



Database

Relation and Keys

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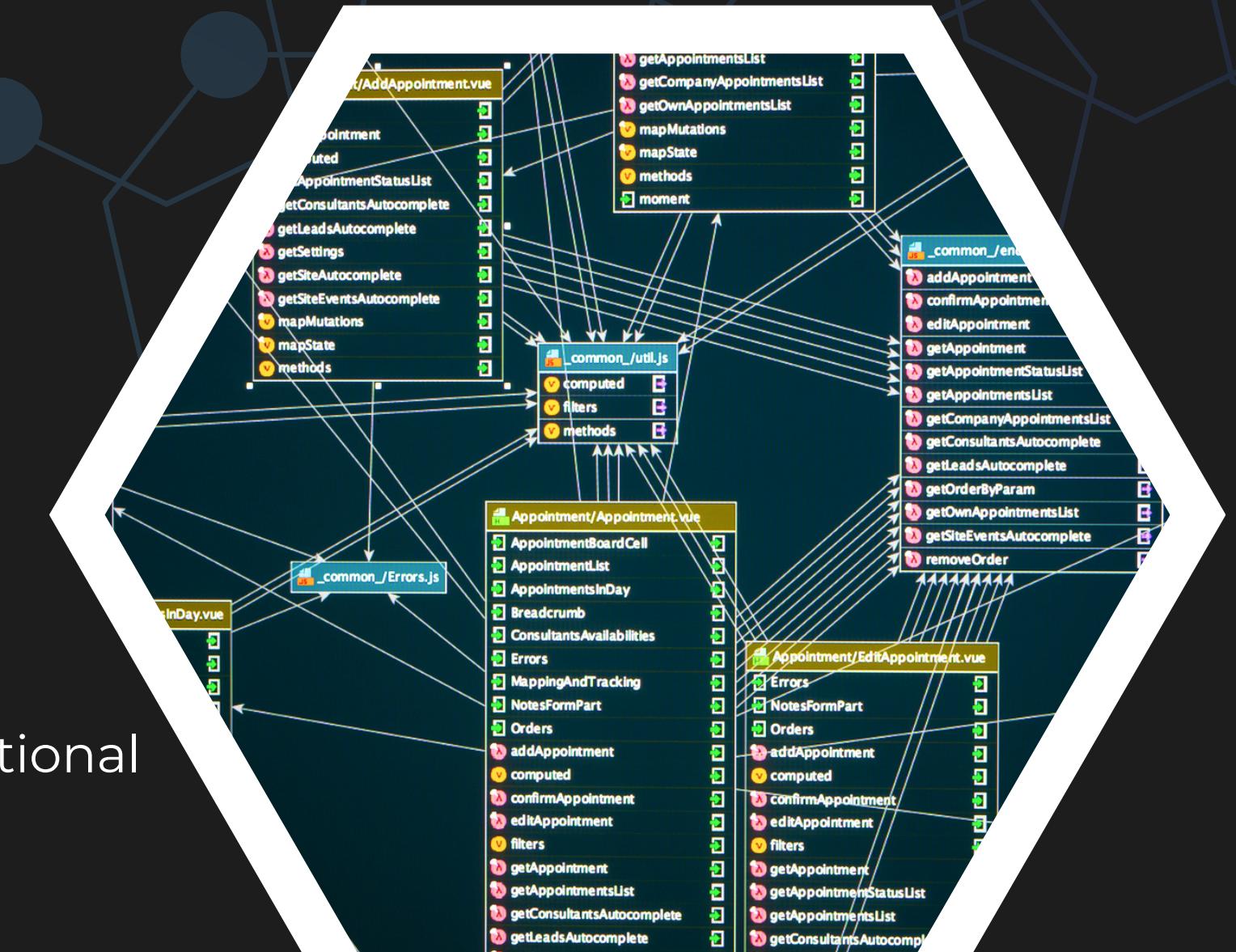
What are keys?





