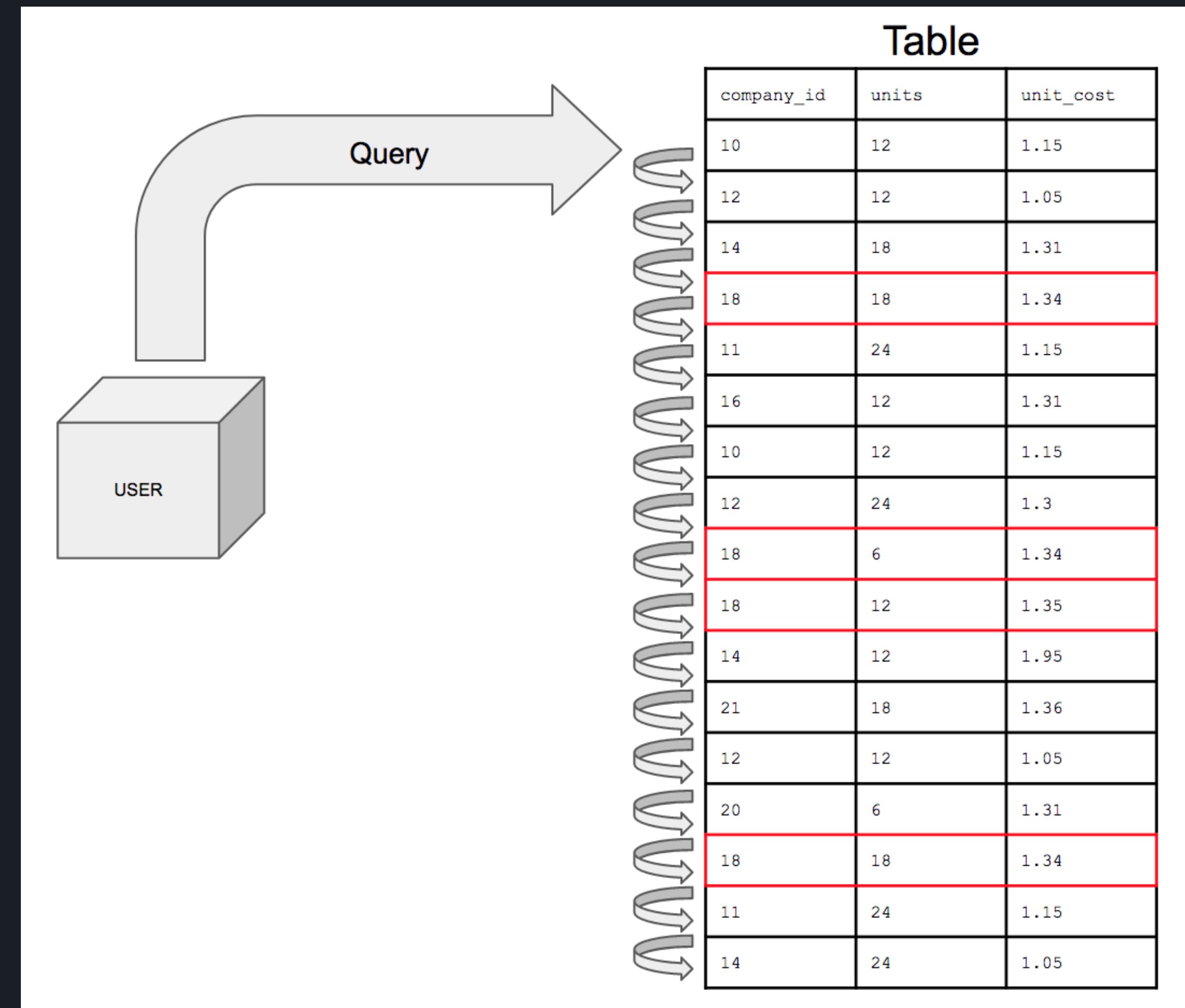
	Most Important Use Group & Use-Cases	Time-to-Market Questions & Solutions	Cost Implementation & Ownership	Users (# & Types)	Data Growth Volume & Variety
Data Lake	Predictive & Advanced Analytics	 Weeks - Months	\$\$\$\$\$		
Data Warehouse	Multi-Purpose Enabler of Operational & Performance Analytics	 Hours - Days	\$\$\$\$		
Data Mart	Line of Business Specific Reporting & Analytics	 Minutes - Hours	\$\$\$\$		

Database Terms - Indexing

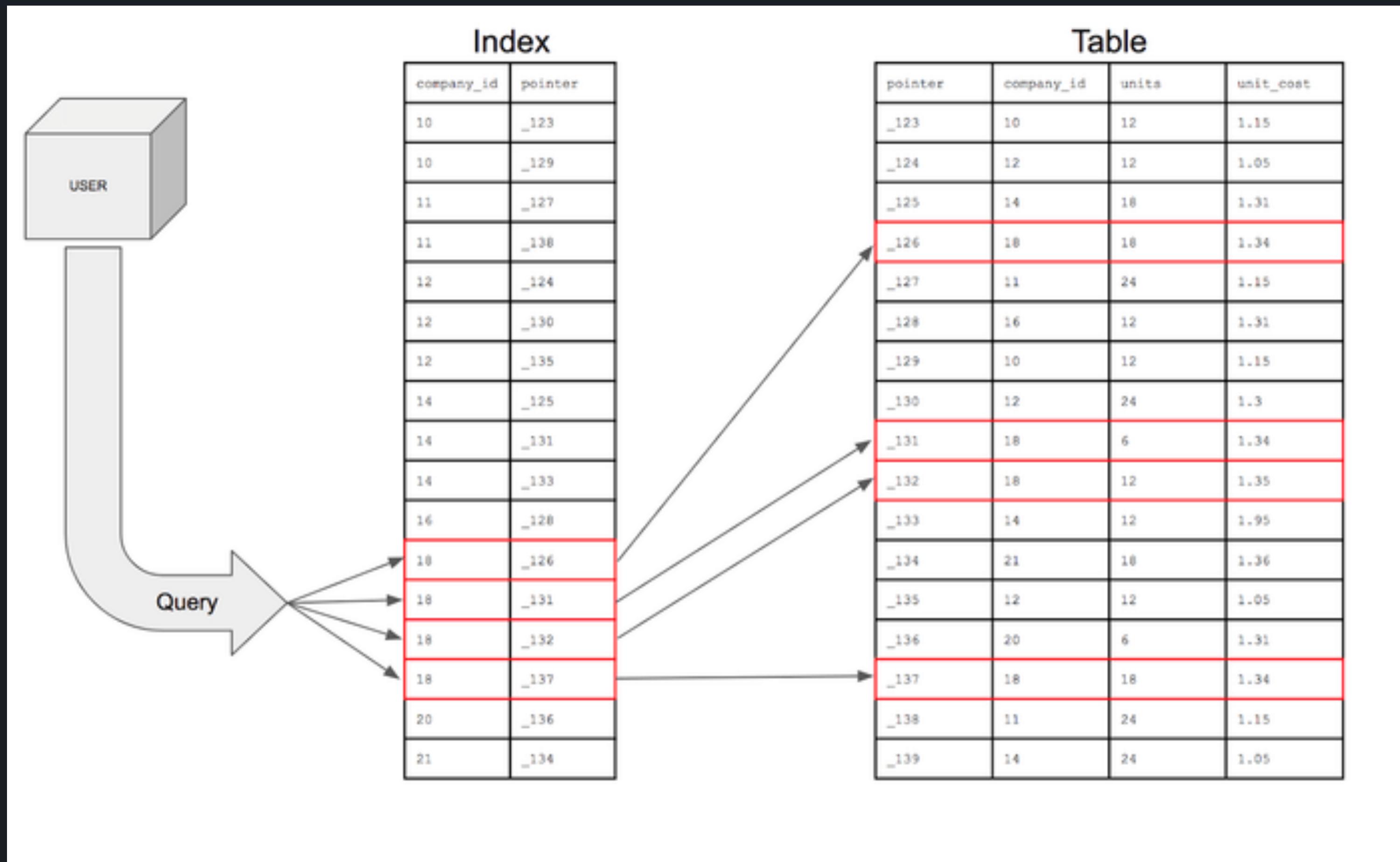
- Indexing
 - Similar to an Index of a Book
 - Helps “Find” Data in a Table
 - Indexed Data is Ordered
 - Indexed Data includes Pointer Reference

COMPANY_ID	POINTER
10	_123
10	_129
11	_127
11	_138
12	_124
12	_130
12	_135
14	_125
14	_131
14	_133
16	_128
18	_126
18	_131
18	_132
18	_137

Database Terms - Without Indexing



Database Terms - With Indexing



Database Terms - Cardinality

Cardinality Relationship

C Computer
S Social
E Education

Cardinality – The number of entities to which another entity can be associated through a relationship

