Relational Database

Thursday, June 22, 2023 9:04 AM

Data Modeling

- Creates representation of tables
- Relationship btw tabels
- Easy to understand

- **Conceptual Model**
  - Abstract View of data
  - Abstract Relationships

- **Logical Model**
  - Includes Attributes
  - type of Relationship (1:1, 1:M, M N)
  - PK + FK

Student	
ID	Integer
Name	string
DOB	:
Address	:

- **Physical Model**
  - Create Database
  - Assign Data Types

Entity

- Table
  - STRONG - has PK, doesn't rely on other entities
  - Weak - has FK, relies on other entites

Attributes

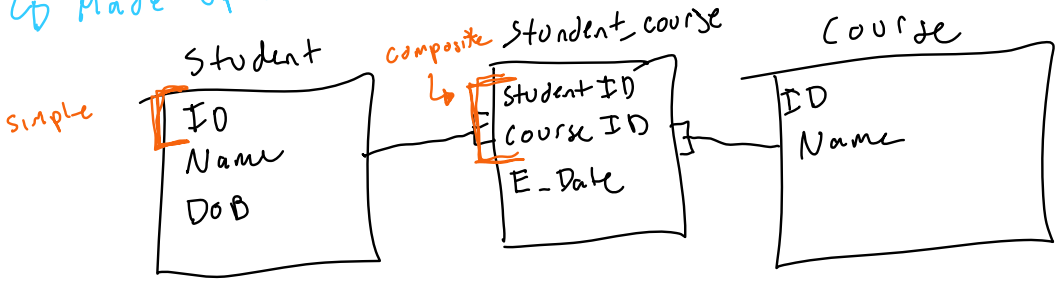
- Columns
- Describes properties of an entity

Candidate Keys

- Uniquely identify a row in a table
- a set of 1 or more columns

↳ Uniquely identify a row in a table
↳ Can be a set of 1 or more columns

- Simple
  ↳ A PK made up of a single column
  ↳ EmployeeID
- Composite
  ↳ Made up of multiple columns



Surrogate Keys

↳ A PK that is auto-incremented

Primary Key

↳ Uniquely identifies a row
↳ A candidate key

Foreign Keys

↳ A column used to link two tables together

Relationships

1 to 1

- A single table A relates to a single table B, vice versa
- Used to create a critical relationship

