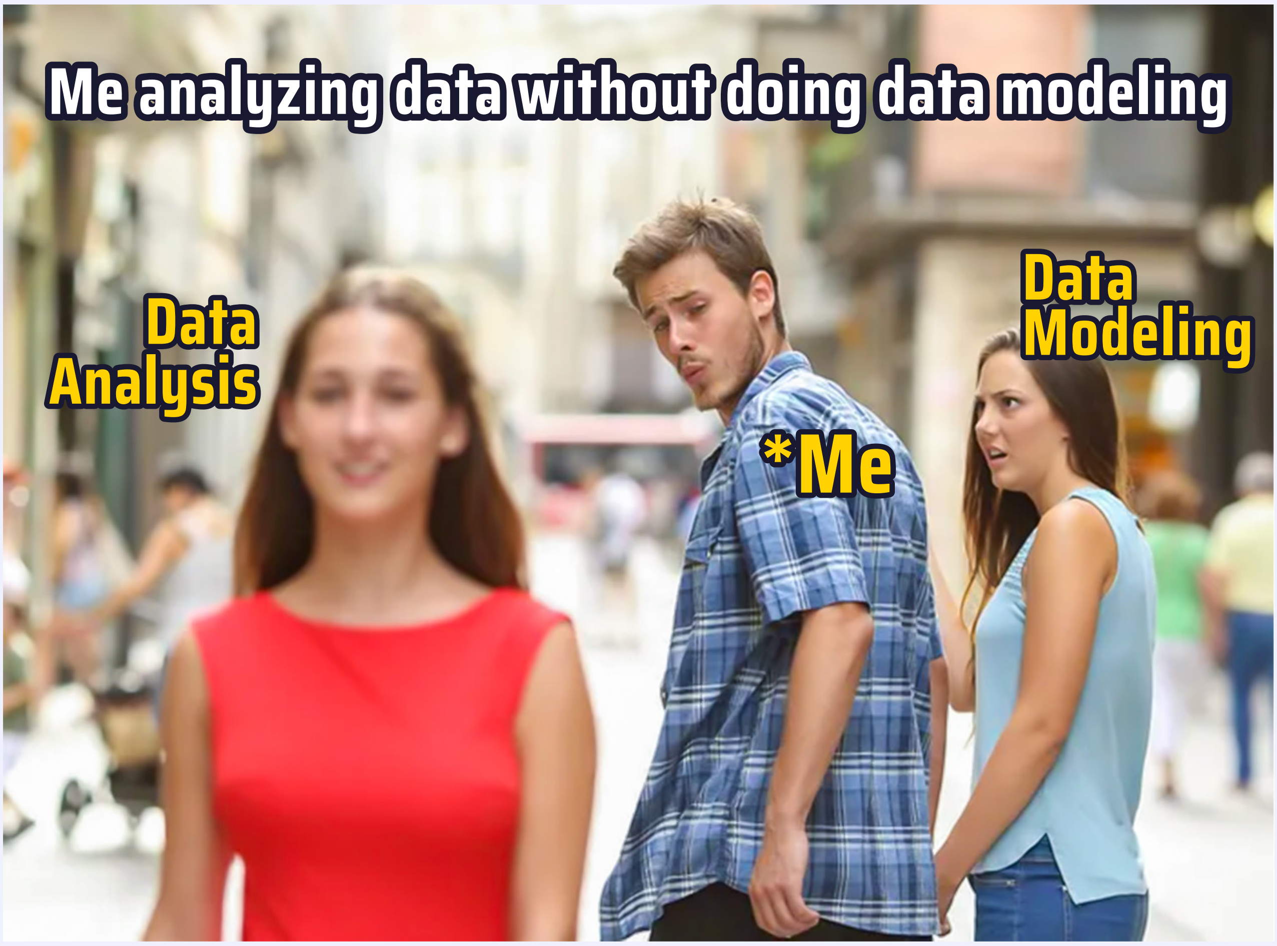
CODE BASICS

Data Modeling

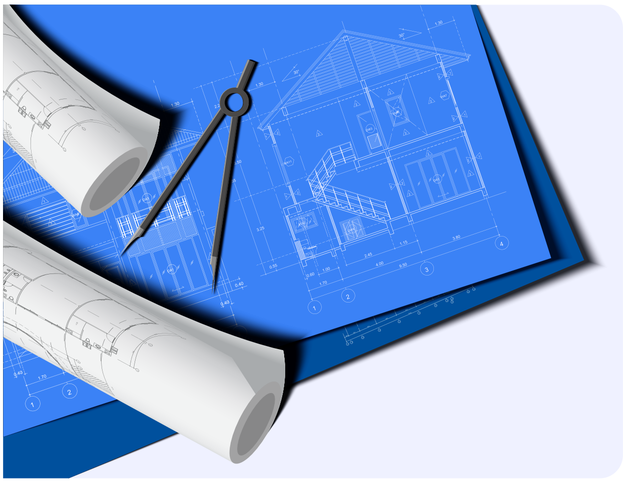
The Foundation of Data

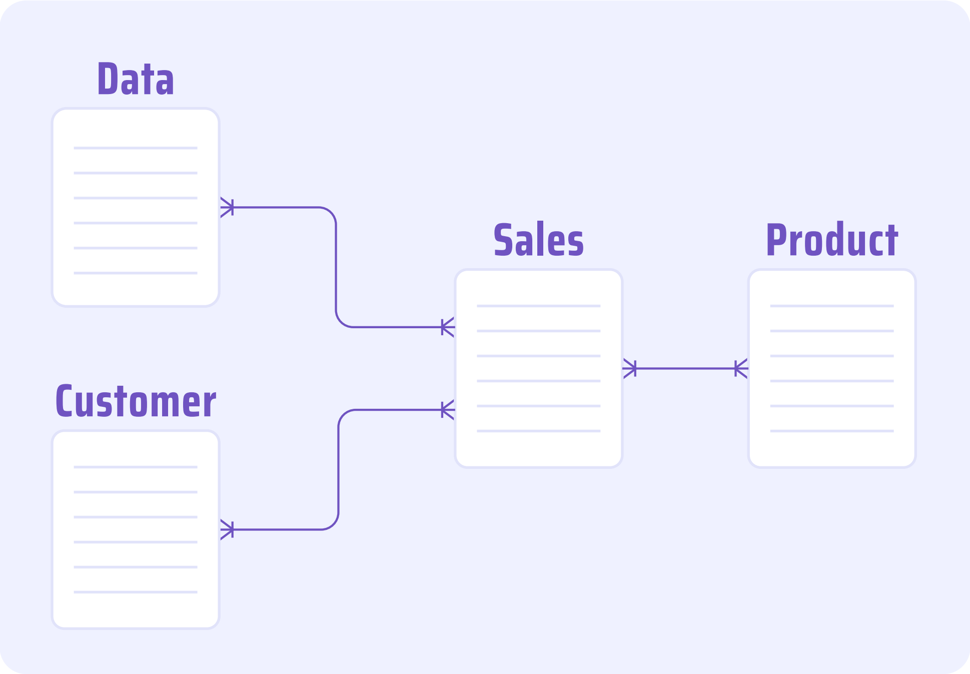


