ACIT 1630

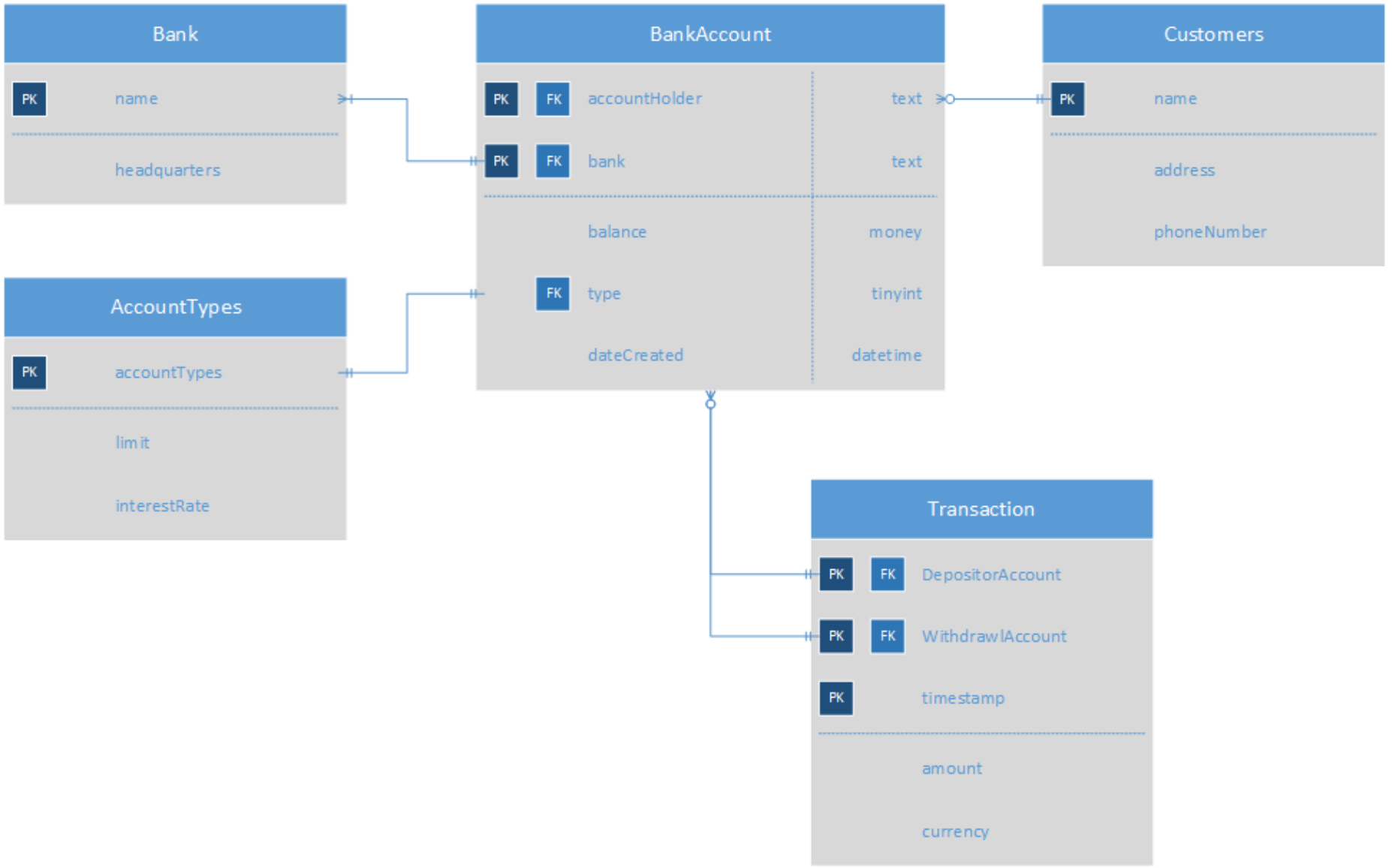
RELATIONAL DATABASE & SQL

ED SWEENEY

LESSON OBJECTIVES

- Explain the functions and characteristics of a relational model.
- Apply UML techniques of database design