Relational Models

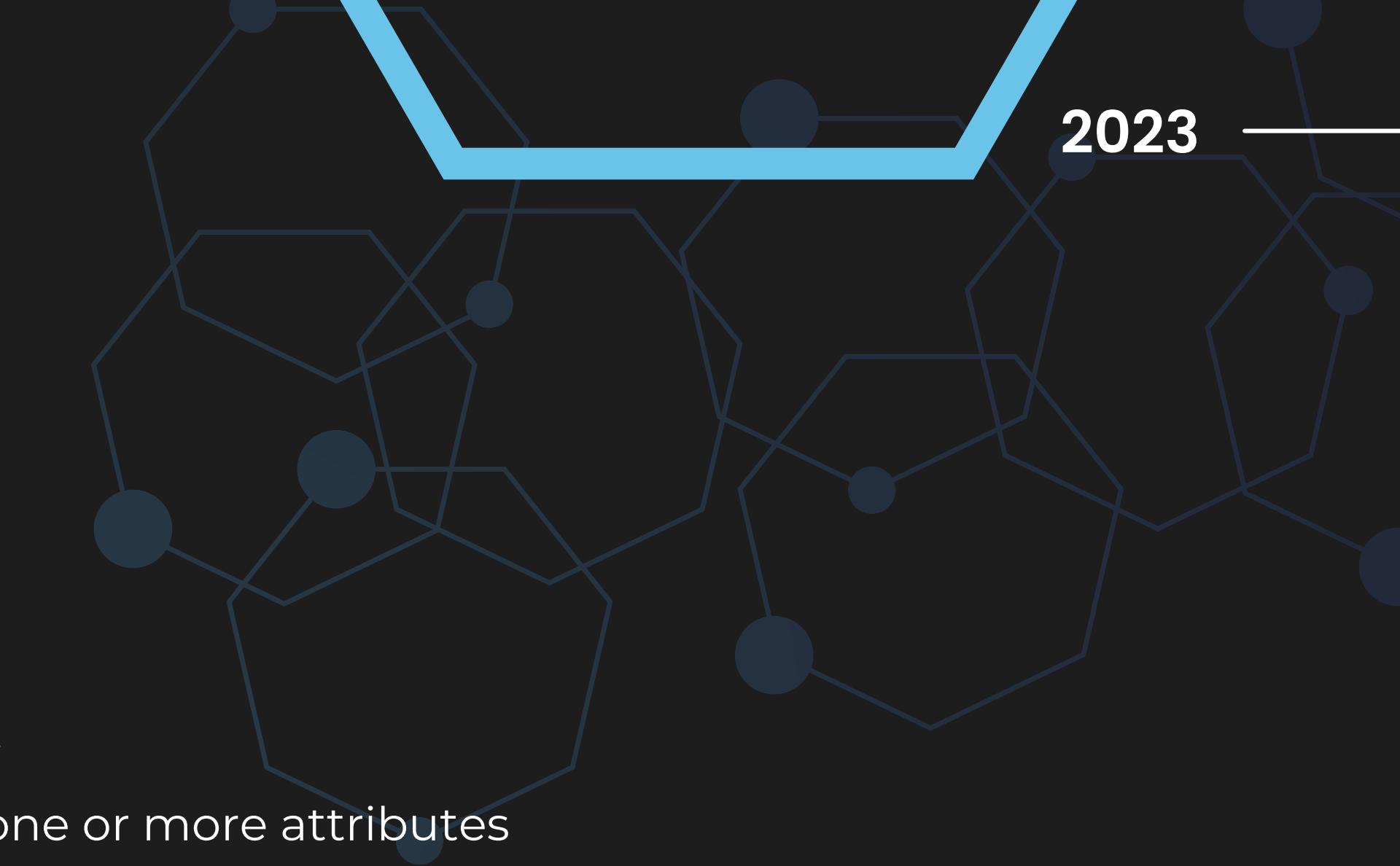
- Why are Relational Models?
 - The relational model organizes data in two-dimensional tables: columns and rows.
 - The relational model includes Relations, Tuples, Attributes, and foreign keys.
 - A set of Relational Schemas represents the relational model.





Terminologies

- A **relation** is a table with columns and rows.
 - **Attribute** is a named column of a relation.
 - **Domain** is the set of allowable values for one or more attributes
 - **Tuple** is a row of a relation
 - **Degree** is the number of attributes in a relation
 - **Cardinality** is the number of tuples in a relation
- Relational database is a collection of normalized relations with distinct relation names.





What are keys?

Relational Keys

- Superkey
 - An attribute, or a set of attributes, that uniquely identifies a tuple within a relation
- Candidate Key
 - Superkey (K) such that no proper subset is a superkey within the relation
 - In each tuple of R , values of K uniquely identify that tuple (uniqueness)
 - No proper subset of K has the uniqueness property (irreducibility)

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What are keys?

Relational Keys

- Primary Key
 - Candidate Key selected to identify tuples uniquely within the relation.
- Alternate Keys
 - Candidate keys that are not selected to be the primary key.
- Foreign Key
 - Attribute, or set of attributes, within one relation that matches candidate key of some (possibly same) relation.



Relation Examples (Stores)

StoreID	Street	City	Zip
#1506	1200 W Dillon Rd	Louisville	80027
#1546	1600 29th Street	Boulder	80301
#1524	1271 Sheridan Blvd	Broomfield	80020
#1517	7125 W 88th Ave	Westminster	80021
#1548	16420 Washington Street	Thornton	80023
#1503	10003 Grant Street	Thornton	80229
#1502	5215 Wadsworth Blvd	Arvada	8002



Relation Examples (Employee)

EmplID	FirstName	LastName	DoB	Position	Department	StoreID
#20399	John	Ford	1998/2/12	Manager	HR	#1506
#30123	Anne	Brand	2001/3/12	Intern	Marketing	#1546
#12524	David	Biden	2000/2/20	Assistant	Sale	#1524
#14517	William	Potter	2001/9/12	Senior Manager	HR	#1506
#15214	Mary	Alexander	2001/9/12	Assistant	IT	#1524
#11032	Rose	Smith	1991/1/21	intern	IT	#1503
#02012	Julie	Smith	1977/12/1	Senior Manager	IT	#1503
#78123	Angela	White	1967/4/4	Senior Manager	HR	#1546
#21342	John	Ford	1983/11/11	Manager	IT	#1546



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Relation practice

SKU	Name	VendorID	Price	Date	Quantity	Location	Description
KB320	MouseMat	V1230	13.32	01/01/2019	3000	A3	Discontinued
YZ783	MouseMat	V3002	10.00	03/01/2019	1000	A3	Discontinued
IU990	Mouse	V3333	19.00	12/01/2019	700	A1	
IU370	Mouse	V3333	15.00	01/01/2020	500	A1	
YZ783	MouseMat	V3012	9.90	05/01/2020	1000	A3	
YZ783	MouseMat	V3012	8.90	05/01/2021	1000	A3	



Practice

- Your client is an online-education company. Could you help your client record the data needed?
 - The company has more than 100 instructors, more than 400 courses, 50 online programs, and around 1 million students.
 - Instructors: instructorID, name, password, email, subject, phone, SSN, Bio, salary, rating, programID,
 - Courses: courseID, TaughtBy, language, schedule, capacity, category, credit, programName, duration, description,
 - Programs: programID, programName, ProgramInfo, duration, CourseName, Price (Free), capacity, schedule.
 - Students: programID, email, studentID, DoB, StartDate, name, progress, phone, goal, payment()