Database

Relational Schema

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Contents

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Database Relations

- Relation schema
  - Defines a relation by a set of attributes (and their domain)
- Relational database schema
  - Set of relation schemas, each with a distinct name
- General format
  - Name(Attribute1, Attribute2, ... Attributex(fk), AttributeN)
  - The attribute(s) with underline as key
  - The attribute(s) with (fk) as foreign key(s).

Relational Schema 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

- Stores(StoreID, Street, City, Zip)

Relation Examples (Employee)

Employees

EmpID	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

- Employees(EmpID, FirstName, LastName, DoB, Position, Department, StoreID(fk))

Practice

ProductDetails

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	

- ProductDetails(SKU, VendorID, Name, Price, Date, Quantity, Location, Description)

Practice

GradeBook

ID	Name	Major	Quiz1	Quiz2	Quiz3	Quiz4
001	Harry	Magic	90	90	80	100
002	Hermione	Magic	100	100	100	100
007	Ron	Magic	80	100	70	100
301	Dobby	Service	95	95	95	95
302	Severus	Education	90	90	99	100
399	Albus	Management	100	100	99	100

- GradeBook(ID, Name, Major, Quiz1, Quiz2, Quiz3, Quiz4)

Practice

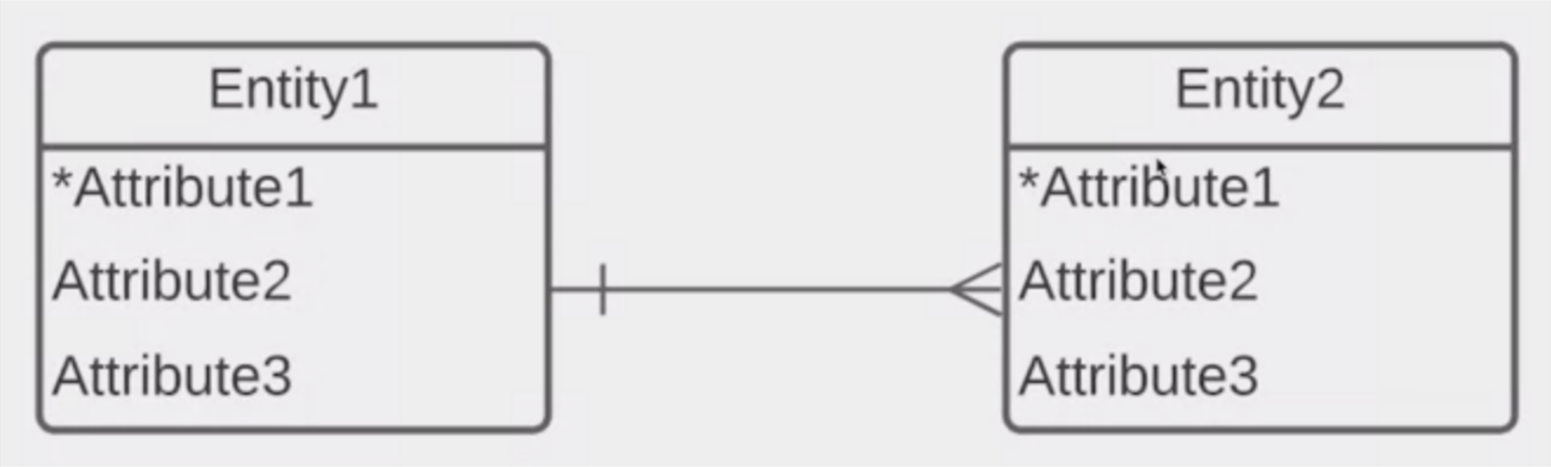
- Your client is an online-education company. Could you help your client record the data needed?
  - The company has more than 100 instructors, more than 400 courses, 50 online programs, and around 1 million students.
  - Instructors: instructorID, name, password, email, subject, phone, SSN, Bio, salary, 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()

Converting ERDs to RMs

- General steps
  - Each entity will be converted directly to a relation
  - the attributes of the Entity become the attributes of the relation
  - the identifier of the Entity become a key of the relation
  - Relationships will be mapped as foreign keys.