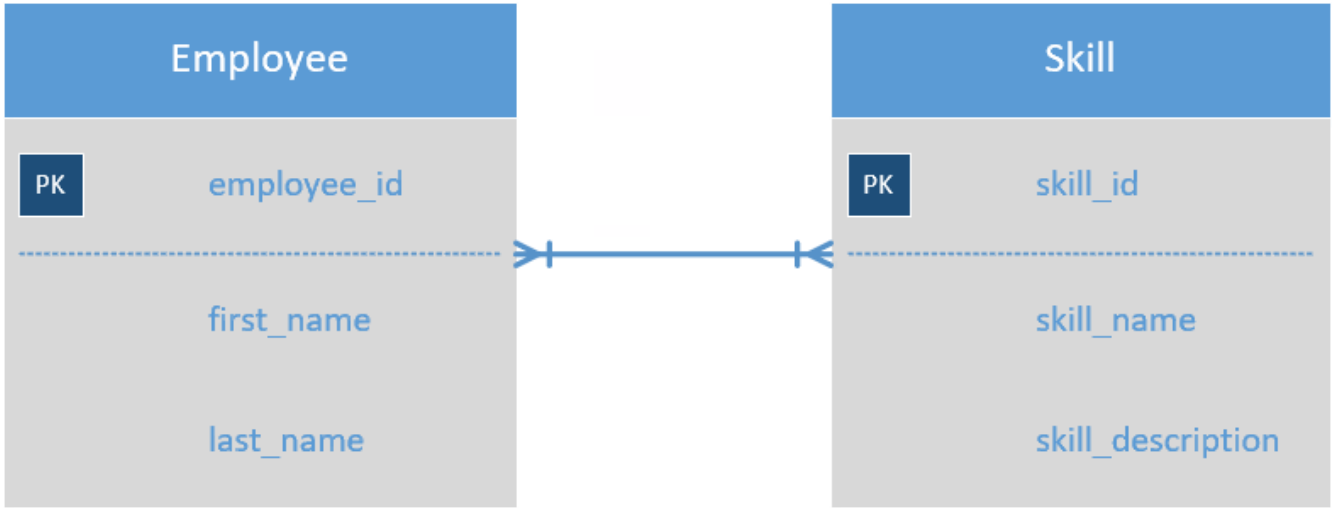
DATABASE MODEL



https://d2vlcm61l7u1fs.cloudfront.net/media%2F034%2F034700fc-0cf1-4547-aa20-90971396d240%2FphpT3NEpo.png

WHAT IS A MODEL?

