

# DATA BASES MODELS AND MER

## DataBase Foundations

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# Outline

1 Databases Types

2 Entity-Relation Model (MER)



# Outline

1 Databases Types

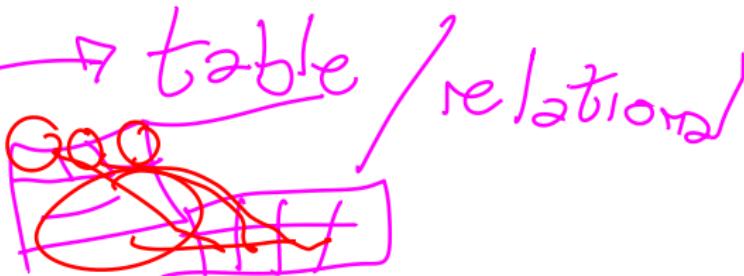
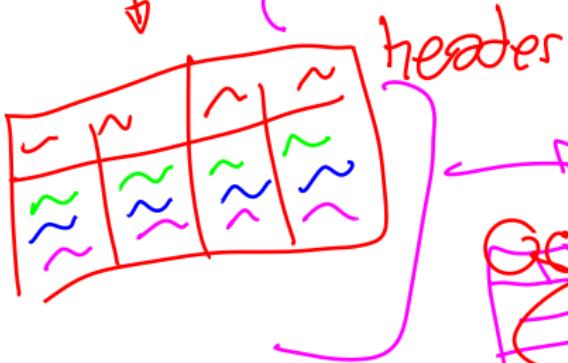
2 Entity-Relation Model (MER)



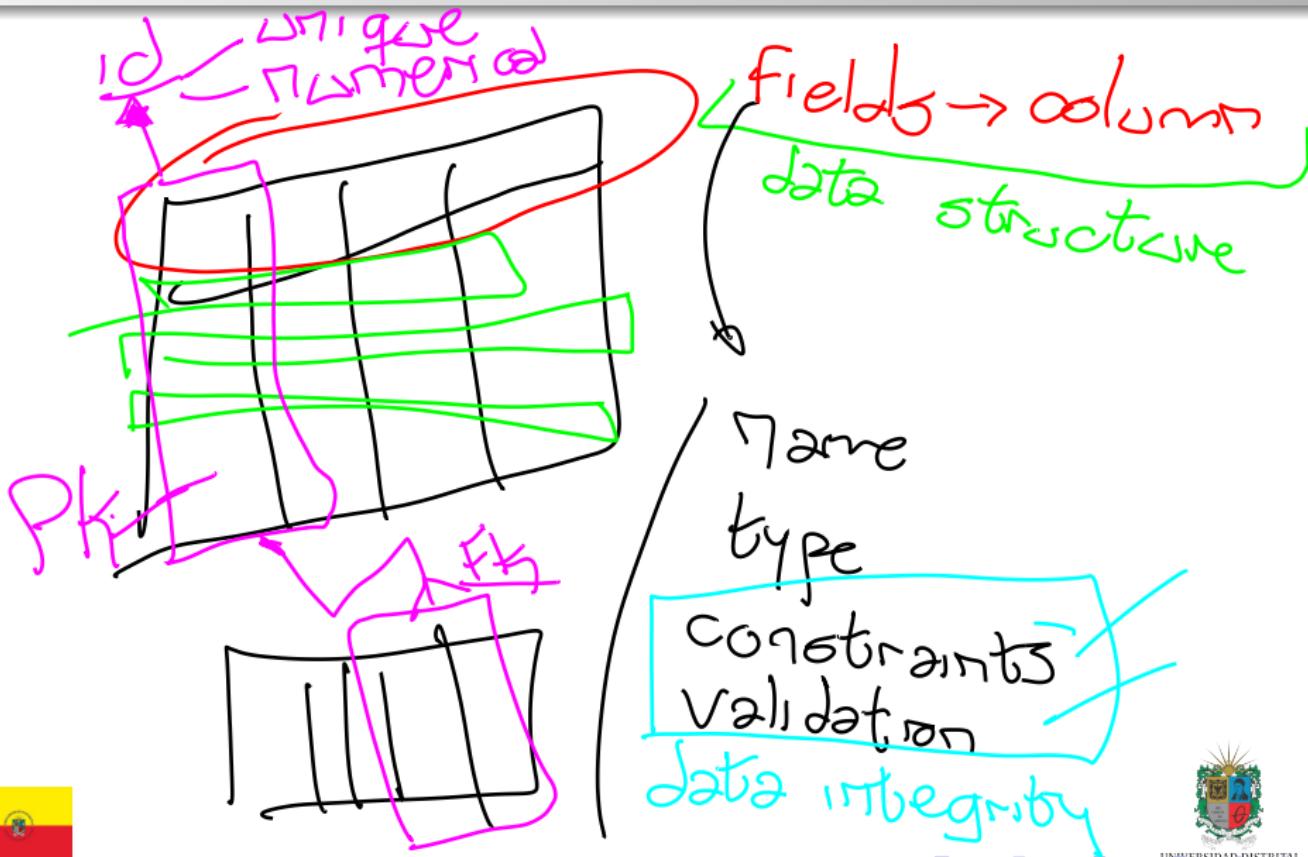
# Relational DataBases, I - Structured Data