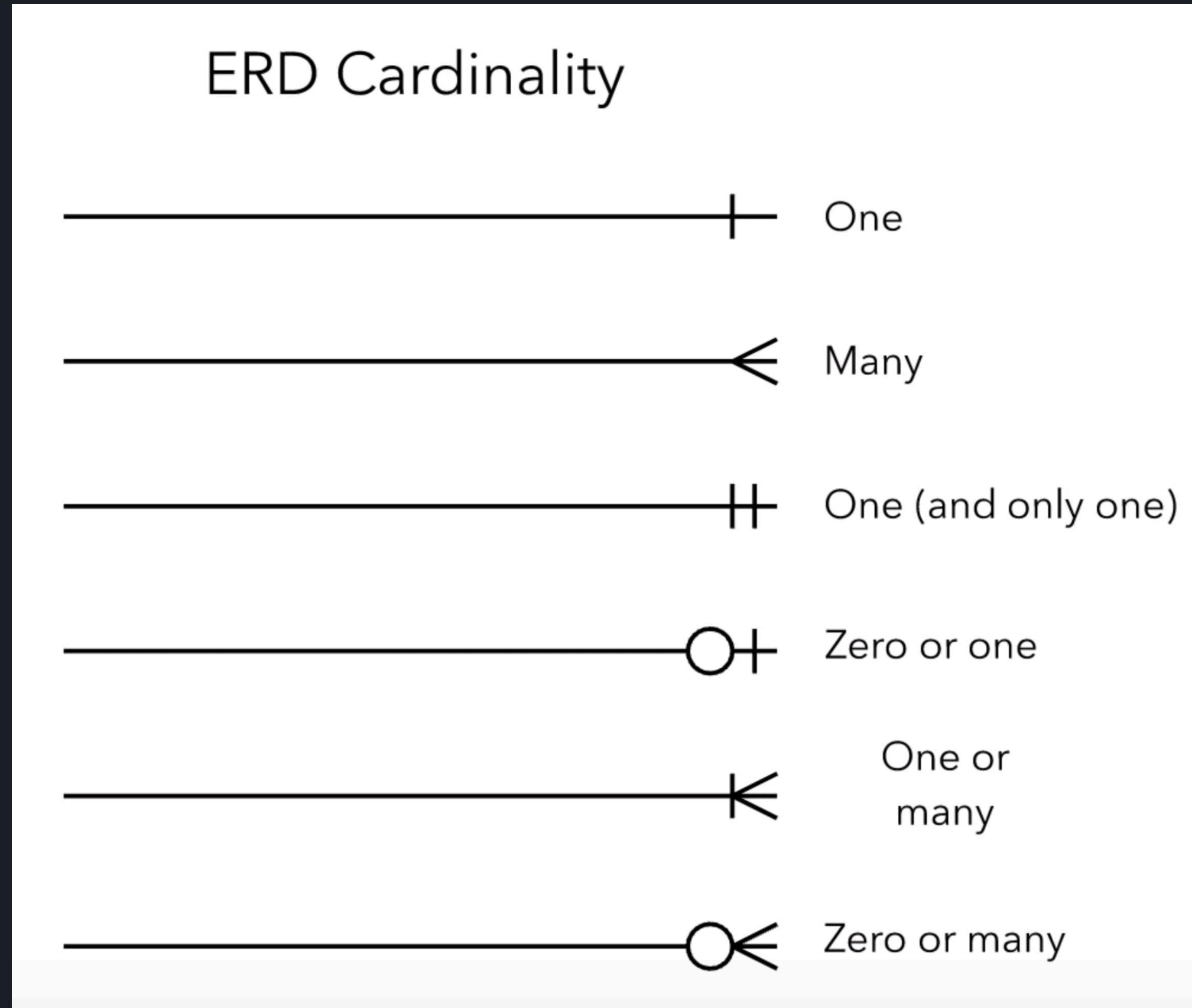
The diagrams on the right show, in order:
one-to-one
one-to-many
many-to-one
many-to-many

The diagram illustrates four types of cardinality relationships using diamond symbols and lines:

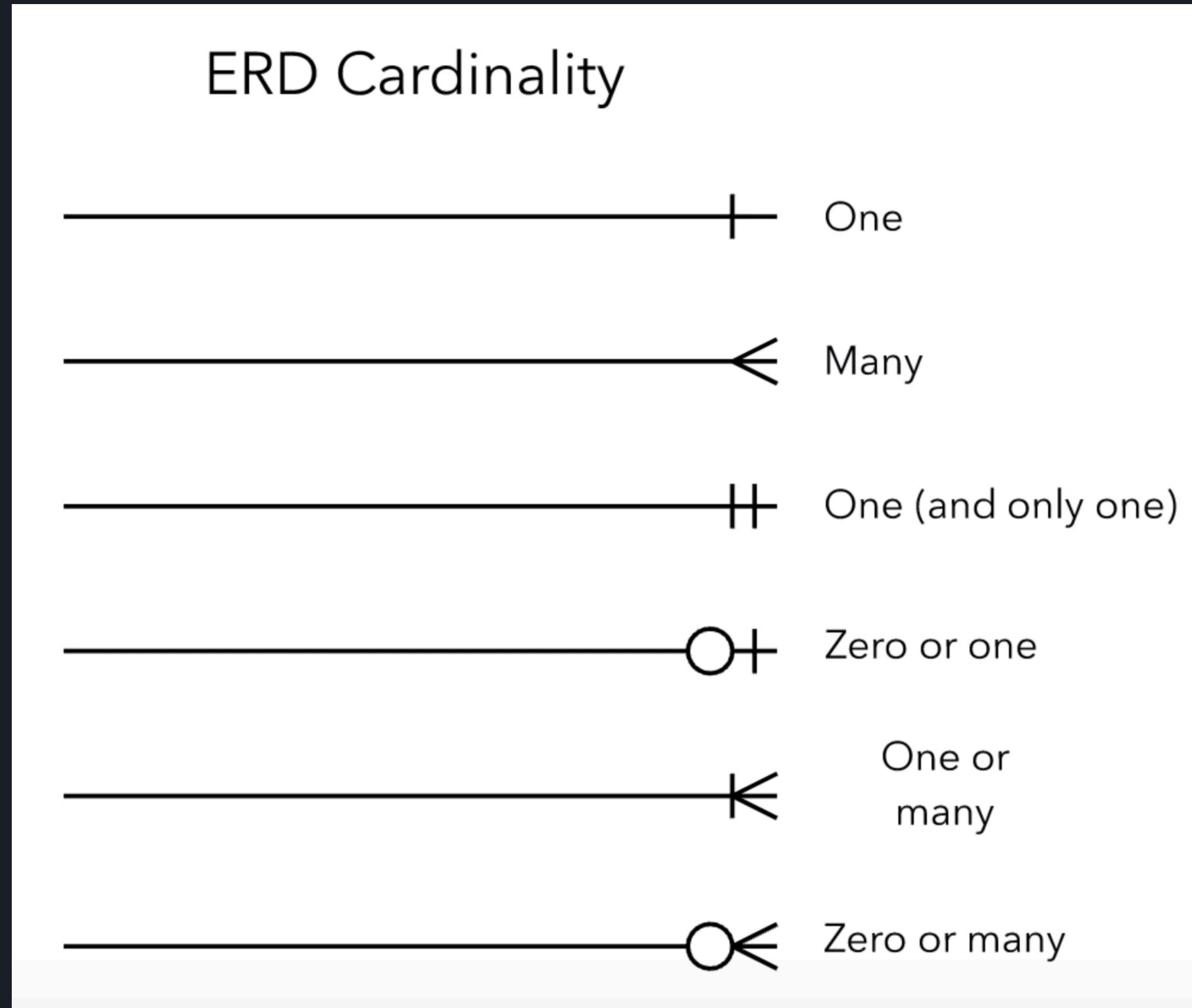
- One-to-one: A diamond symbol with two lines extending from it, each labeled "1".
- One-to-many: A diamond symbol with one line labeled "1" and another line labeled "M".
- Many-to-one: A diamond symbol with one line labeled "M" and another line labeled "1".
- Many-to-many: A diamond symbol with two lines, each labeled "M" and "N".

Relationships are indicated by lines connecting the diamond symbols to the text labels "Relationship" on the right.

Database Terms - Cardinality Cont.



Database Terms - Cardinality Cont.

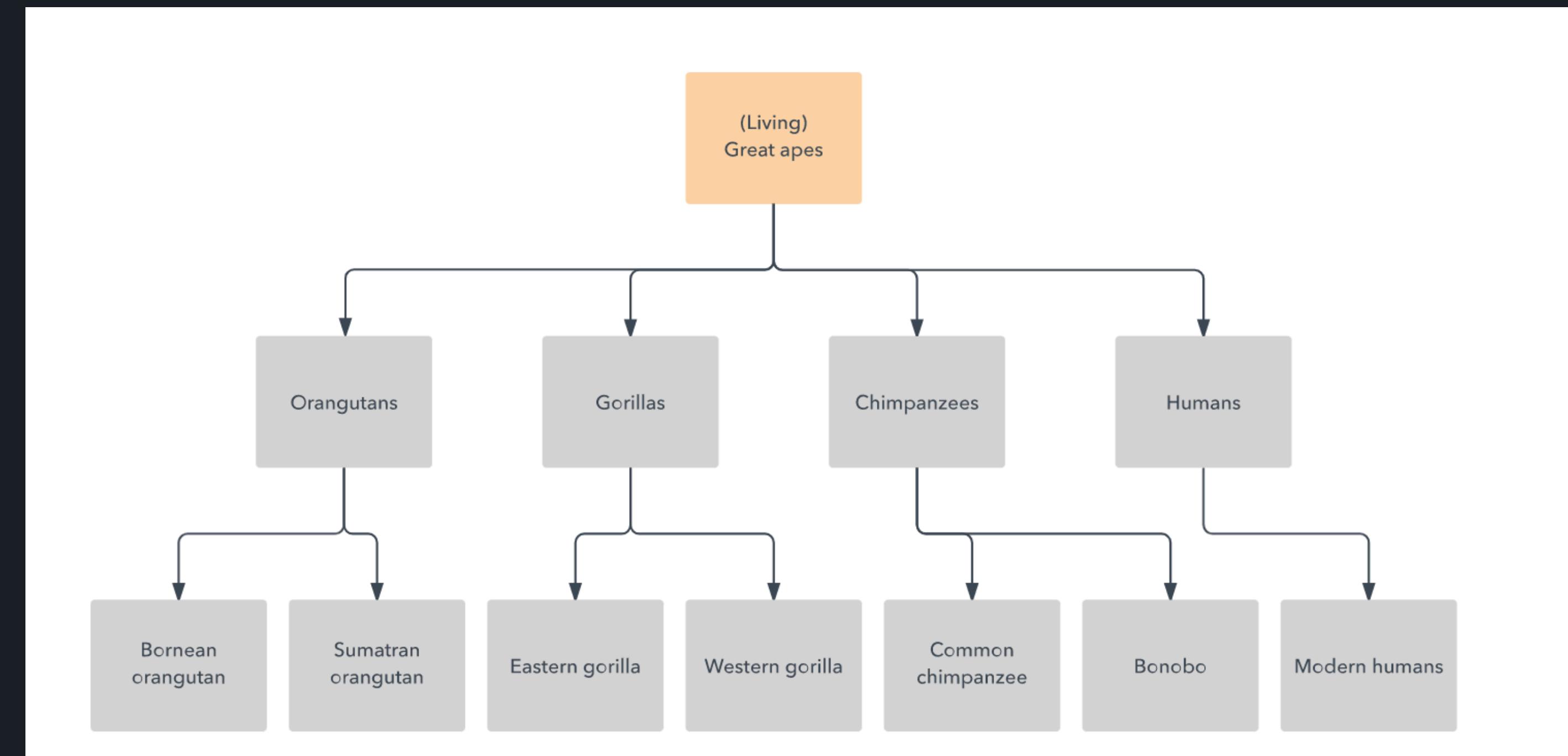


Database Design

- ❖ Hierarchical database model
- ❖ Relational model (ER Model)
- ❖ Network model
- ❖ Object-oriented database model
- ❖ Document model
- ❖ Entity-attribute-value model
- ❖ Star / Snowflake schema
- ❖ The object-relational model