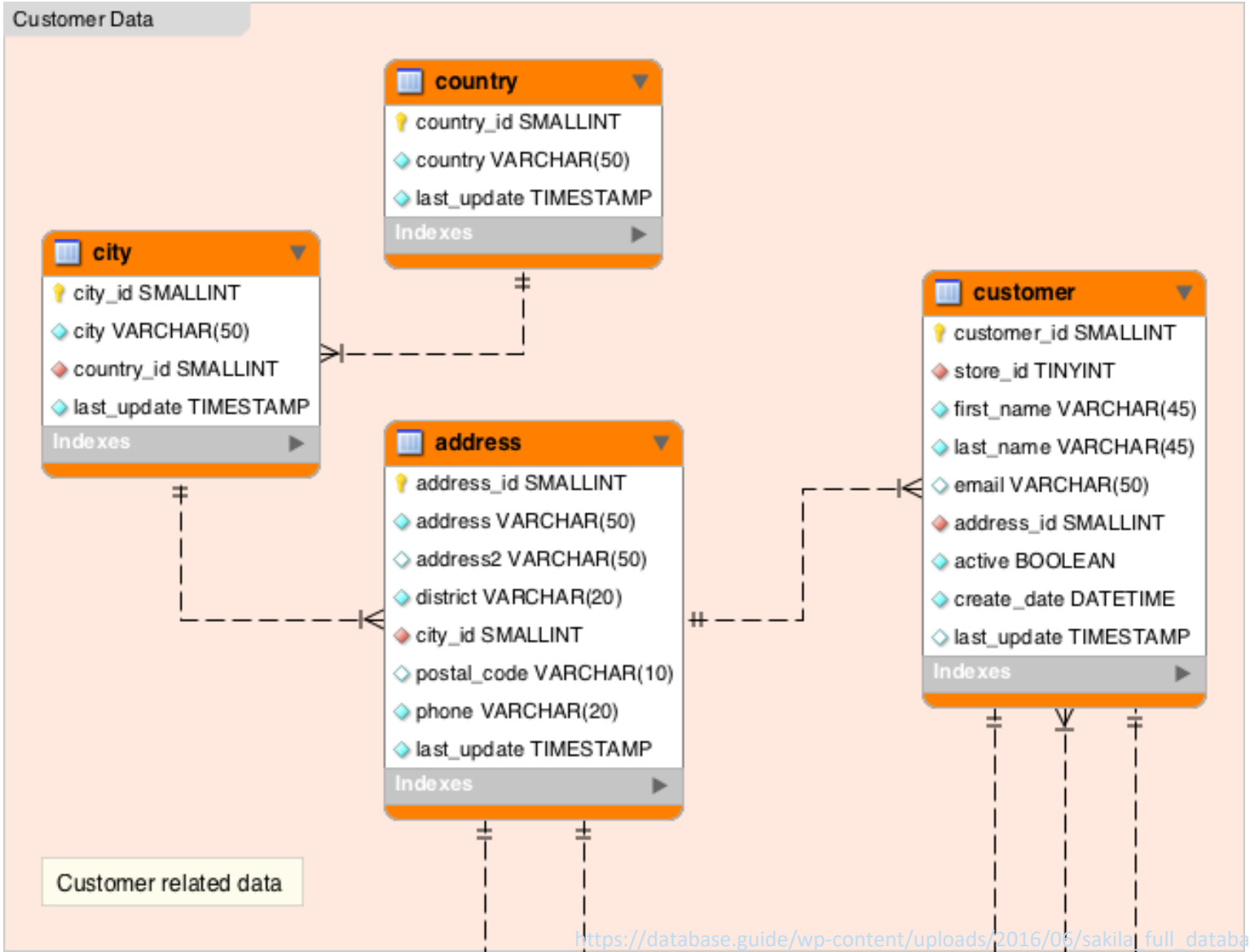
- Graphical representation of:
  - database data
  - relationships
  - contraints



WHY MODEL?

- actor
- address
- category
- city
- country
- customer
- film
- film_actor
- film_category
- film_text
- inventory
- language
- payment
- rental
- staff
- store