Looking at the meme above, you might understand the importance of data modeling.

Let's dive into the topic 😜

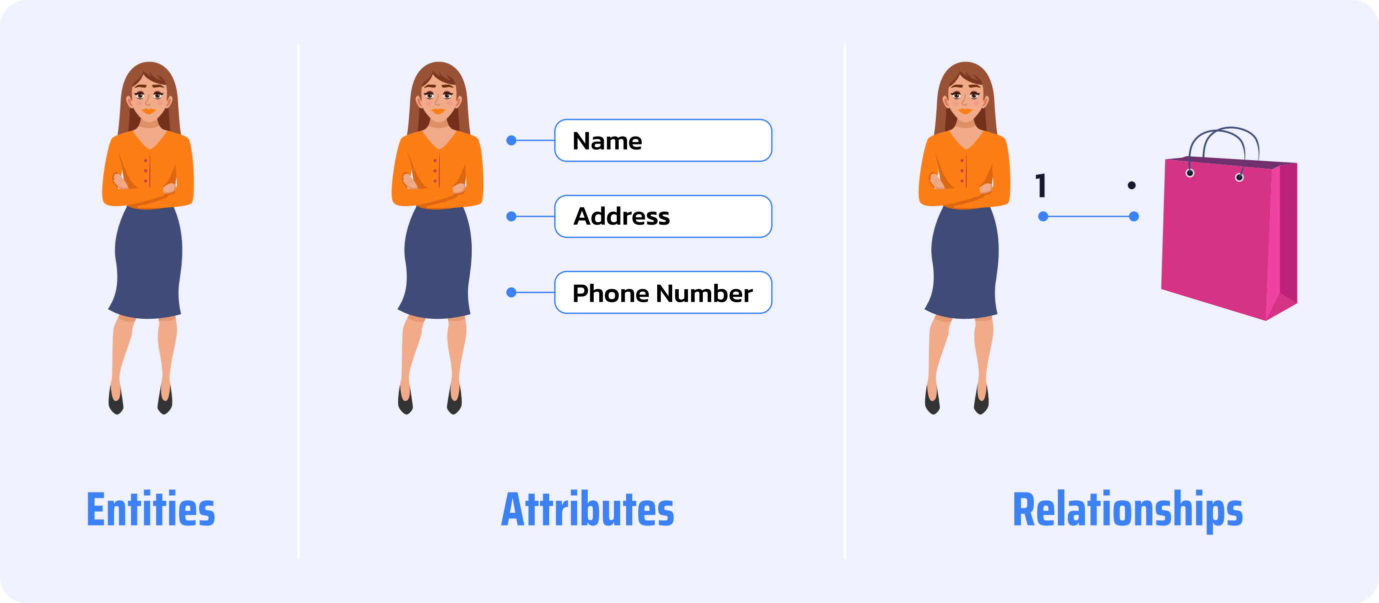
DATA MODELING:





- **Data modeling is an important step in designing and building a database.**
- Just like a blueprint visualizes the plan and details for a house, data modeling creates a visual representation of data entities and the relationships between data elements.

COMPONENTS OF DATA MODELING:



A data model consists of 3 components

Entities:

These are the main things we want to store information about. For instance, in a business, an entity could be "Customer" or "Product."

Attributes:

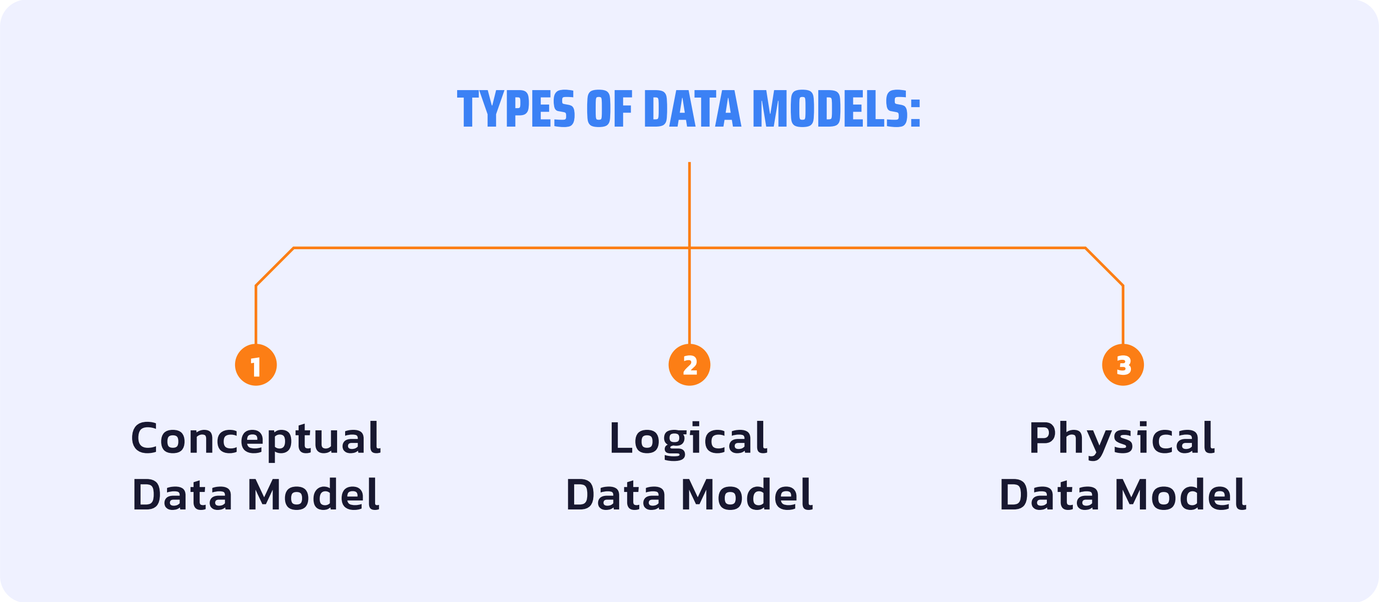
These are the specific pieces of information about an entity. For a "Customer," attributes could include name, address, and phone number.

Relationships:

These define how entities are connected or related to each other. For example, a "Customer" can have a relationship with an "Order."