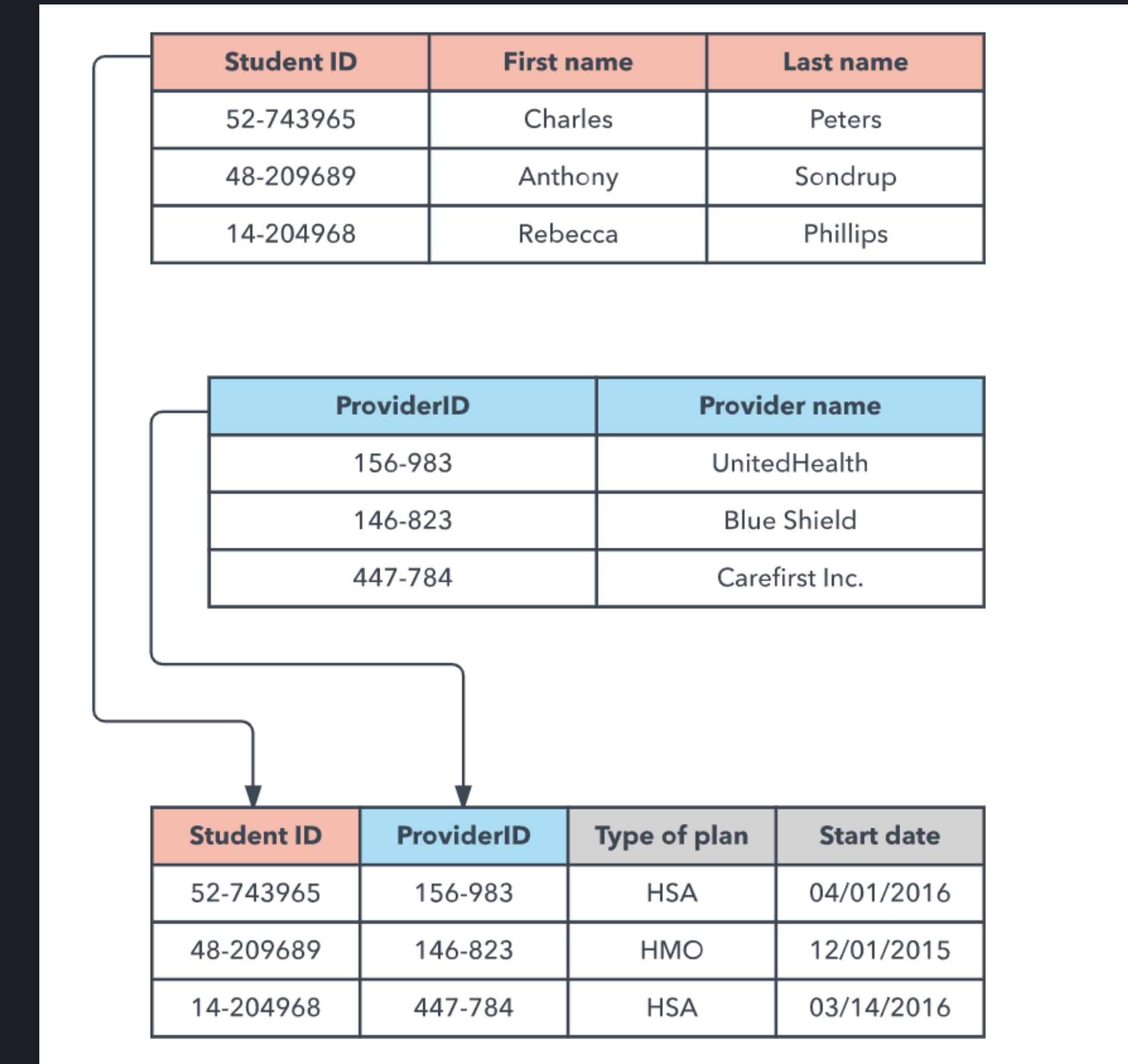
Database Design - Hierarchical

- Hierarchical Database Model
 - Tree-Like Structure
 - Each Record has 1 Parent
 - Possibility for Siblings
 - Does not describe complex relationships



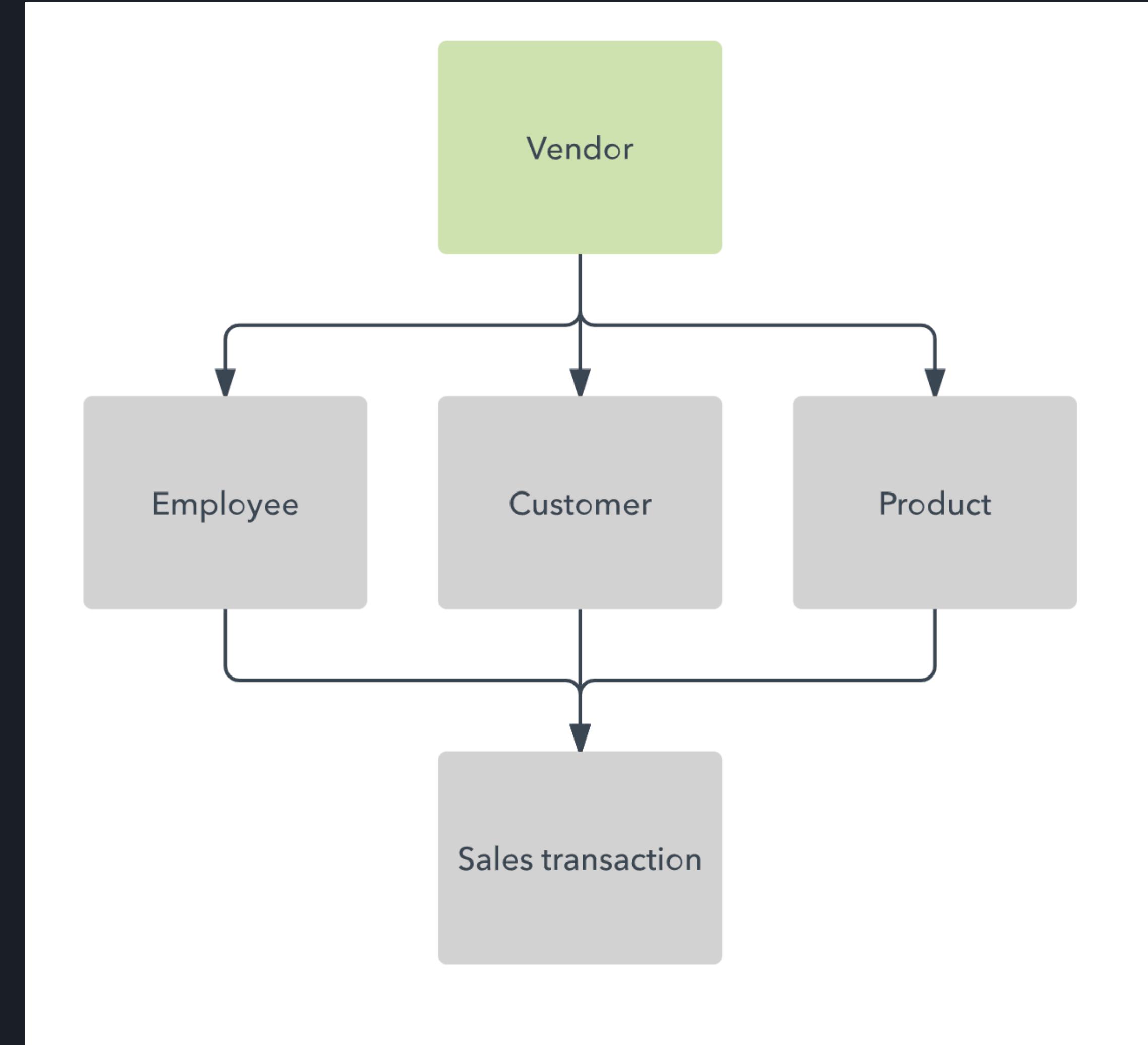
Database Design - Relational

- Relational Database Model
 - Table Structure
 - Entity / Relationship
 - Foreign Key / Primary Key