→ all rows same format

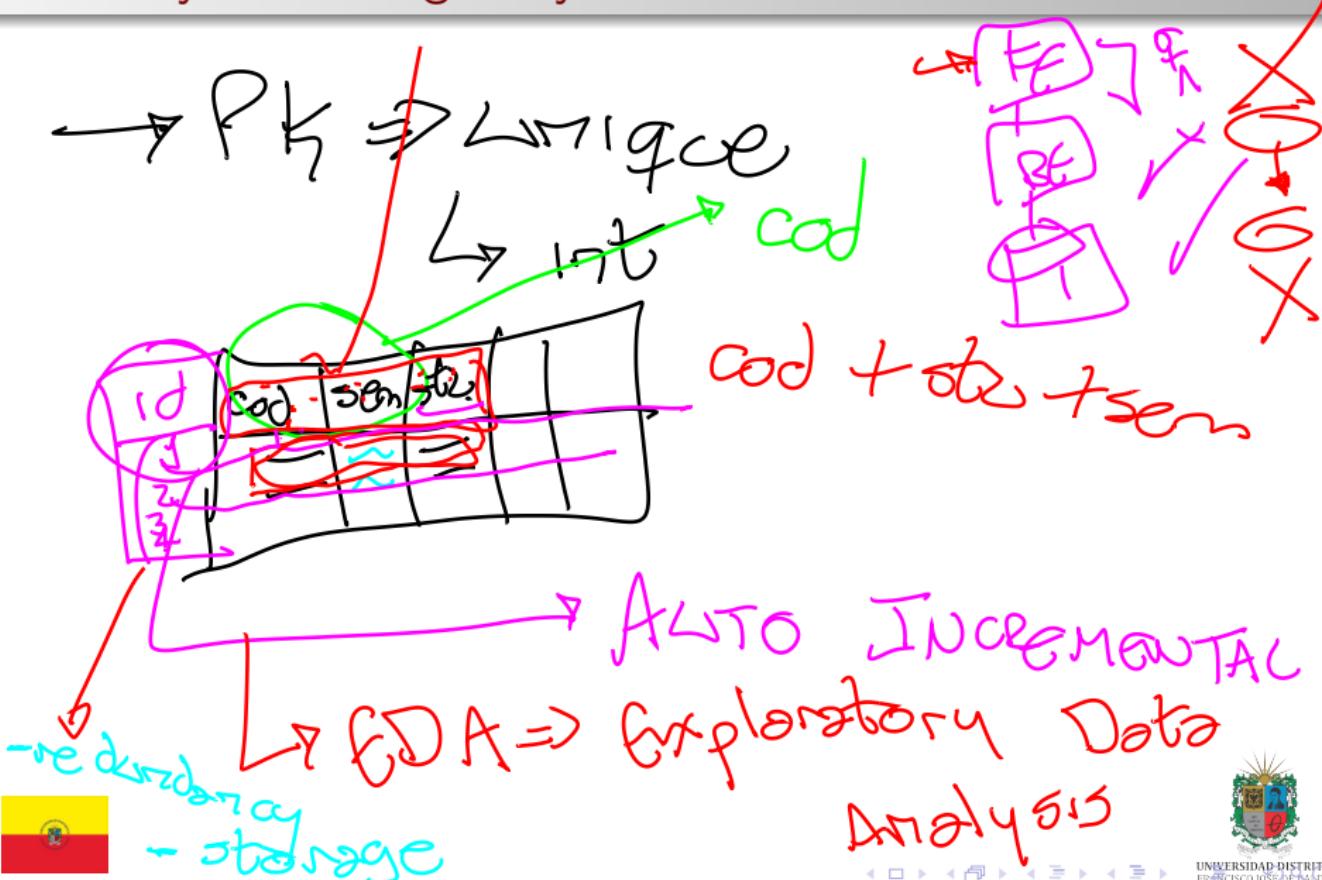
\* list      \* trees      \* hash      \* graph  
 semi-struct