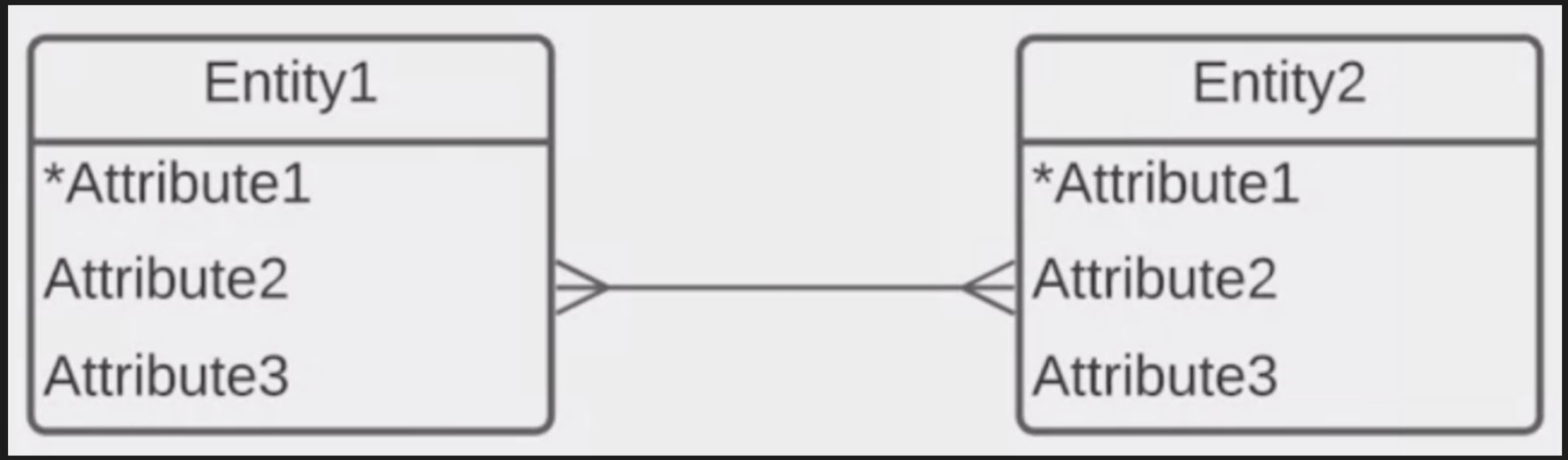
Participation will be ignored at this step, only cardinality matters.

Binary, One to Many



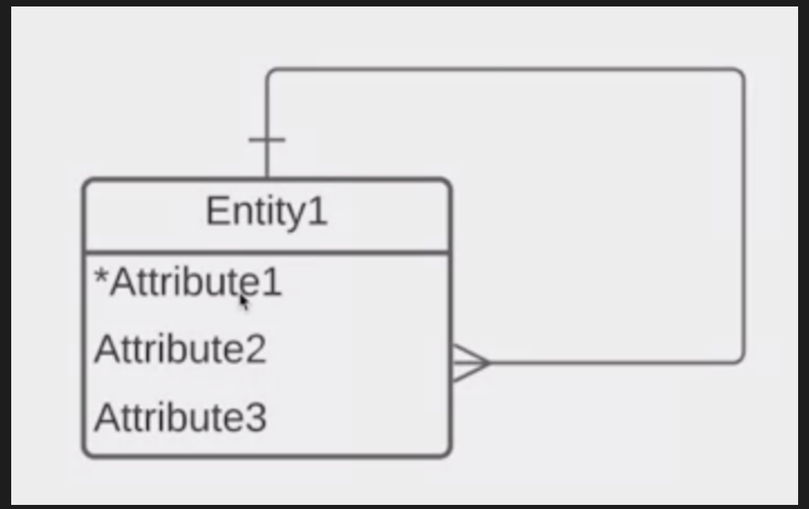
- Entity1(Attribute1, Attribute2, Attribute3)
- Entity2(Attribute1, Attribute2, Attribute3, Attribute1B(fk))

Binary, Many to Many



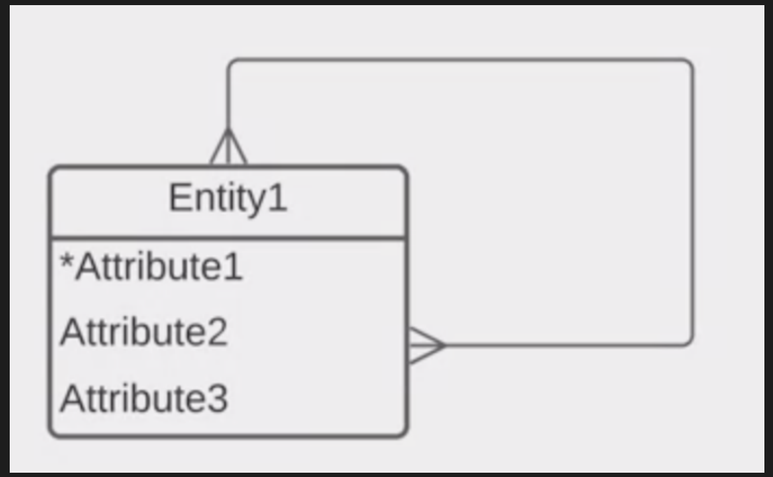
- Entity1(Attribute1, Attribute2, Attribute3)
- Entity2(Attribute1, Attribute2, Attribute3)
- Entity1_2(Attribute1A(fk), Attribute1A(fk))