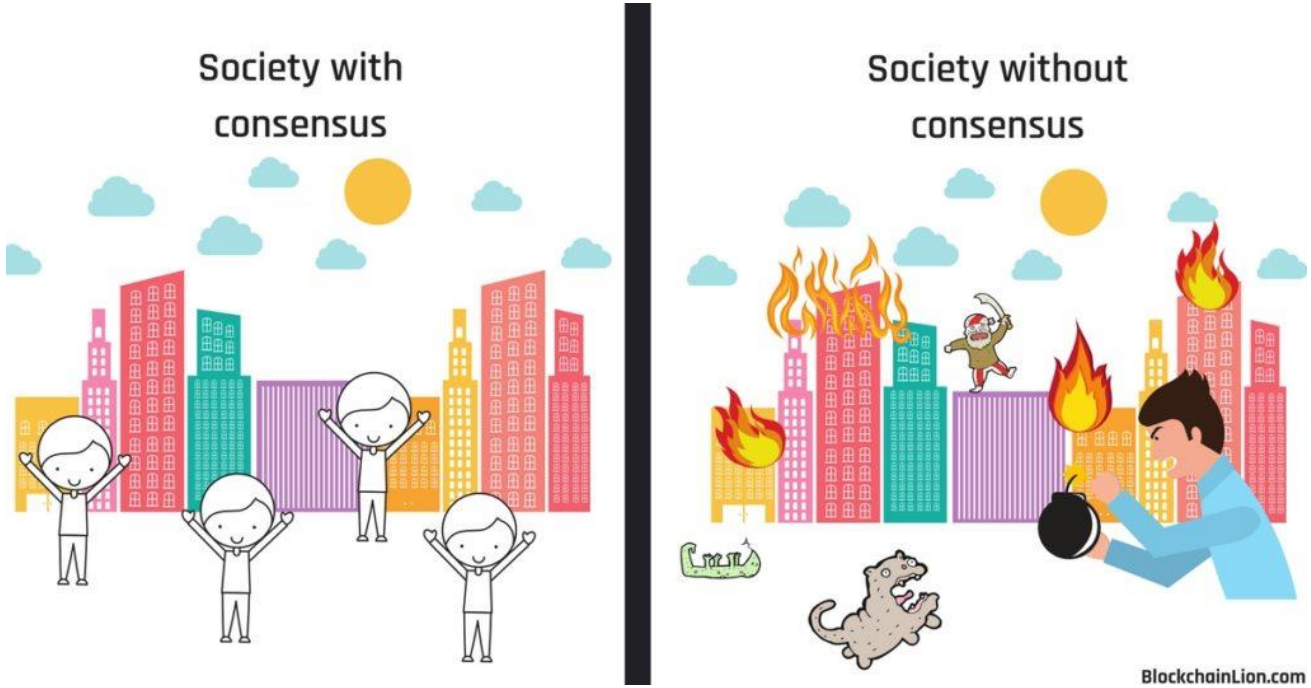
WHY MODEL?



https://database.guide/wp-content/uploads/2016/05/sakila_full_database_schema_diagram.png

WHY MODEL?

- Facilitates
  - communication
  - collaboration
  - consensus



http://blockchainlion.com/wp-content/uploads/2018/04/blockchainlion-images-1-1024x536.jpg

WHAT IS IN A MODEL?

- Description of data structure to store data
- Enforceable rules (constraints) to maintain data integrity
- Support for data transformations

ENTITY RELATIONSHIP DIAGRAM (ERD)

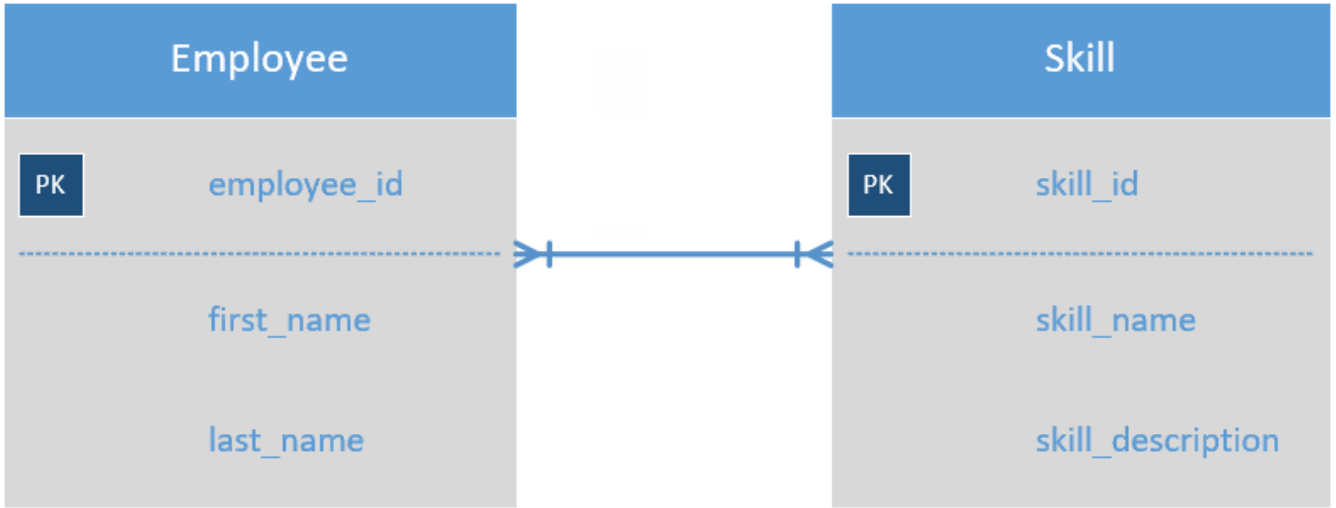
- Entity (Table)
  - Data for a Person, Place, Thing
  - Noun
  - Attributes (Column Fields in Table)
    - Characteristics about our Entity
    - Help make our Entity Unique