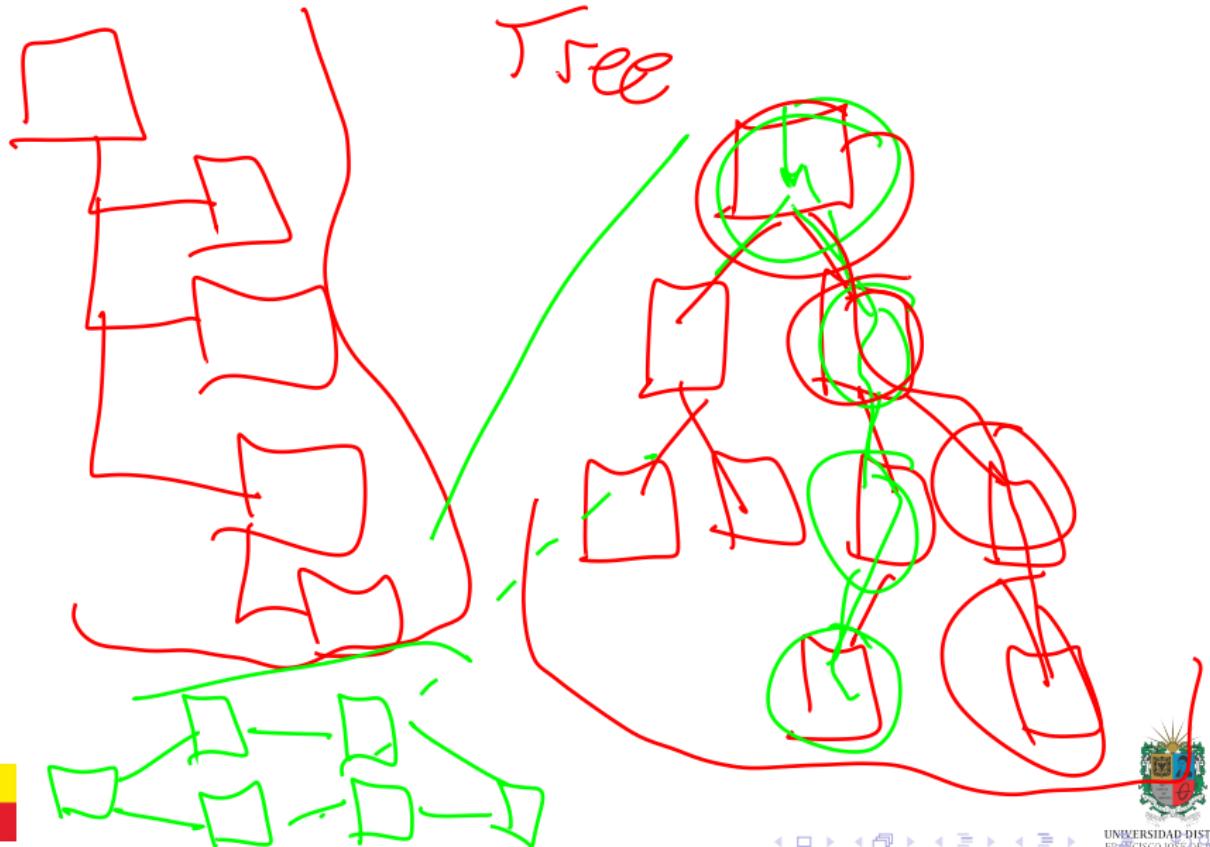
# Relational DataBases II - Tables & Keys