Unary, One to Many



- Entity1(Attribute1, Attribute2, Attribute3, Attribute1B(fk))

Unary, Many to Many



- Entity1(Attribute1, Attribute2, Attribute3)
- Entity1_1(Attribute1A(fk), Attribute1B(fk))

One to One

- Merge
  - We can merge two entities as one, and find the primary key for the new entity.
- Not merge
  - One to one can be treat as a special case of One to many
  - If both sides are mandatory, we can choose either side as one, and choose the other side as many
  - If only one side is mandatory, we choose that side as one and the other side as many
  - if both sides are optional, we have to rethink about the primary key

More Than Binary

- if the relationship has more than 2 entities evolved, then we need to find a way to separate them to some binary/unary relationships
- We cannot handle relationship more than 2 entities evolved

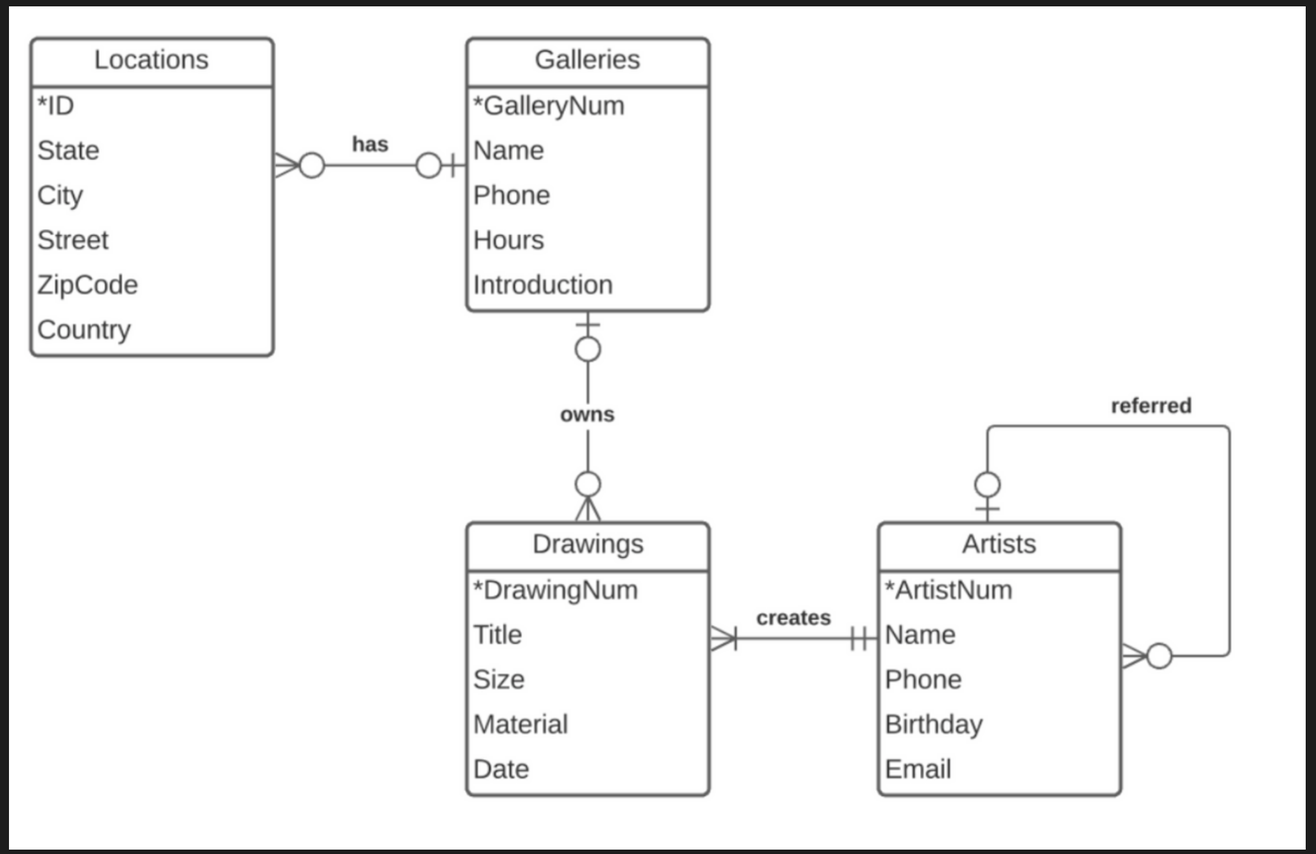
Practice

Location(ID, State, City, Street, ZipCode, Country, Gallerynum(fk))

Drawings(DrawingNums, Title, Size, Material, Date, ArtistNum(fk), GalleryNum(fk))

Artists(ArtistNum, Name, Phone, Birthday, Email, ArtistNum(fk))

Galleries(GalleryNum, Name, Phone, Hours, Introduction)



Next Lesson

01 Normalization