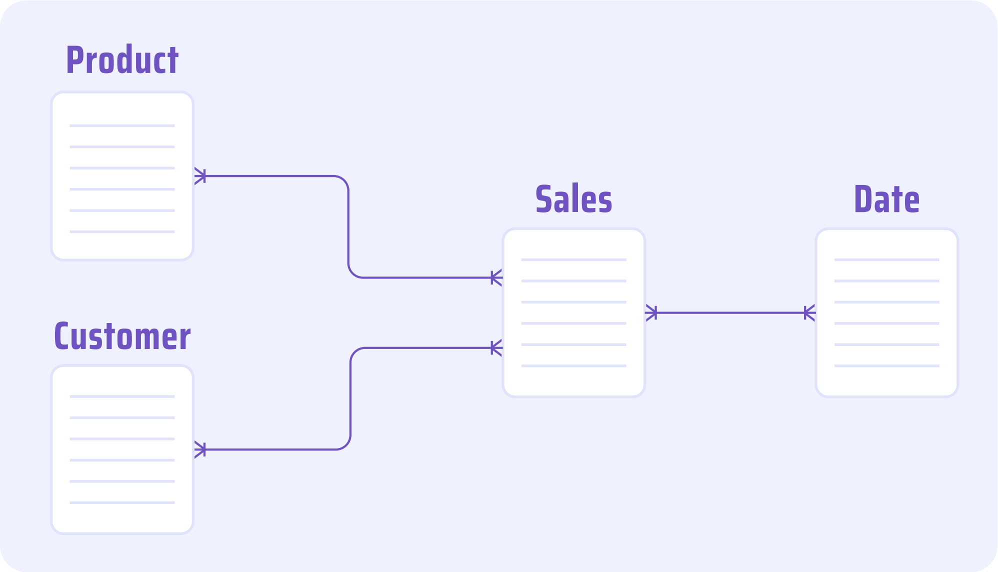
TYPES OF DATA MODELS:

There are 3 types of data models:
Conceptual Data Model, Logical Data Model, Physical Data Model



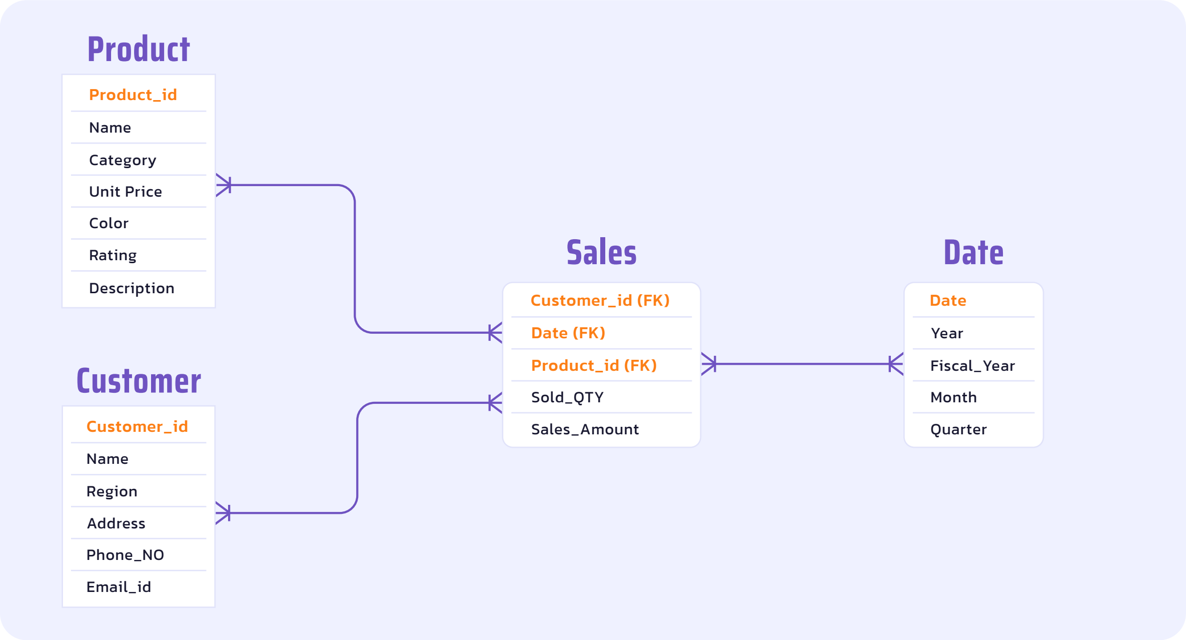
1 CONCEPTUAL DATA MODEL

A high-level view of what needs to be stored and how different entities relate to each other. It's like a bird's eye view.



2 LOGICAL DATA MODEL

More detailed than the conceptual model, specifying attributes and relationships. It's like a floor plan of a house.