# Primary and Foreign Keys



# Semi-Structured Data

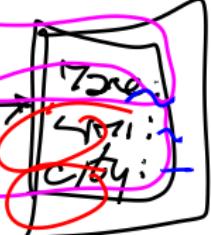


## Document-Based NoSQL

MongoDB

→ Collection

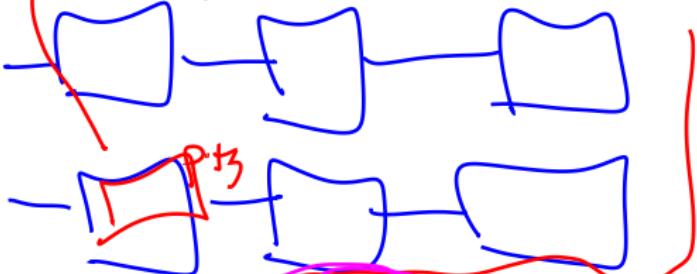
key:value



→ person

↓ → pet

↓ → cars



33 C.storage

+ redundancy

+ storage

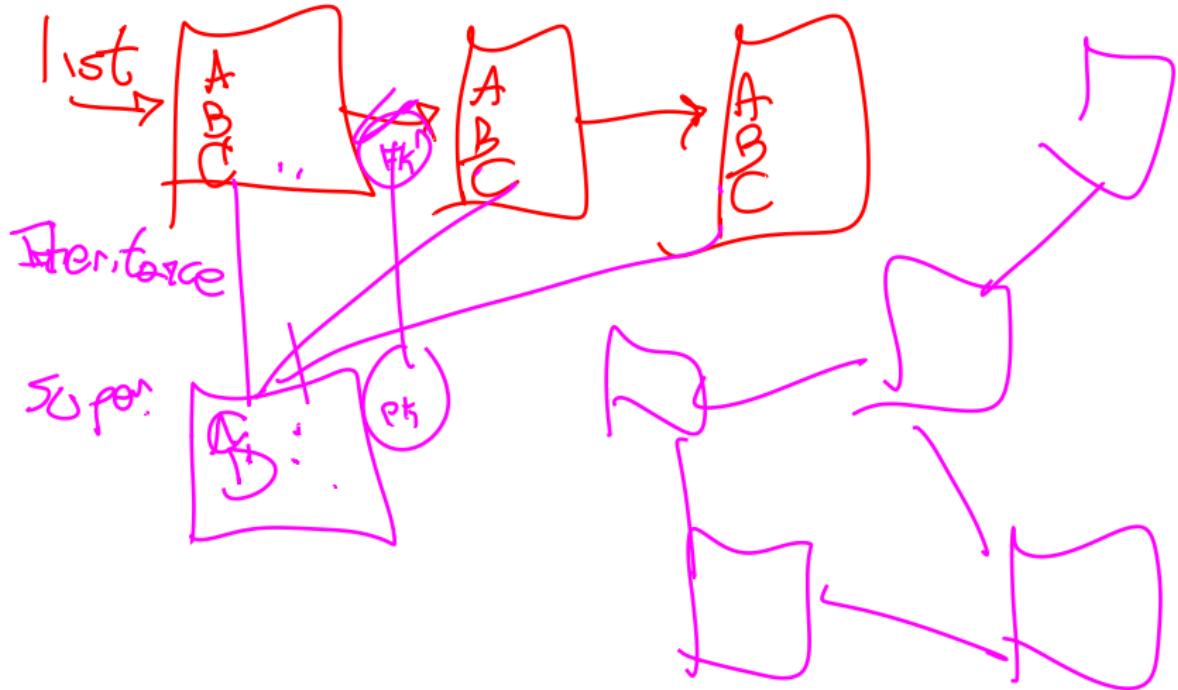
No SQL

GSI

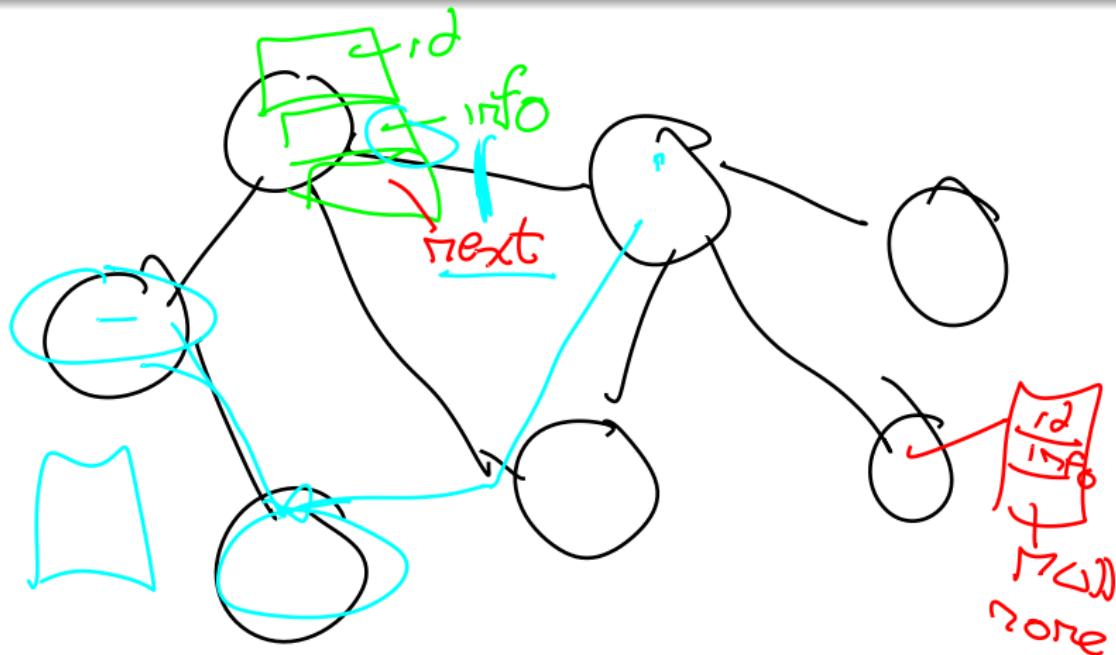
ESQL