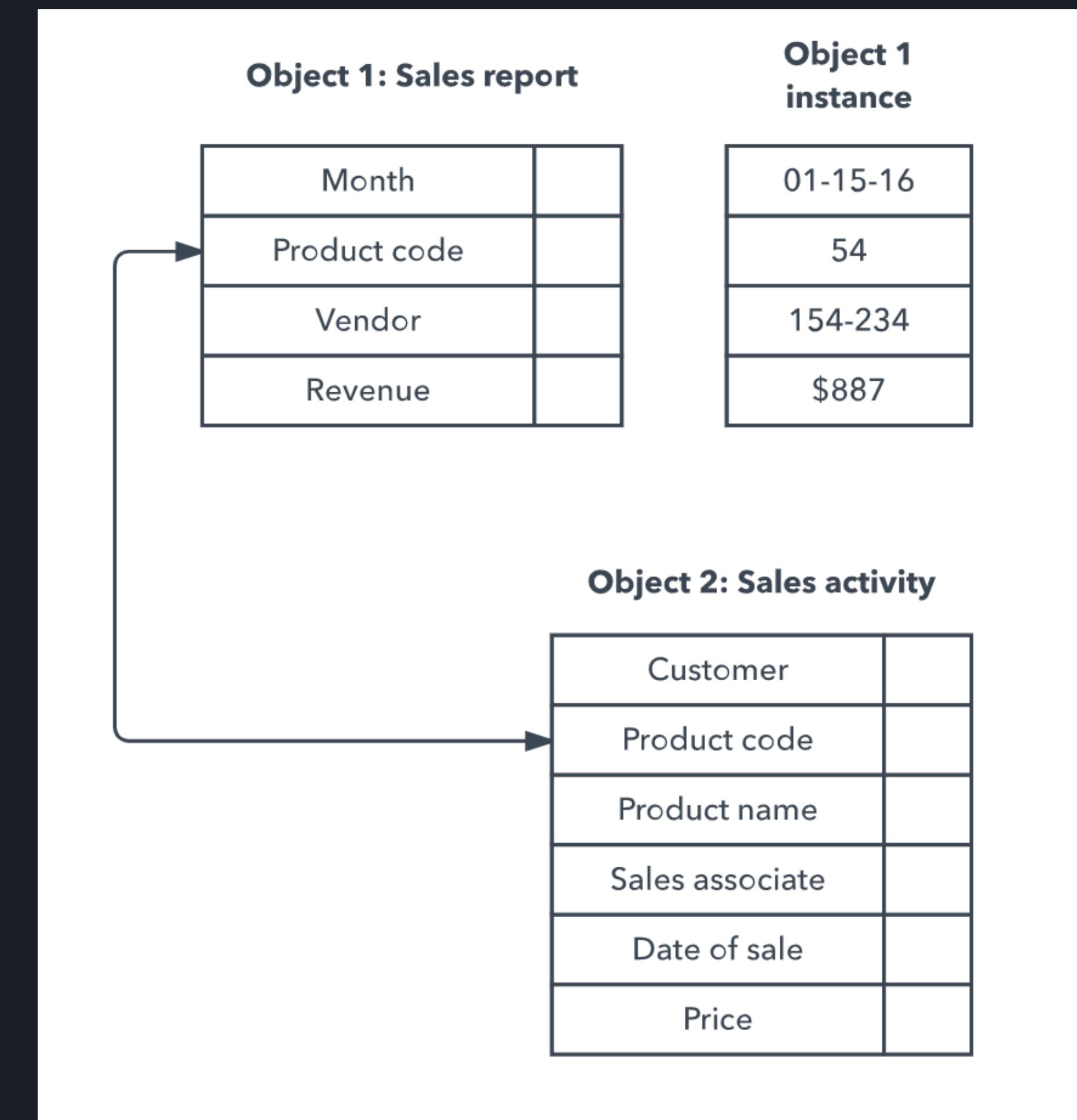
Database Design - Network

- ❖ Network Database Model
 - ❖ Similar to Hierarchy
 - ❖ Allows for Many-To-Many Relationships
 - ❖ One Parent



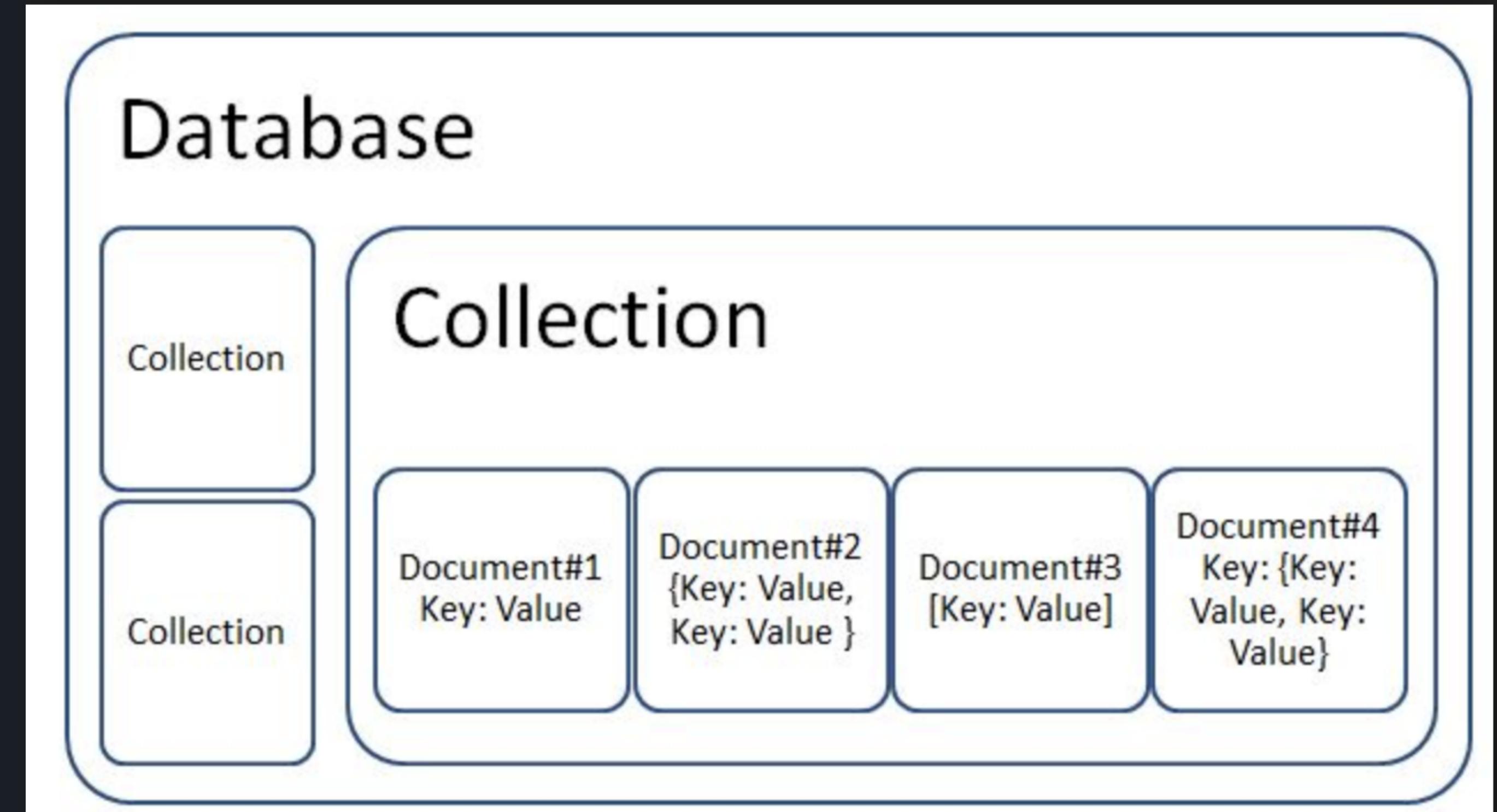
Database Design - Object Oriented

- Object Oriented Database Model
 - Table Structure
 - Used for Multimedia and non-traditional data
 - Hyperlinking Capabilities



Database Design - Document

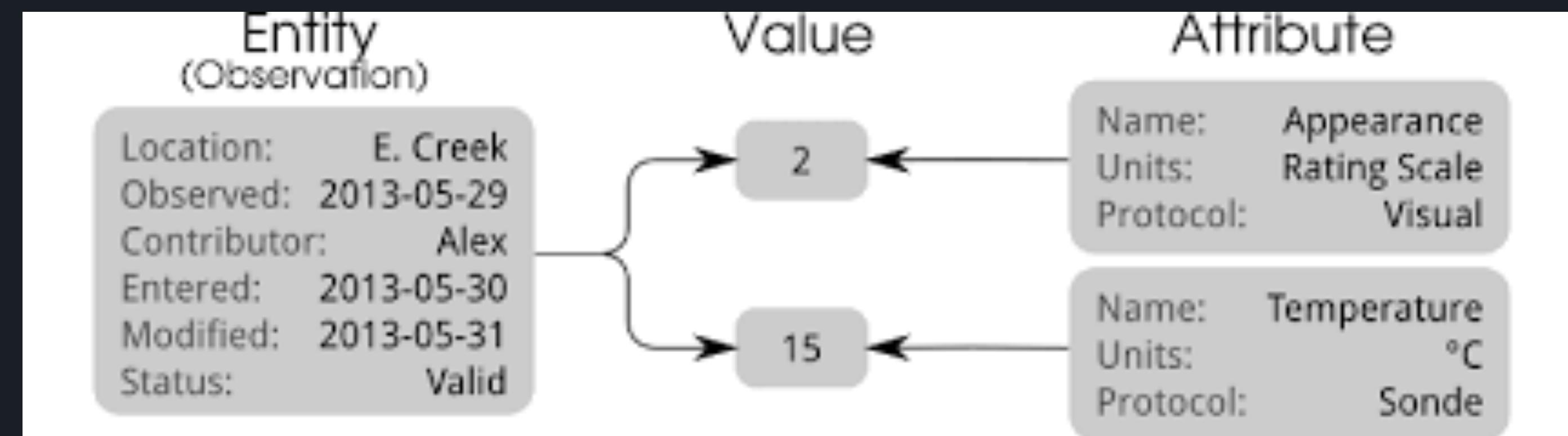
- ❖ Document Database Model
 - ❖ Document (semi-structured data)
 - ❖ Non-Atomic
 - ❖ NoSQL