https://icameforthesoup.files.wordpress.com/2014/07/person-place-thing.jpg

ENTITY RELATIONSHIP DIAGRAM (ERD)

- Relationship (Keys on Table)
  - Link or association between entities
  - Verbs

- One-to-One
- One-to-Many
- Many-to-Many



https://s3.amazonaws.com/tjn-blog-images/wp-content/uploads/2016/07/20003911/manage-work-relationship-810x540.jpg

RELATIONSHIPS

- One-to-One
  - Rarely used
- One-to-Many
  - Most Common
- Many-to-Many
  - Cannot be implemented
  - Use instead: 2 - One-to-Many relationships

ENTITY RELATIONSHIP DIAGRAM (ERD)

- Constraints
  - Rules to keep values in expected range
    - Age >= 18
    - Start_date before End_date
    - Grade >= 0% and <=100%
    - Values are unique

https://cdn2.iconfinder.com/data/icons/airport-set-2/512/45-512.png

NULLS

- Nulls
  - Option to leave a field (attribute) empty or blank
  - Unknown value. ex: grade in an unfinished course, death_date
  - Knowable but missing value. ex: optional address information
  - Not applicable.

PRIMARY KEY

- Primary Key
  - Must be Unique
  - Cannot be NULL
  - Should not change
  - Often autogenerated

  - Uniquely identifies the row

PRIMARY KEY

- Could be:
  - Single attribute
  - Multiple attributes combined
    - Composite key
- Must:
  - Uniquely identify the row

PRIMARY KEY

- Exercise

- Bad or missing primary key.

FOREIGN KEY

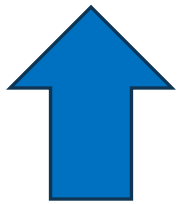
- Foreign Key
  - Enforceable Relationship between Tables
  - Matches a corresponding Primary Key in the other Table
  - Sometimes allowed to be Null (if relationship is optional)

PRIMARY KEY

person_id	first_name	last_name
1	Katie	Sylvia
2	Penny	Superbark
3	Fix-it	Felix
4	Gru	Despicable

FOREIGN KEY

pet_id	name	type	person_id	first_name
1	Max	Dog	1	Katie
2	Duke	Dog	1	Katie
3	Bolt	Dog	2	Penny
4	Mittens	Cat	2	Penny
5	Rhino	Hamster	2	Penny
6	Kyle	Dog?	4	Gru



FOREIGN KEY

- **Pet Type** could also be another Table (Entity)
  - Removes redundancy of multiple “Dogs”
  - What if we don’t know the pet type?
    Ex: Gru’s ‘Dog’ Kyle

https://vignette.wikia.nocookie.net/despicableme/images/3/3c/Kylewhite.png/revision/latest/scale-to-width-down/250?cb=20170711185130

FOREIGN KEY

- We could leave the Pet Type NULL

pet_id	name	pet_type_id
1	Max	1
2	Duke	1
3	Bolt	1
4	Mittens	2
5	Rhino	3
6	Kyle	NULL

pet_type_id	type
1	Dog
2	Cat
3	Hamster

FOREIGN KEY

- We could create a dummy row – called a flag

pet_id	name	pet_type_id
1	Max	1
2	Duke	1
3	Bolt	1
4	Mittens	2
5	Rhino	3
6	Kyle	4

pet_type_id	type
1	Dog
2	Cat
3	Hamster
4	Unknown

LAB

- D2L: learn.bcit.ca
- ERDs in Draw.io
- Explore MySQL Data Types
- Primary and Foreign Keys

- Submit required screenshots

- Complete by Thursday 11:30PM

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