Product

Product_id
Name
Category
Unit Price
Color
Rating
Description

Customer

Customer_id
Name
Region
Address
Phone_NO
Email_id

Sales

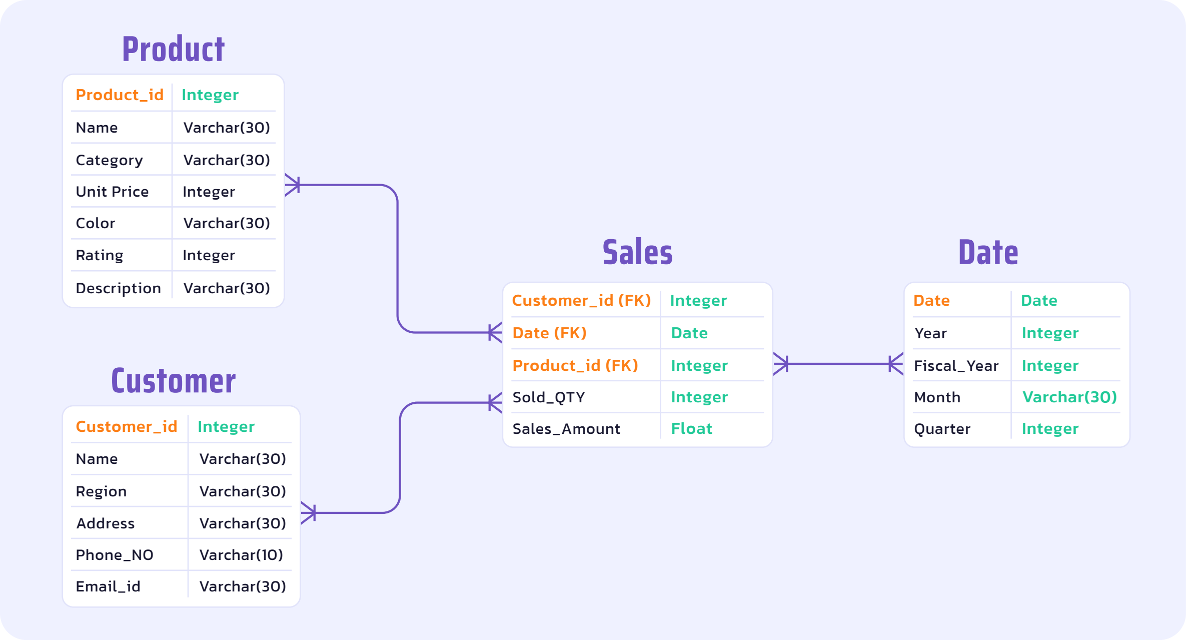
Customer_id (FK)
Date (FK)
Product_id (FK)
Sold_QTY
Sales_Amount

Date

Date
Year
Fiscal_Year
Month
Quarter

3 PHYSICAL DATA MODEL

It specifies how the data will be stored, considering database technologies and constraints. It's like the actual construction of the house.



Product

Product_id	Integer
Name	Varchar(30)
Category	Varchar(30)
Unit Price	Integer
Color	Varchar(30)
Rating	Integer
Description	Varchar(30)

Customer

Customer_id	Integer
Name	Varchar(30)
Region	Varchar(30)
Address	Varchar(30)
Phone_NO	Varchar(10)
Email_id	Varchar(30)

Sales

Customer_id (FK)	Integer
Date (FK)	Date
Product_id (FK)	Integer
Sold_QTY	Integer
Sales_Amount	Float

Date

Date	Date
Year	Integer
Fiscal_Year	Integer
Month	Varchar(30)
Quarter	Integer

TYPES OF TABLES:

Data modeling establishes a connection and flow of data between tables, typically consisting of fact tables surrounded by dimension tables, along with the relationships between these tables.