Database Design - Entity-Attribute-Value

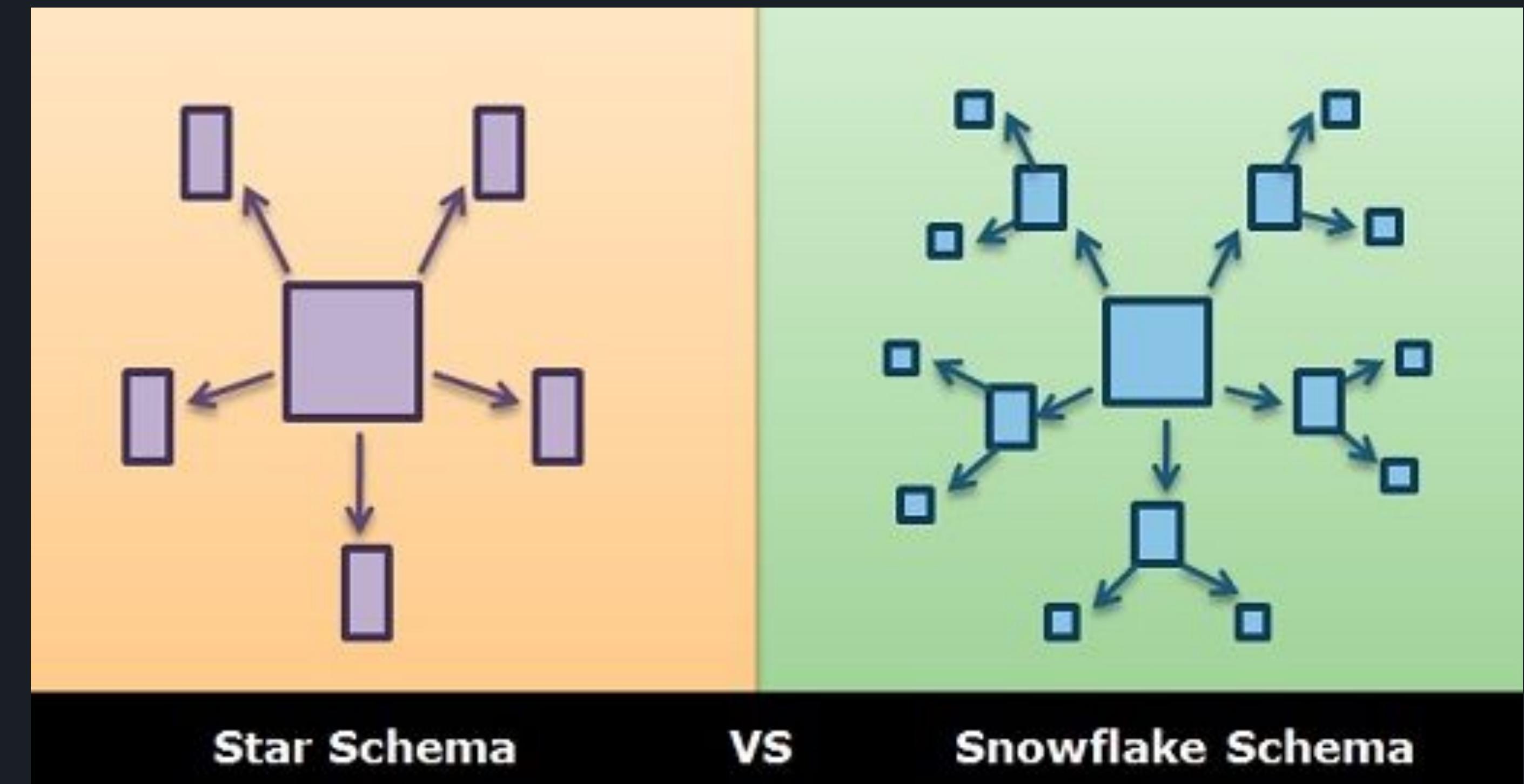
- EAV Database Model

- Quick Lookups
- GeoMapping
- Fact Finding



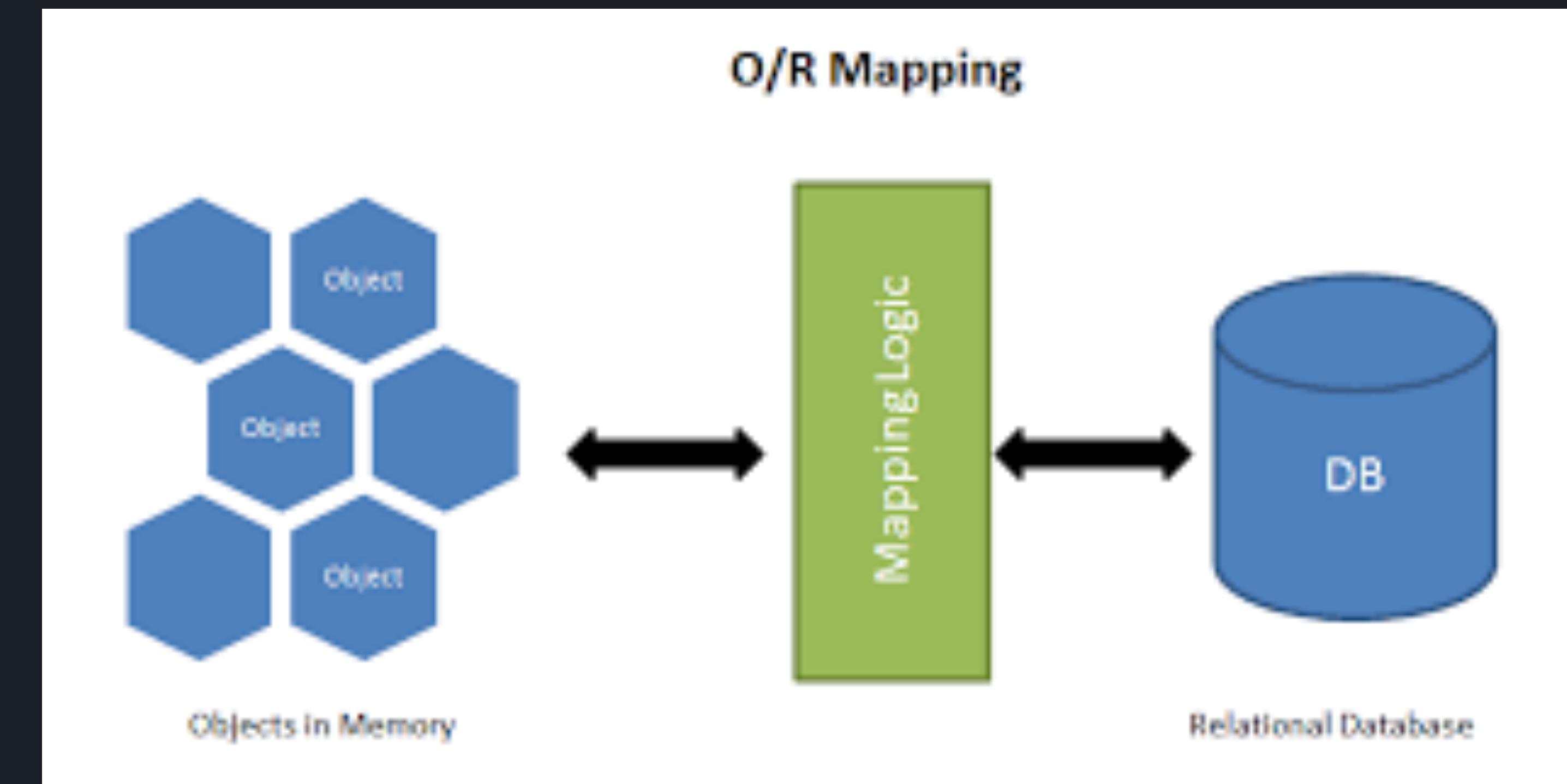
Database Design - Star / Snowflake

- EAV Database Model
 - OLAP
 - Facts / Dimensions
 - Business Intelligence



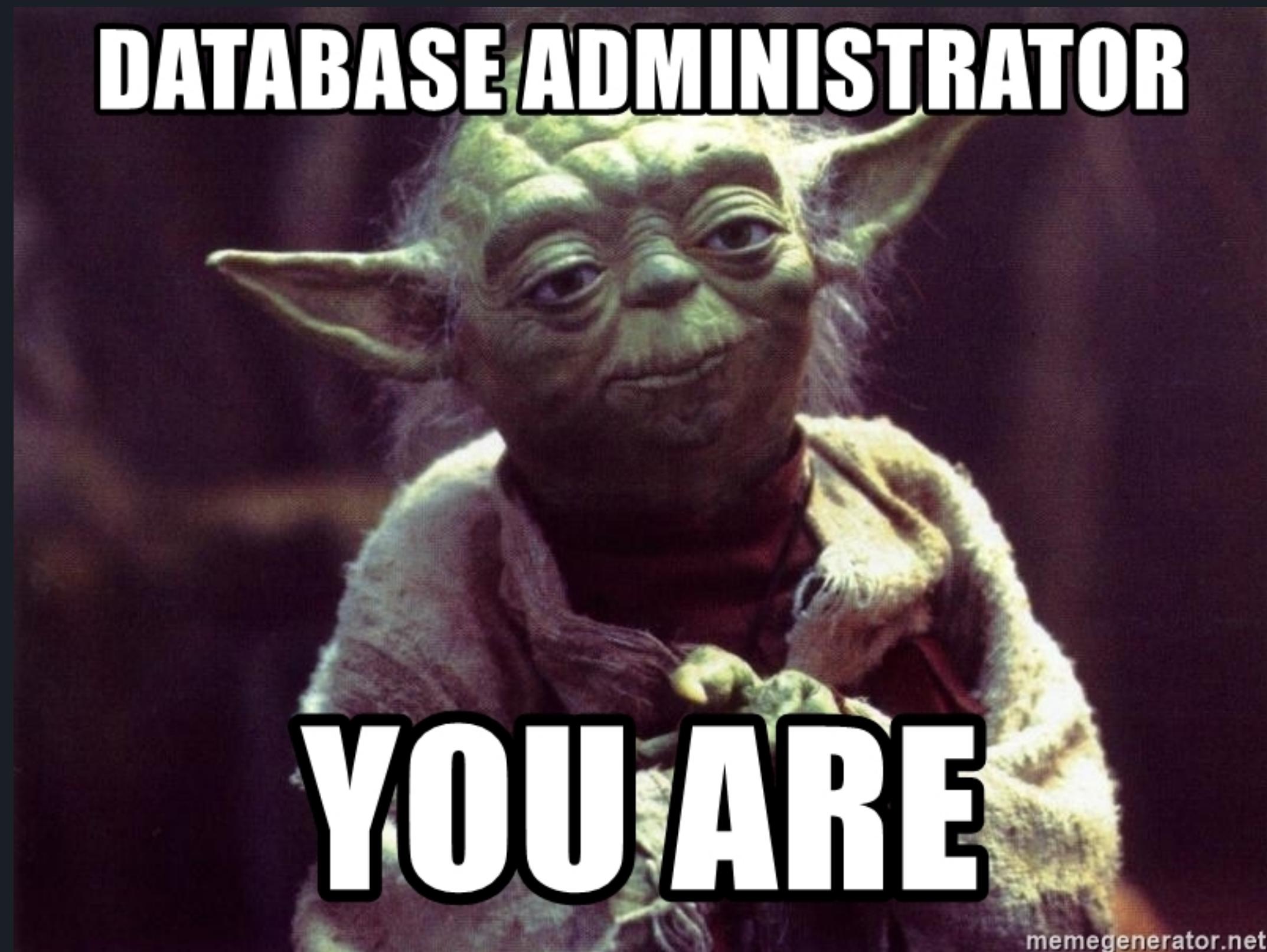
Database Design - Object Relational

- Object Relational Model
 - Also called Hybrid Model
 - Abstracts ER Model
 - Basis for Django's ORM