# Object-Oriented NoSQL



# Graph-Based NoSQL



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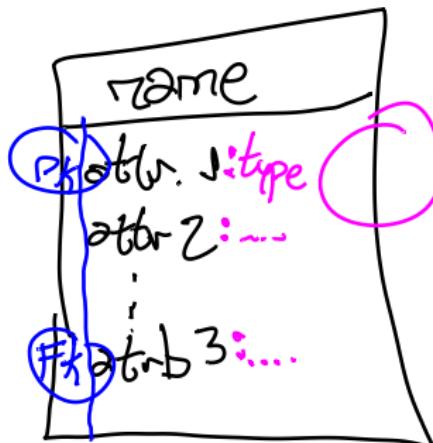
# Basic Concepts

Entity  $\Rightarrow$  Table

Relationships

Attr, better  $\Rightarrow$  columns

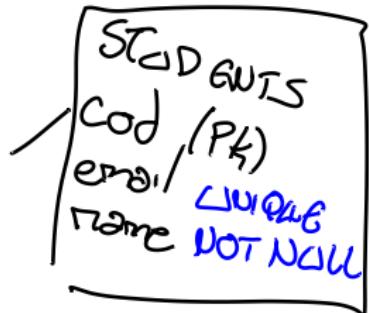
$\begin{cases} \text{1-to-1} \\ \text{1-to-many} \\ \text{many-to-many} \end{cases}$



