Working With Databases: Relational Data Model

Dr. Ilkay Altintas and Dr. Leo Porter

Twitter: #UCSDpython4DS

By the end of this video, you should be able to:

- Describe the structural components of a relational data model

- Demonstrate which components make up a data model's 'schema'

- Explain the purpose of primary and foreign keys

- Describe a "Join" operation

A Collection of Tables

ID	FName	LName	Department	Title	Salary
202	John	Gonzales	IT	DB Specialist	104750
203	Mary	Roberts	Research	Director	175400
204	Janaki	Rao	HR	Financial Analyst	63850
205	Alex	Knight	IT	Security Specialist	123500
206	Pamela	Ziegler	IT	Programmer	85600
207	Harry	Dawson	HR	Director	115450

No Duplicates

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~~207~~	~~Harry~~	~~Dawson~~	~~HR~~	~~Director~~	~~115450~~

Dissimilar Tuples Disallowed

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207	Harry	Dawson	HR	Director	115450
Jane	Doe	208	Res. Associate	65800	Research

Foreign Keys

EmpSalaries		
EmpID	**Date**	**Salary**
202	1/1/2016	104750
203	2/15/1016	175400
204	6/1/2015	63850
205	9/15/2015	123500
206	10/1/2015	85600
207	4/15/2015	115450
202	9/15/2014	101250
204	3/1/2015	48000
207	9/15/2013	106900
205	10/1/2014	113400

Foreign key

EmpSalaries.EmpID References

Employees.ID

Primary key

Joining Relations

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205	Alex	Knight	9/15/2015	123500
205	Alex	Knight	10/1/2014	113400
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Summary

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Working With Databases: Structured Query Language

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By the end of this video, you should be able to:

- Describe what data retrieval means

- Explain the purpose of SQL

- Create simple SELECT queries

What is Data Retrieval?

- Data retrieval
  - The way in which the desired data is specified and retrieved from a data store
- Our focus
  - How to specify a data request
  - The internal mechanism of data retrieval
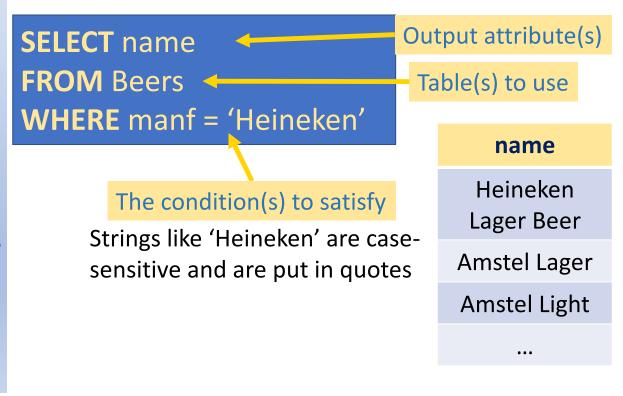
Structured Query Language

name	addr	license
Great American Bar	363 Main St., SD, CA 92390	41-437844098
Beer Paradise	6450 Mango Drive, SD, CA 92130	41-973428319
Have a Good Time	8236 Adams Avenue, SD, CA 92116	32-032263401

- The standard for structured data

- Example Database Schema

    Bars(name, addr, license)
    Beers(name, manf)
    Sells(bar, beer, price)

SELECT-FROM-WHERE

- Which beers are made by Heineken?

SELECT name
FROM Beers
WHERE manf = 'Heineken'

Output attribute(s)

Table(s) to use

The condition(s) to satisfy

Strings like 'Heineken' are case-sensitive and are put in quotes

Select $_{manf='Heineken'}$ (Beers)

⬇

Project(name)

name
Heineken Lager Beer
Amstel Lager
Amstel Light
...

More Example Queries

- Find expensive beer
  - SELECT DISTINCT beer, price
  - FROM Sells
  - WHERE price > 15
- Which businesses have a Temporary License (starts with 32) in San Diego?
  - SELECT name
  - FROM Bars
  - WHERE addr LIKE '%SD%' **AND** license LIKE '32%' LIMIT 5

name	addr	license
Great American Bar	363 Main St., SD, CA 92390	41-437844098
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Summary

- SQL is the standard querying language for structured relational data
- Resembles pandas data frames operations
- Allow for selection of data and more