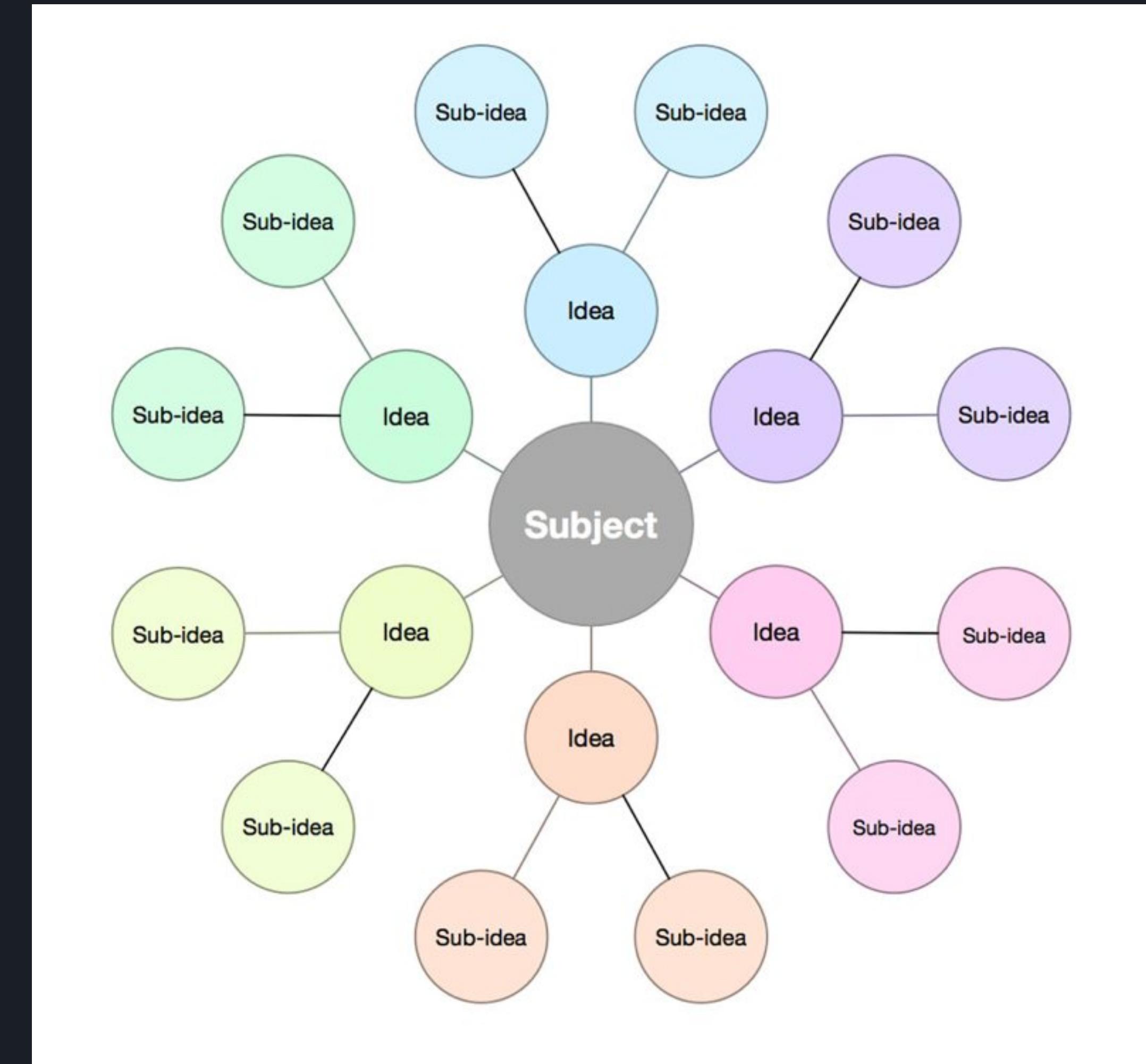
So How Do Design a Database?

- 4 Steps
 - Conceptual Design
 - Logical Design
 - Normalization
 - Physical Implementation