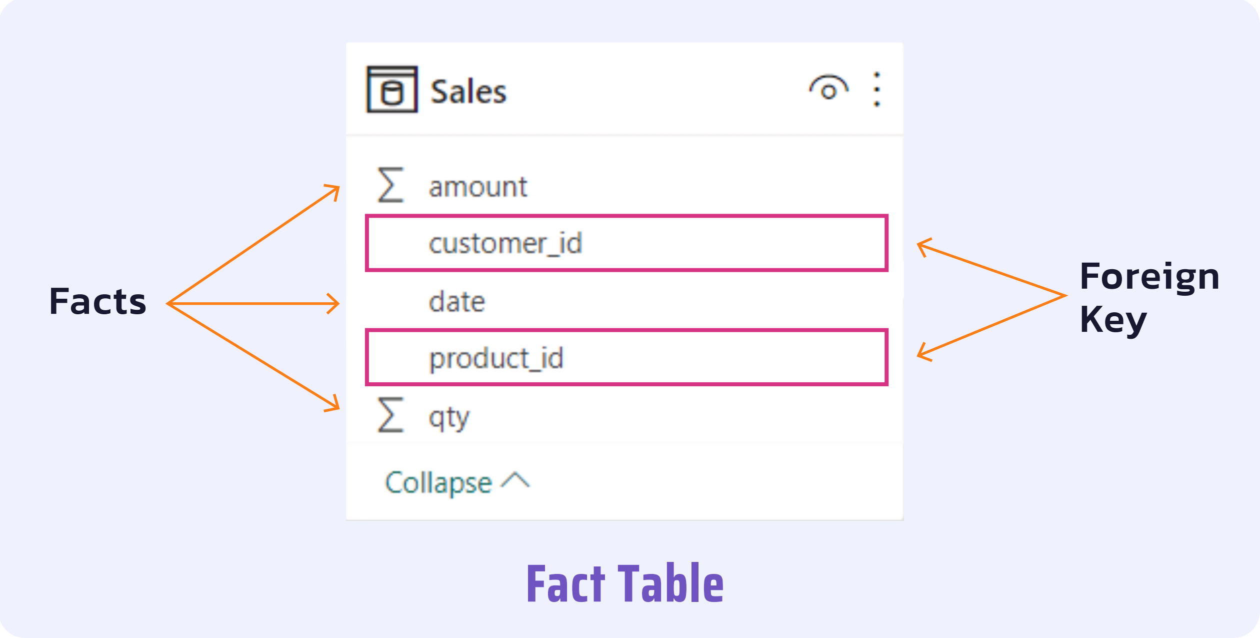
1 FACT TABLE:

A fact table contains measurements, metrics, or facts about a business process.

It generally compresses transactional data.

It has two types of columns: one representing facts of the business and another containing foreign keys to dimension tables.

Example: A Sales fact table contains data on store sales, detailing the quantity of each product sold and the revenue generated from each sale.



Fact Table

Facts: amount, date, quantity. These columns represent the business facts.

Foreign keys: customer_id, product_id. These columns contain foreign keys that link to dimension tables.

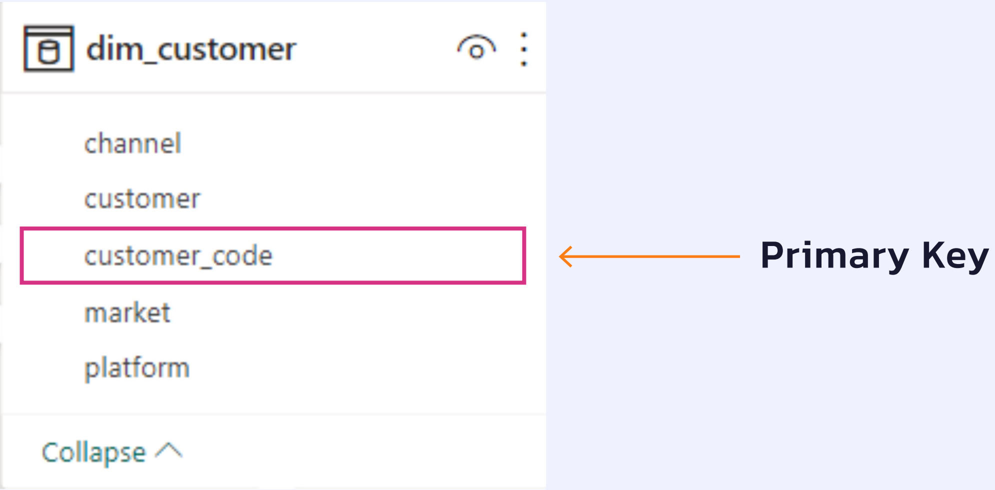
2 DIMENSION TABLE:

Fact tables are connected to dimension tables using foreign keys.

Dimension tables consist of attributes that describe the objects of a fact table.

Each dimension table includes a primary key that uniquely identifies each record and using this key dimension table associates with fact tables.

Example: A dim_Customer table stores information about the customers who made purchases.



dim_customer

channel
customer
customer_code
market
platform

Primary Key

Dimension Table

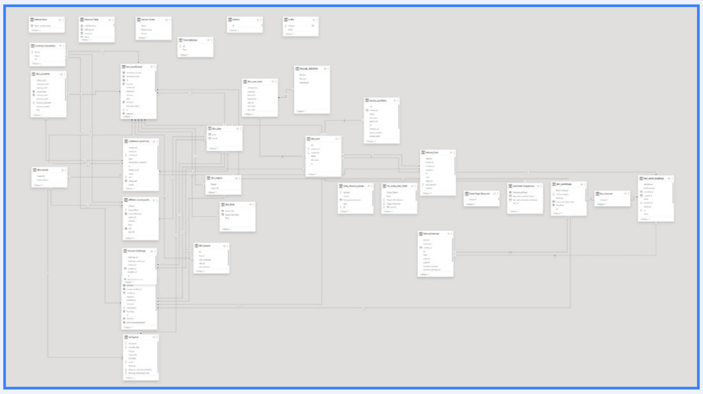
Primary Key: Customer_code.