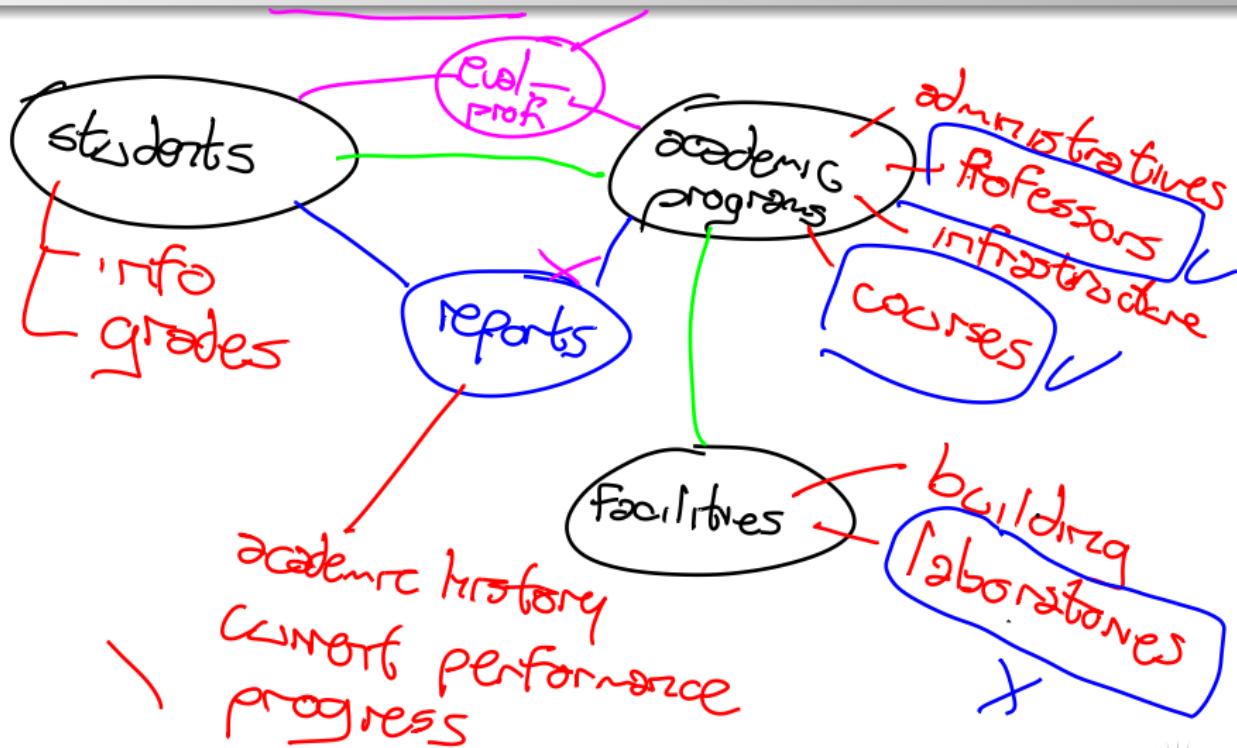
Constraints

① unique

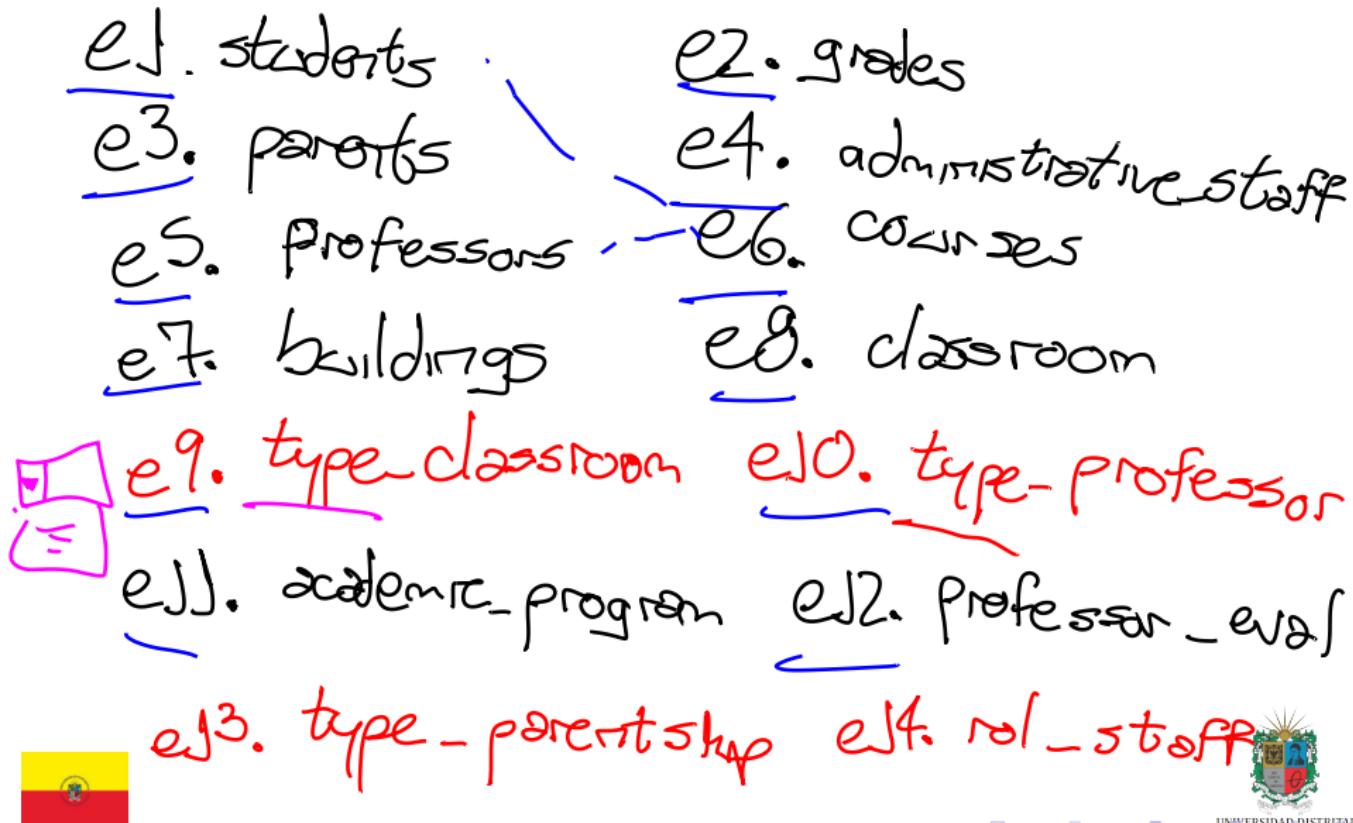
② not null  
\*mandatory



# Step 0. Define Components



# Step 1. Define Entities



## Step 2. Define Attributes per Entity

- e1.  $\Rightarrow$  cod, name, email, phone, address
- e2.  $\Rightarrow$  value, student, course, period
- e3.  $\Rightarrow$  id, name, student, type
- e4.  $\Rightarrow$  id, name, no
- e5.  $\Rightarrow$  id, name, email, academic\_program, bachelor
- e6.  $\Rightarrow$  cod, name, semester, academic\_program
- e7.  $\Rightarrow$  id, name, address, latitude, longitude
- e8.  $\Rightarrow$  number, building, type\_classroom
- e9.  $\Rightarrow$  id, name, description ] e13 e14
- e10.  $\Rightarrow$  id, name, description ] e13 e14
- e11.  $\Rightarrow$  street, name, coordinator, department