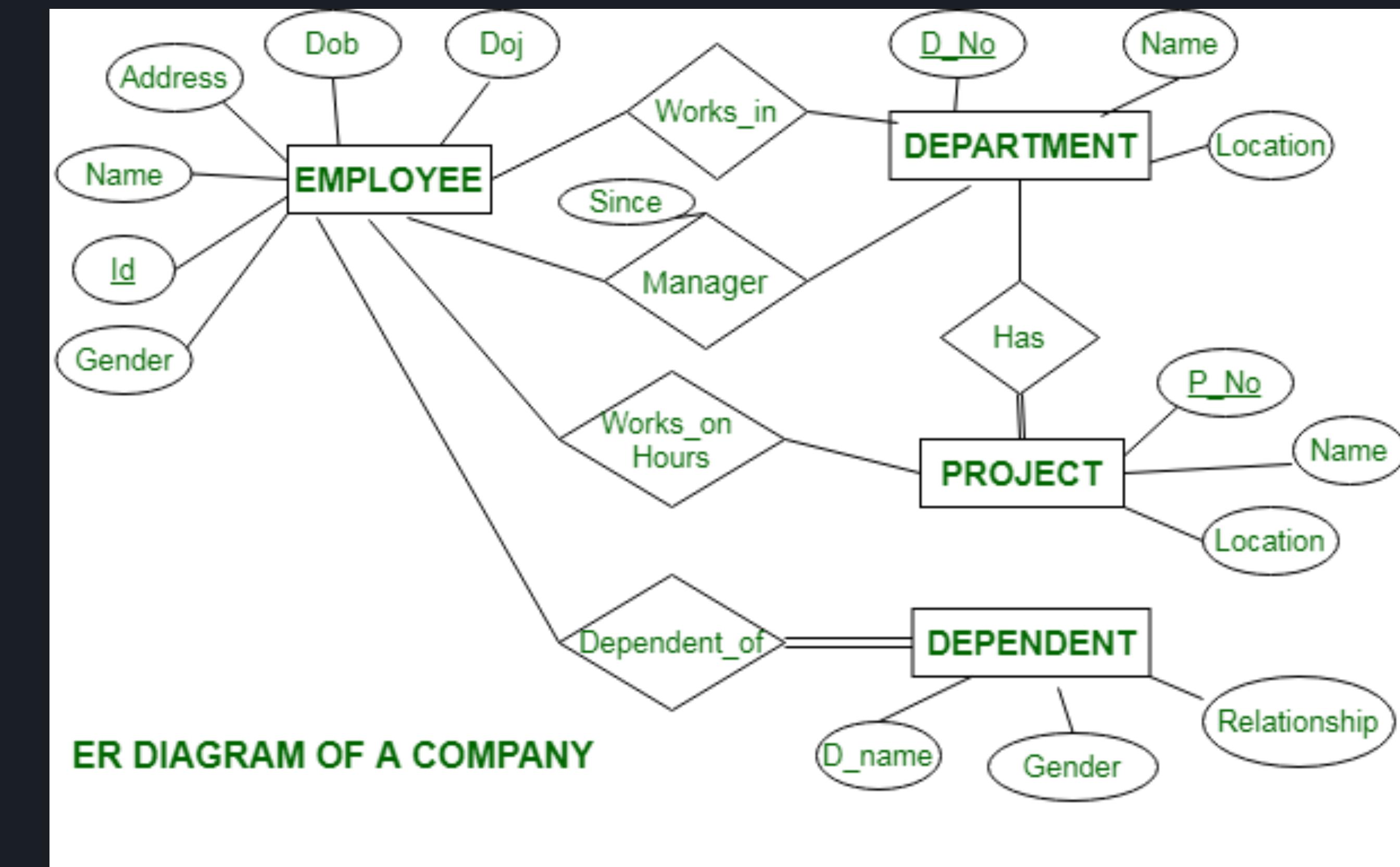
Design → Conceptual

- Conceptual
 - High Level
 - Basic Needs
 - Brainstorming Phase



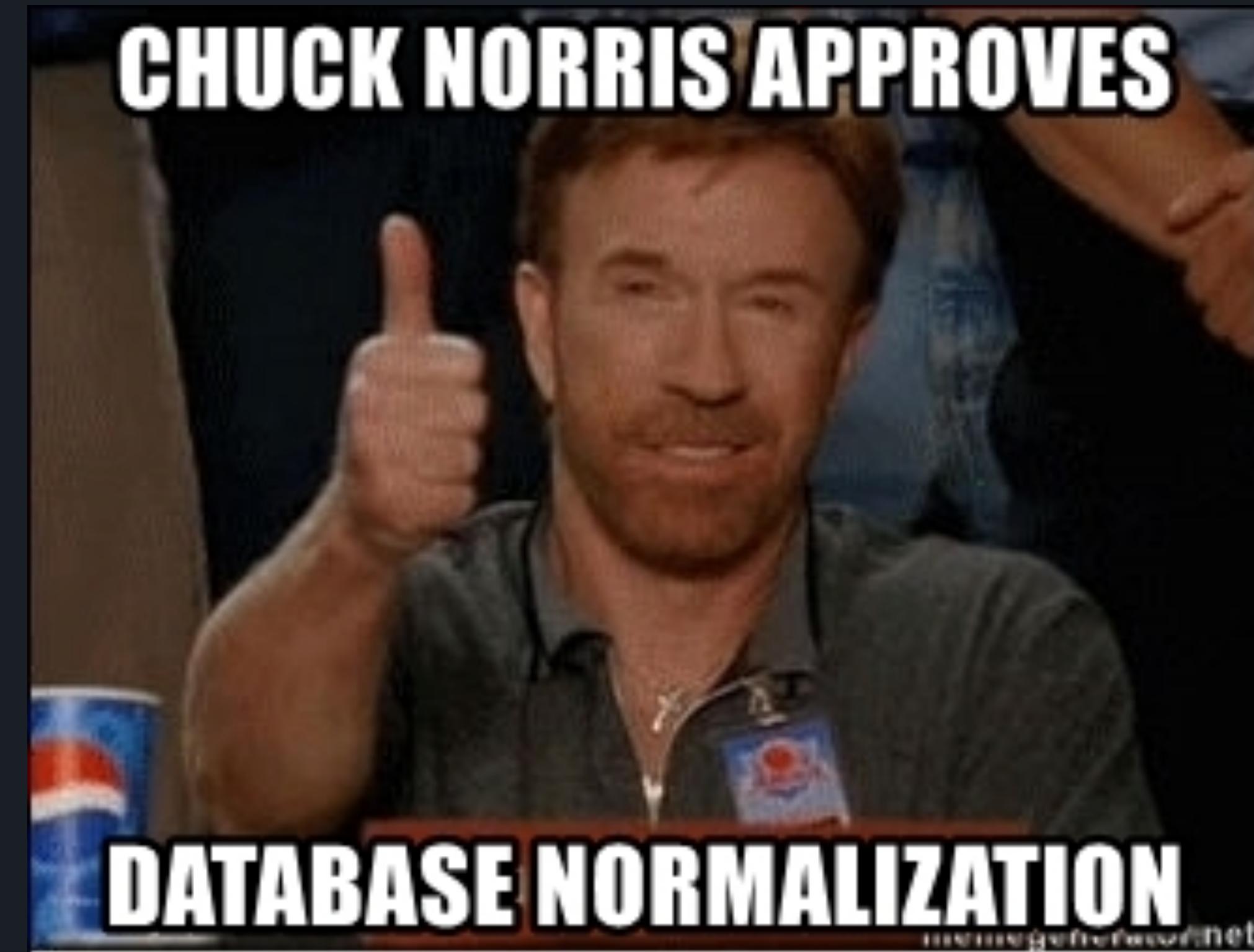
Design → Logical

- Logical
 - Data Modeling
 - Map Tables
 - ER diagram



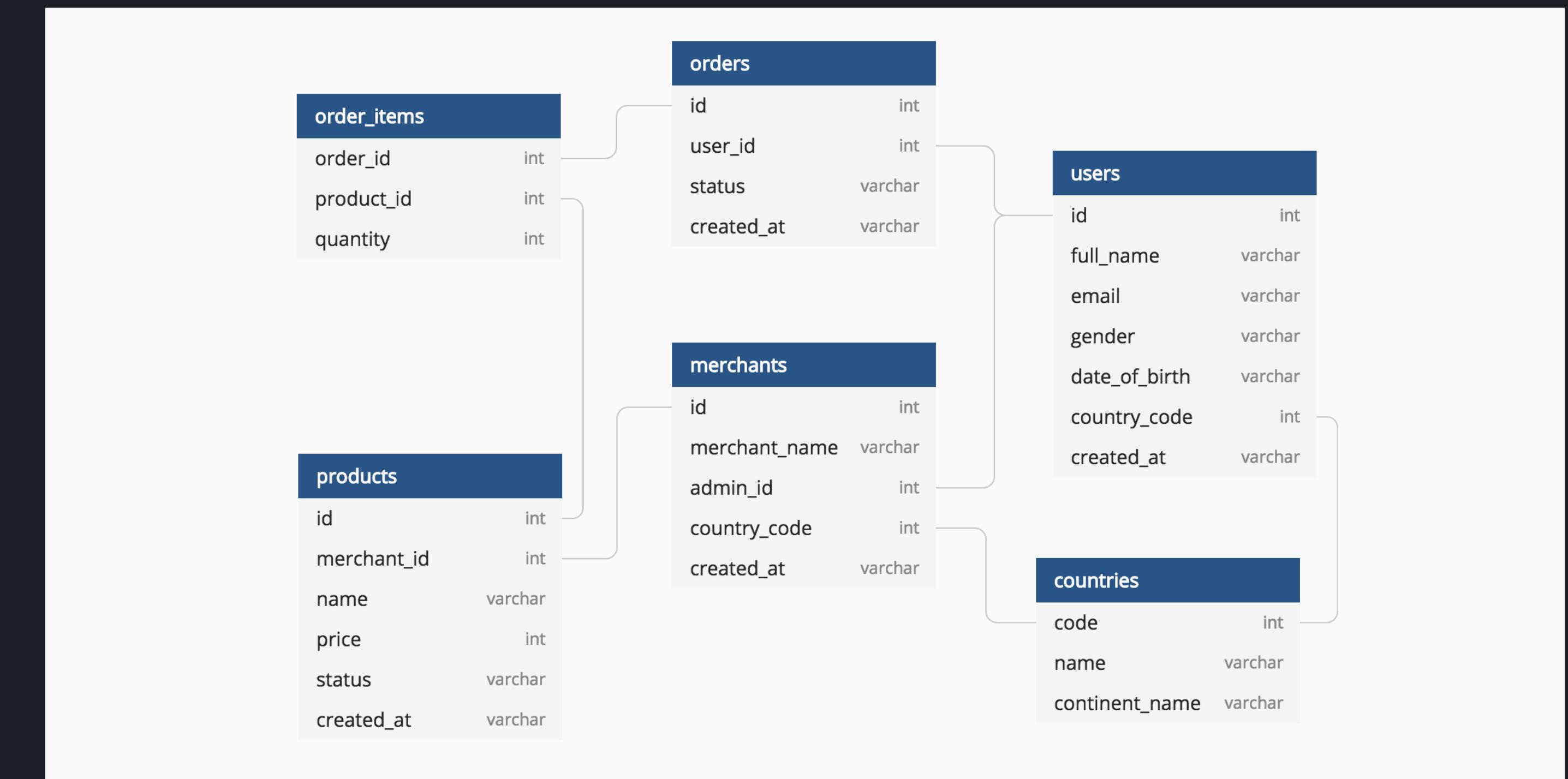
Design -> Normalization

- ❖ Normalization
 - ❖ Remove Duplicates
 - ❖ Check Logic
 - ❖ Maintain ACID



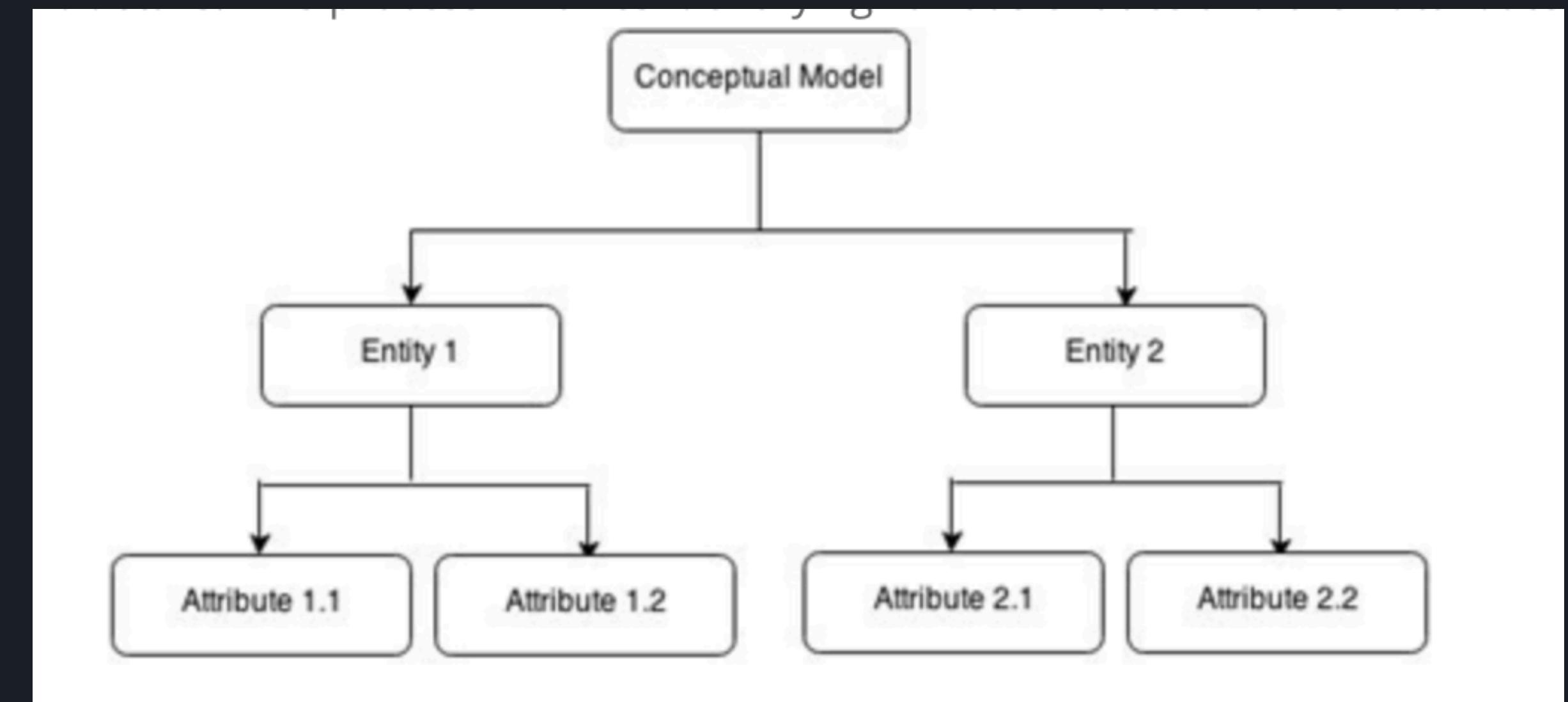
Design → Physical

- Physical
 - DDL
 - Schema Diagrams
 - Create Database



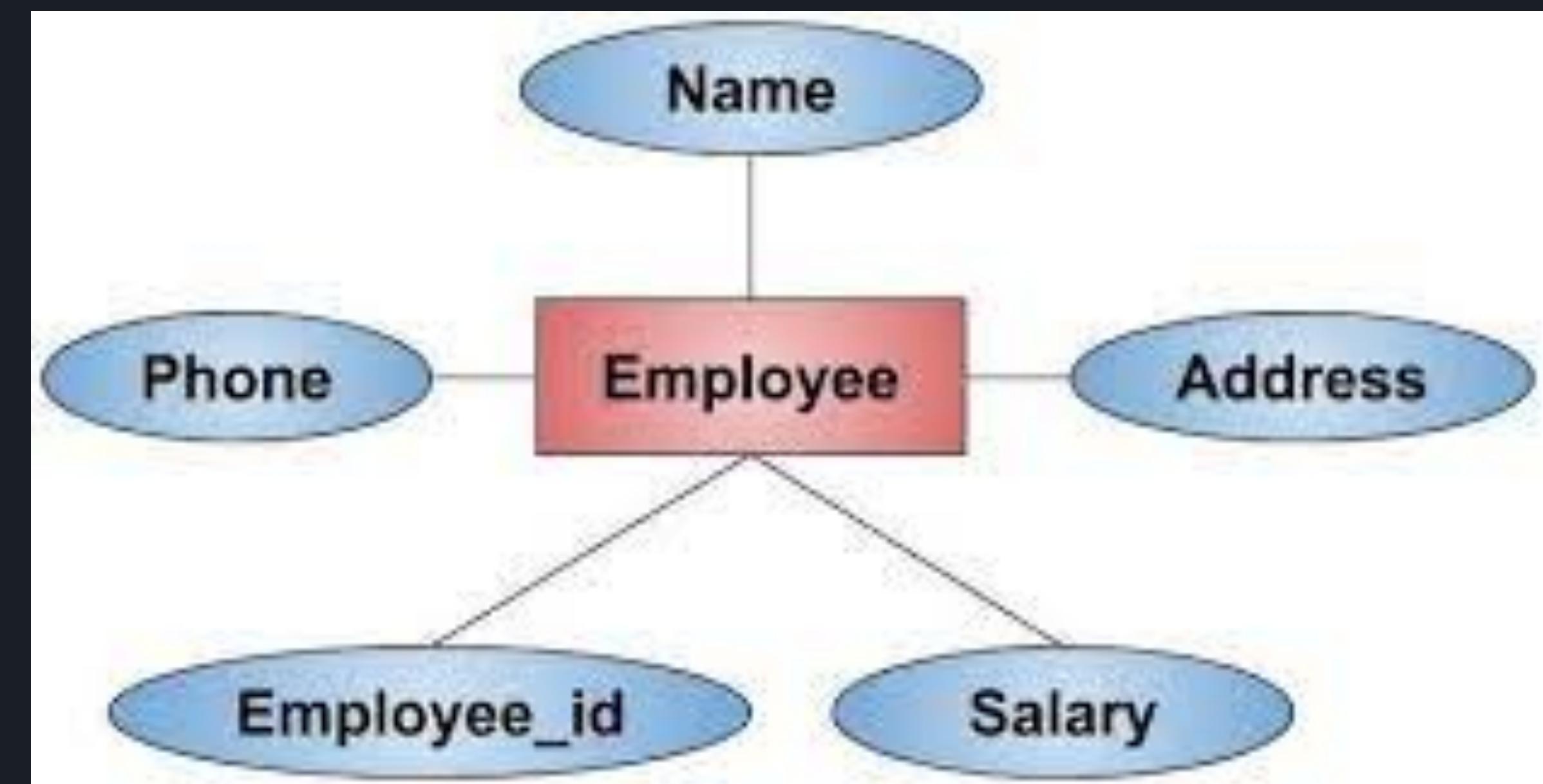
Other Design Ideas - Top Down

- Top Down Approach
 - Start with Abstract
 - Develop Each Entity through Relations