This column contains unique, non-null values associated with records in fact tables.

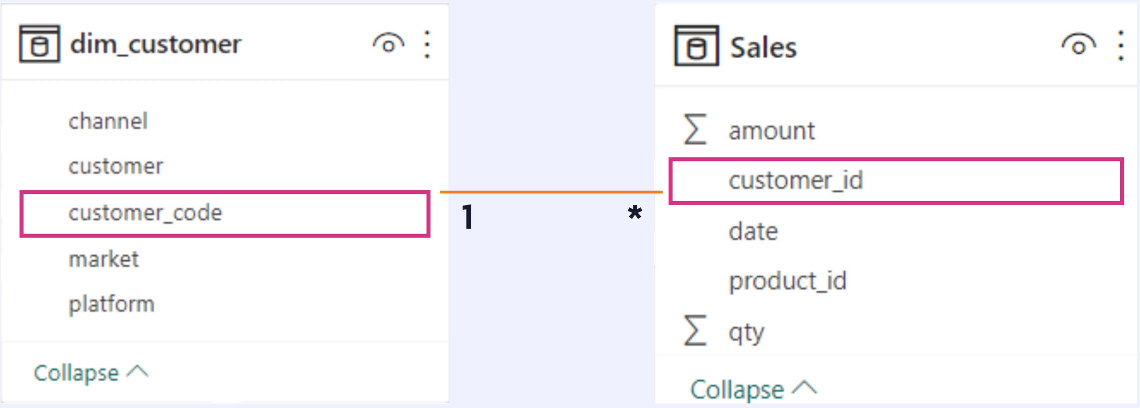
TYPES OF RELATIONSHIPS:

Only Data Analysts Can Relate

The Relationship I Want



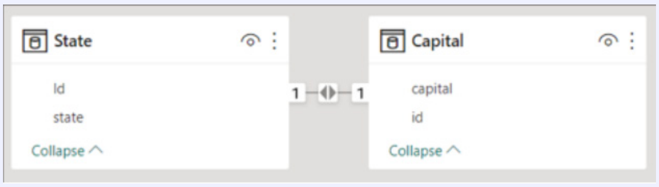
The Relationship I Get

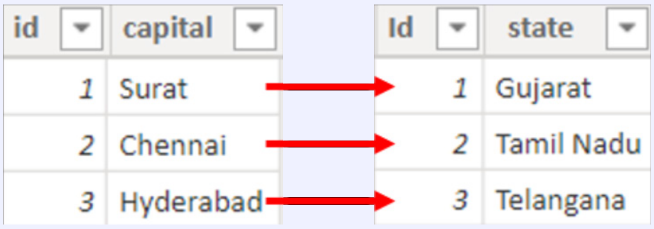


Dimension Table   **Fact Table**

- Here dim_customers is a dimension table, and Sales is a fact table
- The tables should consist of a common column attribute to make a relationship between tables.
- **There are 4 types of relationships**:
  1. One-to-One relationship
  2. One-to-Many relationship
  3. Many-to-One relationship
  4. Many-to-Many relationship

1 One-to-One Relationship:





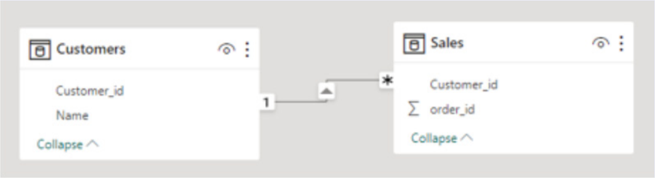
id	capital
1	Surat
2	Chennai
3	Hyderabad

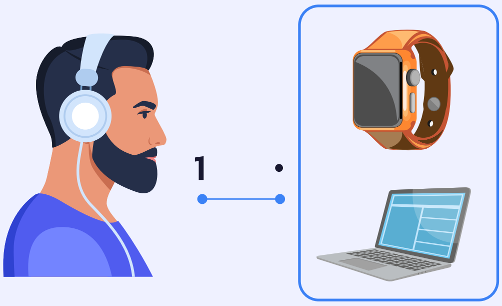
Id	state
1	Gujarat
2	Tamil Nadu
3	Telangana

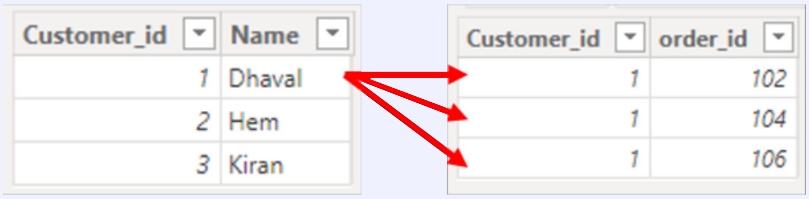
Each row in the first table is mapped to only one row in the second table.