### Step 3 Define Relationships

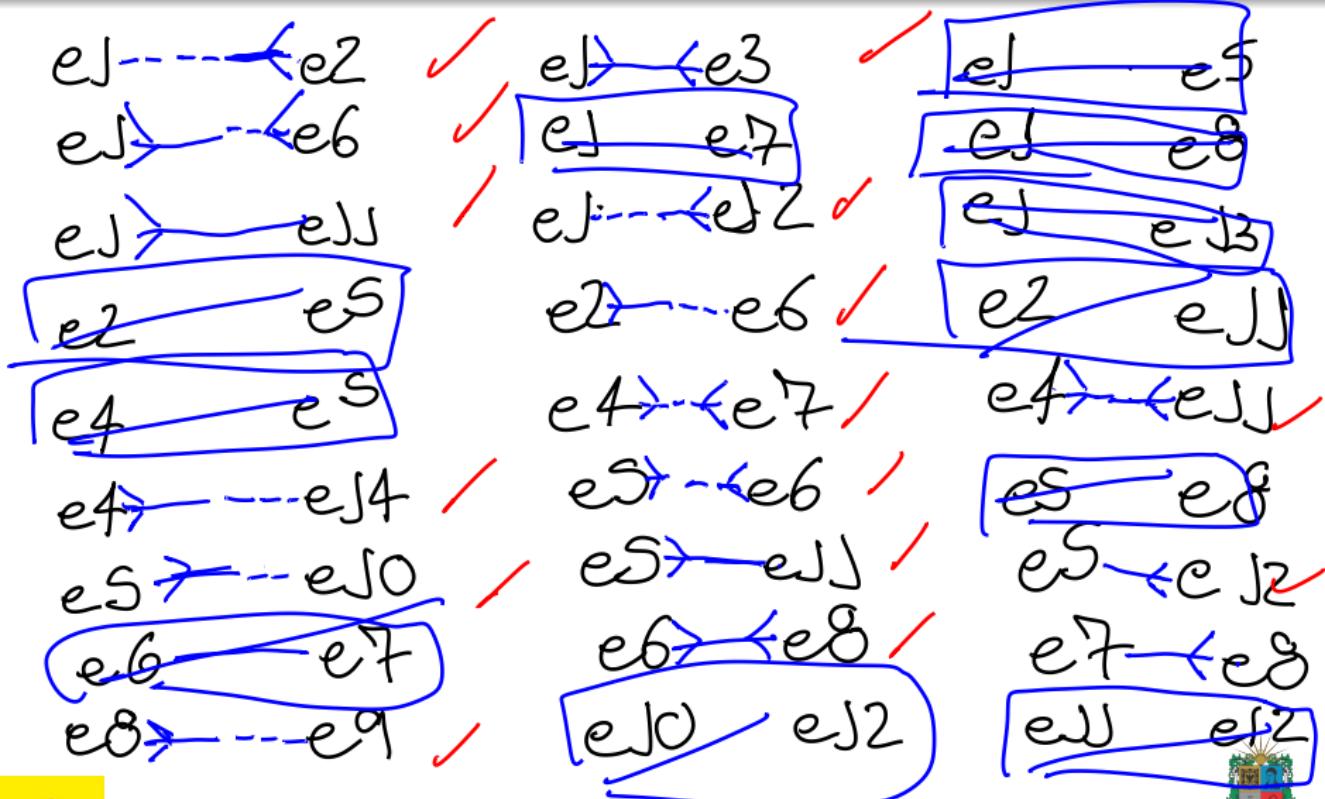
	e1	e2	c3	e4	e5	e6	e7	e8	e9	e10	e11	e12	e13	e14
e1		/	/											
e2														
e3														
e4														
e5														
e6														
e7														
e8														
e9														
e10														
e11														
e12														
e13														
e14														

Annotations on the matrix:

- Red checkmarks (/) indicate relationships between entities.
- Red X's indicate non-existent or invalid relationships.
- Blue circles highlight specific relationships: (e1, e2), (e1, e3), (e1, e4), (e1, e5), (e1, e6), (e1, e7), (e1, e8), (e1, e9), (e1, e10), (e1, e11), (e1, e12), (e1, e13), (e1, e14), (e2, e3), (e2, e4), (e2, e5), (e2, e6), (e2, e7), (e2, e8), (e2, e9), (e2, e10), (e2, e11), (e2, e12), (e2, e13), (e2, e14), (e3, e4), (e3, e5), (e3, e6), (e3, e7), (e3, e8), (e3, e9), (e3, e10), (e3, e11), (e3, e12), (e3, e13), (e3, e14), (e4, e5), (e4, e6), (e4, e7), (e4, e8), (e4, e9), (e4, e10), (e4, e11), (e4, e12), (e4, e13), (e4, e14), (e5, e6), (e5, e7), (e5, e8), (e5, e9), (e5, e10), (e5, e11), (e5, e12), (e5, e13), (e5, e14), (e6, e7), (e6, e8), (e6, e9), (e6, e10), (e6, e11), (e6, e12), (e6, e13), (e6, e14), (e7, e8), (e7, e9), (e7, e10), (e7, e11), (e7, e12), (e7, e13), (e7, e14), (e8, e9), (e8, e10), (e8, e11), (e8, e12), (e8, e13), (e8, e14), (e9, e10), (e9, e11), (e9, e12), (e9, e13), (e9, e14), (e10, e11), (e10, e12), (e10, e13), (e10, e14), (e11, e12), (e11, e13), (e11, e14), (e12, e13), (e12, e14), (e13, e14).



# Step 4 Define Relationships Types



# Step 6. First Entity-Relationship Draw



# Step 7. First Split Many-to-Many Relationships



# Step 8. Second Entity-Relationship Draw



# Step 9. Get Data-Structure E-R M



# Step 10. Define Constraints and Properties of Data



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1 Databases Types

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# Thanks!

# Questions?



Repo: [github.com/engandres/ud-public/courses/databases-foundations](https://github.com/engandres/ud-public/courses/databases-foundations)