- Think Hierarchical



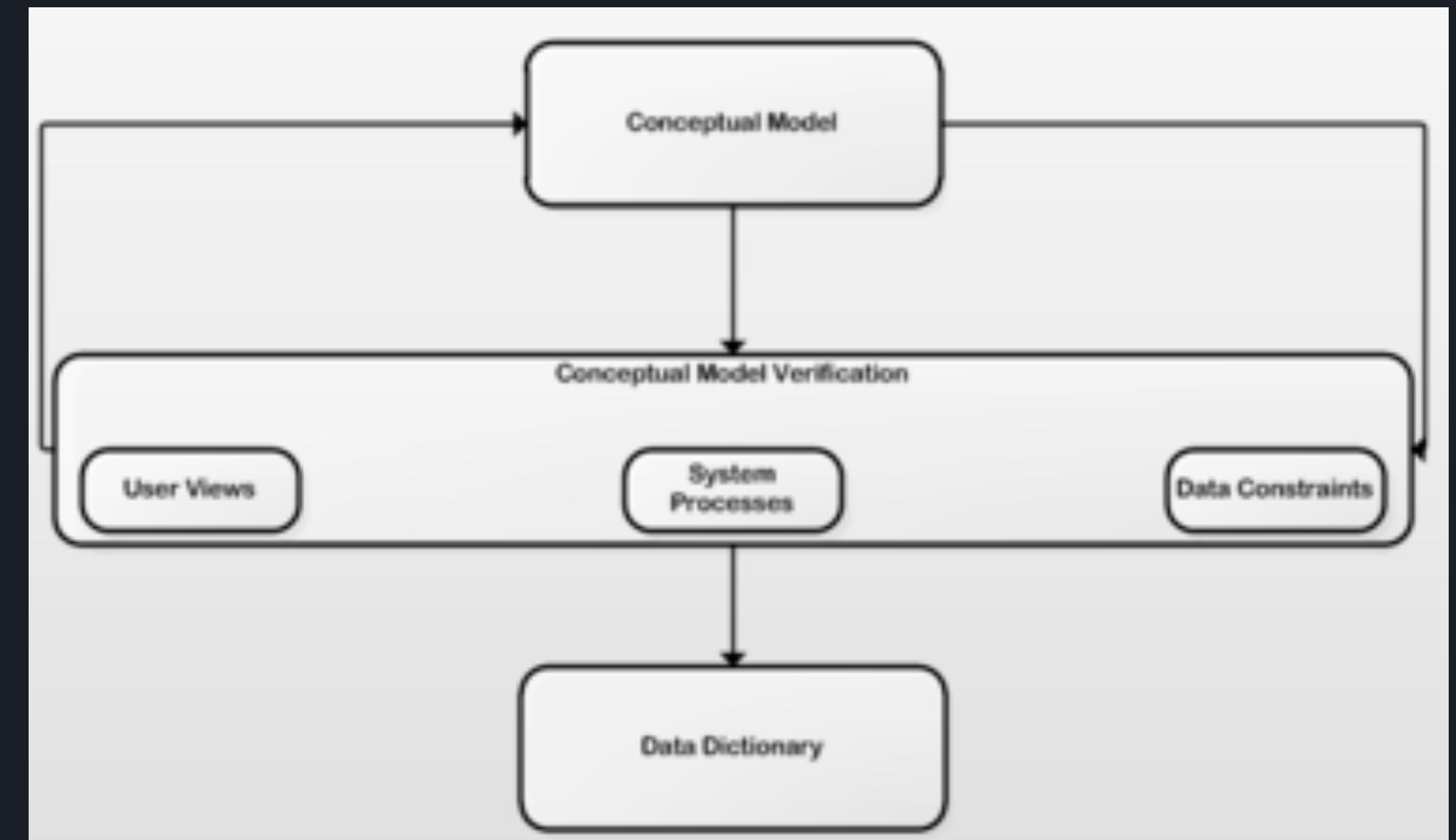
Other Design Ideas - Bottom Up

- Bottom Up Approach
 - Start with Details
 - Develop Each Entity In Isolation
 - Think About Individual Parts



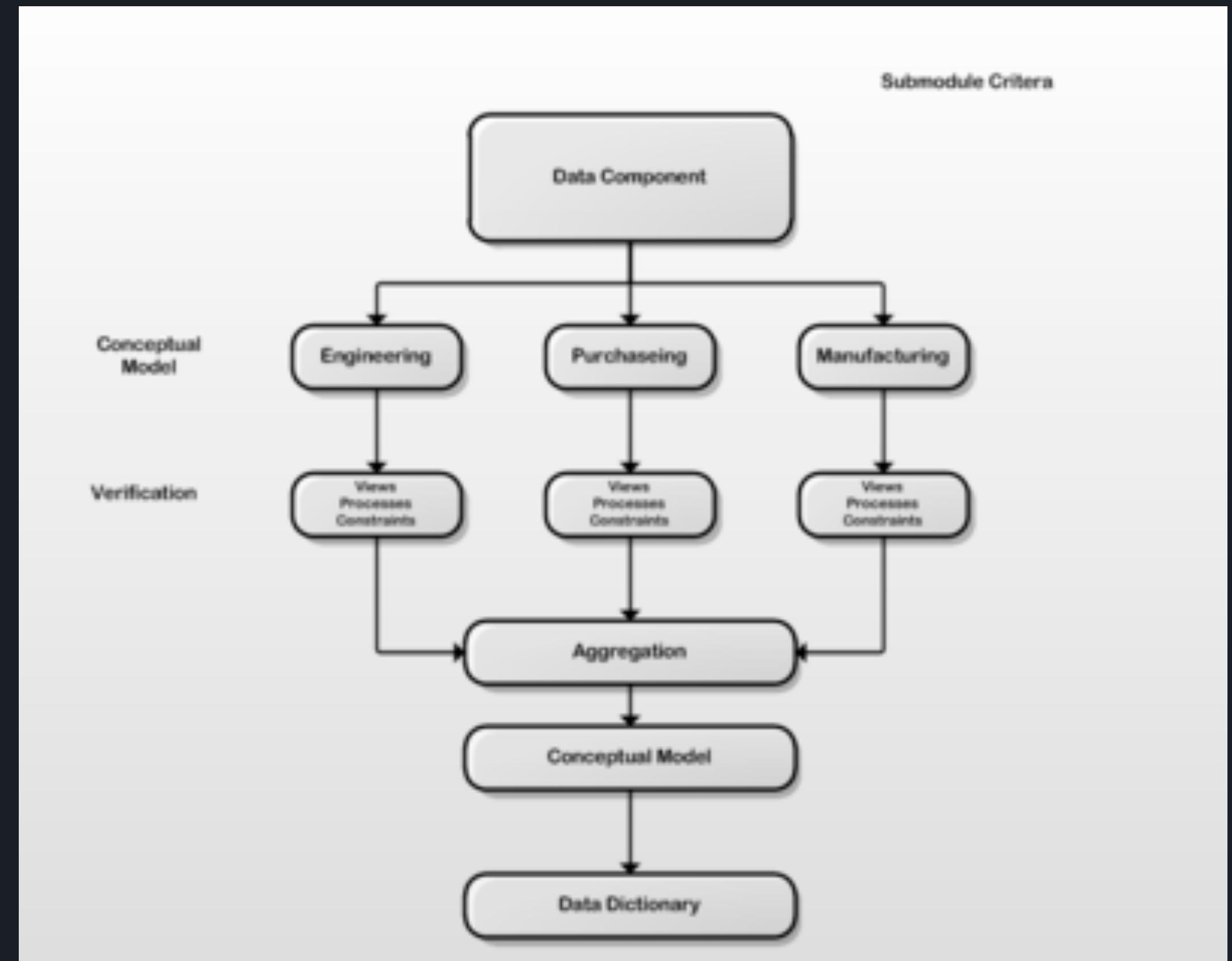
Other Design Ideas - Centralized

- Centralized Approach
 - Small Scale
 - Core Design that branches outward
 - “Start-Up” Mentality



Other Design Ideas - Decentralized

- ❖ Decentralized Approach
 - ❖ Large Scale
 - ❖ Column Based Approach
 - ❖ “FAANG” Mentality



Questions?

when your lecturer asks if you have any questions



DAILY CHALLENGE -> BYODB



Take Home Challenge