People

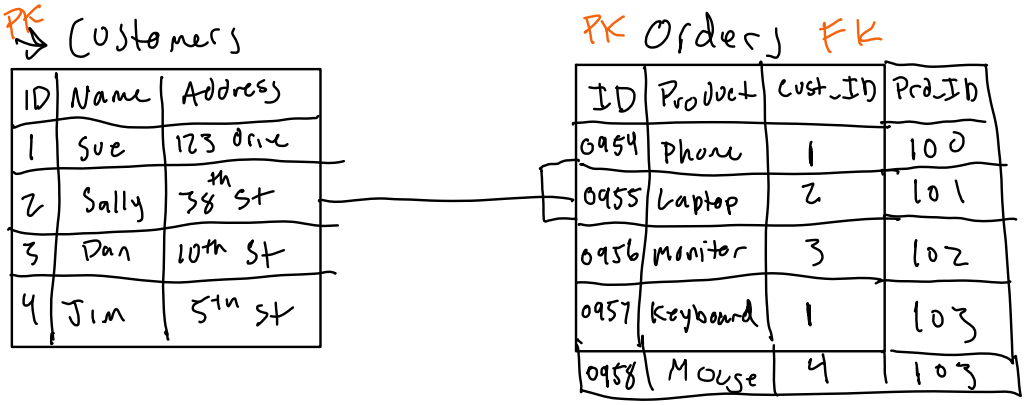
ID	Name
1	Bob
2	Sally
3	Jane

Drivers Licenses

ID	Number
100	3486B
102	36898
103	4661C

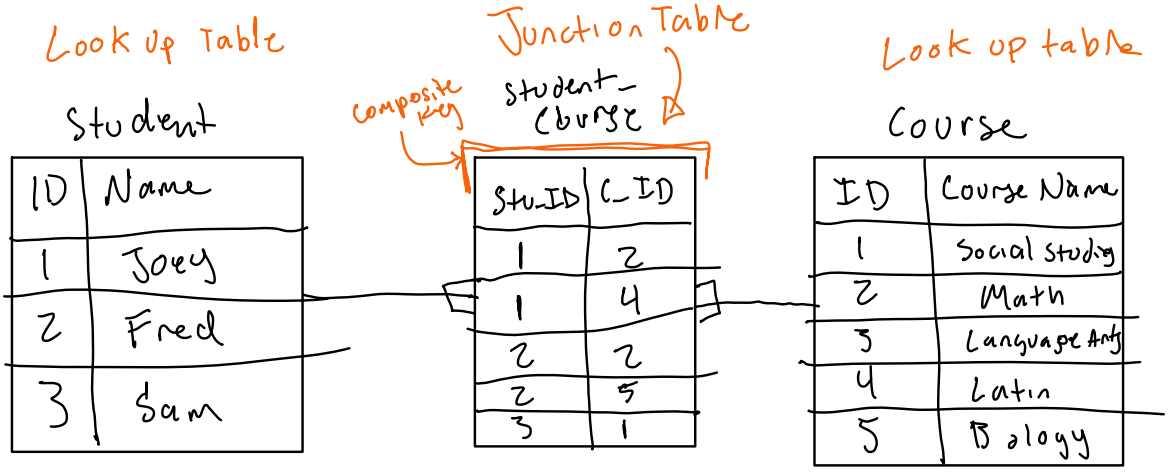
One to Many

- A row (record) in table A relates to one or more rows in table B



Many to Many

- Exist between a table A that relates to 1 or more rows in table B, & where table B also relates to 1 or more rows in table A



Normalization

- Helps prevent redundant data in your tables
- Easier to understand
- Easier to enhance & extend
- Protects from
  - Insertion: When its impossible to insert certain data types into your DB
  - Update: When updating the value of a column leads to DB inconsistencies
  - [illegible] leads to unintended loss

- Update: when updating the value of a column leads to [illegible]
- Deletion: when deleton of data leads to unintended loss

1NF

- Prevents row from a unique column from ever being inserted.

Product

ID	color	Price
1	red, green	5.99
2	blue	10.99
3	yellow, red	20.00
4	green	5.00
5	Red	1.00

Product_Price

ID	Price
1	5.99
2	10.99
3	20.00
4	5.00
5	1.00

Product_Color

ID	Color
1	red
1	green
2	blue
3	yellow
3	red
4	green
5	red

NOT Permitted:

→ Use of row order

→ Mixing data types in a single column

→ Missing a PK

→ Repeating groups

2NF

- Each non-key column on a table must be dependent on the entire PK
- Conditons to satisfy
  - Must be in 1NF
  - All non-key columns are fully dependent on PK
  - No partial dependencies

Purchase_Detail

Cost_ID	Store_ID	Location
1	1	LA
1	3	SF
2	1	LA
3	2	NY
4	3	SF

Purchase

Cost_ID	Store_ID
1	1
1	3
2	1
3	2
4	3

Store

Store_ID	Location
1	LA
2	NY
3	SF

3NF

- Forbid dependency on non-key attributes on another non-key attribute.
- Every non-key attribute should depend on the key, the whole key, and nothing but the key.
- Conditions to satisfy:
  - Is in 2NF
  - No transitive dependencies

Book Detail

BookID	GenreID	G_Type	Price
1	1	Gardening	20.99
2	2	Sports	25.75
3	1	Gardening	15.00
4	3	Travel	10.00
5	2	Sports	35.00

↓

Genre

GenreID	G_Type
1	Gardening
2	Sports
3	Travel

↓

Book

BookID	G_ID	Price
1	1	20.99
2	2	25.75
3	1	15.00
4	3	10.00
5	2	35.00