For example, each state has only one capital.

2 One-to-Many Relationship:







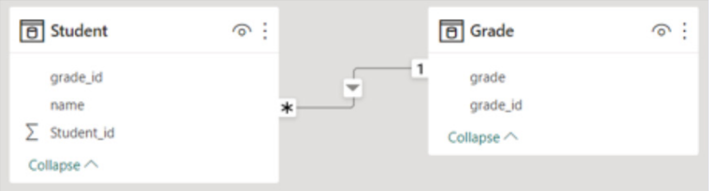
Customer_id	Name
1	Dhaval
2	Hem
3	Kiran

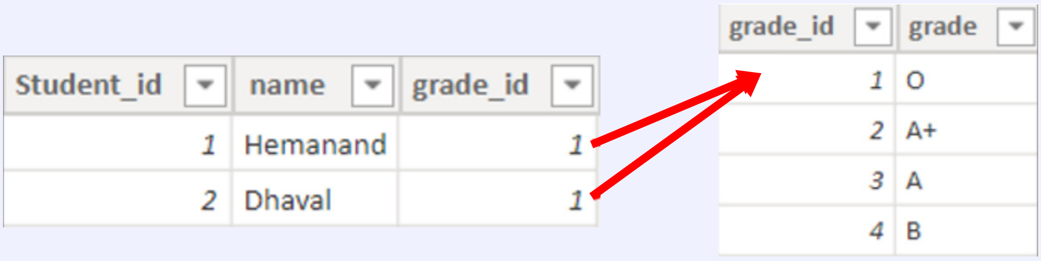
Customer_id	order_id
1	102
1	104
1	106

In a one-to-many relationship, each row in the first table can be associated with multiple rows in the second table.

For example, a customer can place several orders over time, but each order is tied to a specific customer.

3 Many-to-One Relationship:





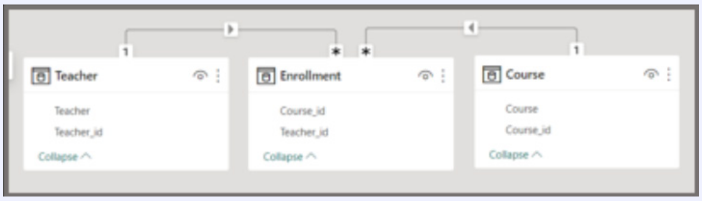
Student_id	name	grade_id
1	Hemanand	1
2	Dhaval	1

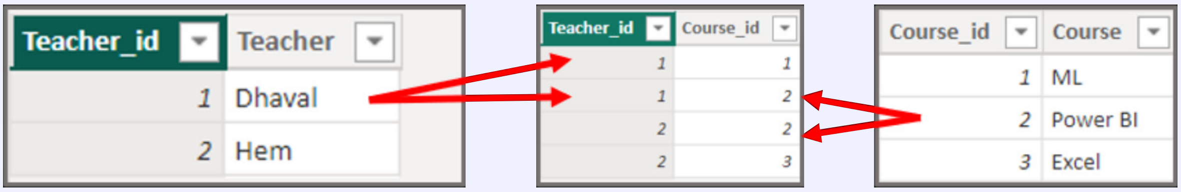
grade_id	grade
1	O
2	A+
3	A
4	B

Multiple rows in the first table are mapped to a single related row in the second table.

For instance, different students can receive the same grade.

4 Many-to-Many Relationship:





Teacher_id	Teacher
1	Dhaval
2	Hem

Teacher_id	Course_id
1	1
1	2
2	2
2	3

Course_id	Course
1	ML
2	Power BI
3	Excel

Multiple records from one table relate to multiple records from another table.

Many-to-Many Relationship:

Dhaval teaches
ML, Power BI

Power BI taught by
Dhaval and Hem

For example, more than one teacher can teach multiple courses. Dhaval teaches ML and Power BI; Power BI is taught by both Dhaval and Hem.

CODE
BASICS

Enabling Careers

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