# SQL FUNDAMENTALS

LIGHTHOUSE LABS

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# AGENDA

- Databases and SQL
- Anatomy of a Query
- Order of Execution
- Debugging a Query
- PostgreSQL Setup

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# Databases and SQL

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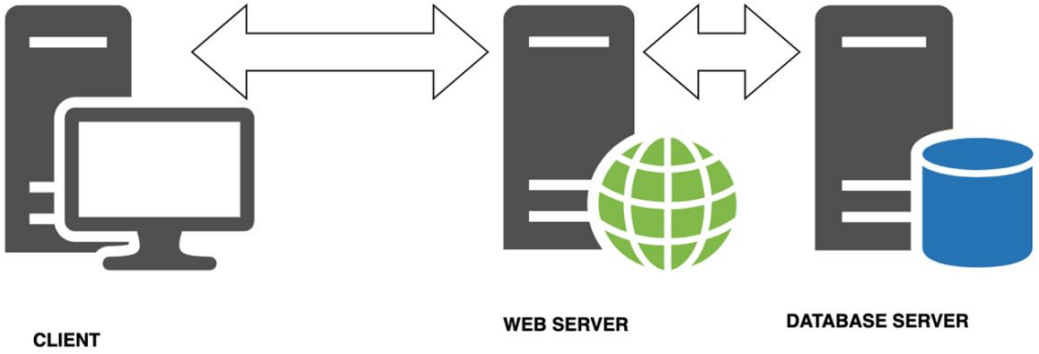
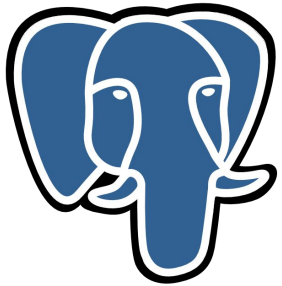
# What is a database?

- Organized collection of persistent data
- Info stored to be retrieved efficiently at a later time
- Third tier of web development architecture
- Different types of databases and architectures



# Database Management System

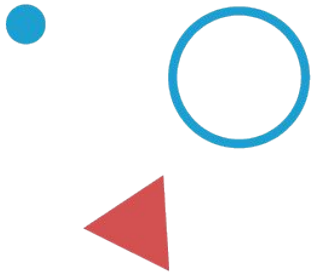
- Software designed specifically for managing data in a database
- Manipulates data itself, data format, file structures
- Defines rules to validate and manipulate data using query language (SQL)
- We are using PGAdmin with PostgreSQL (open source)

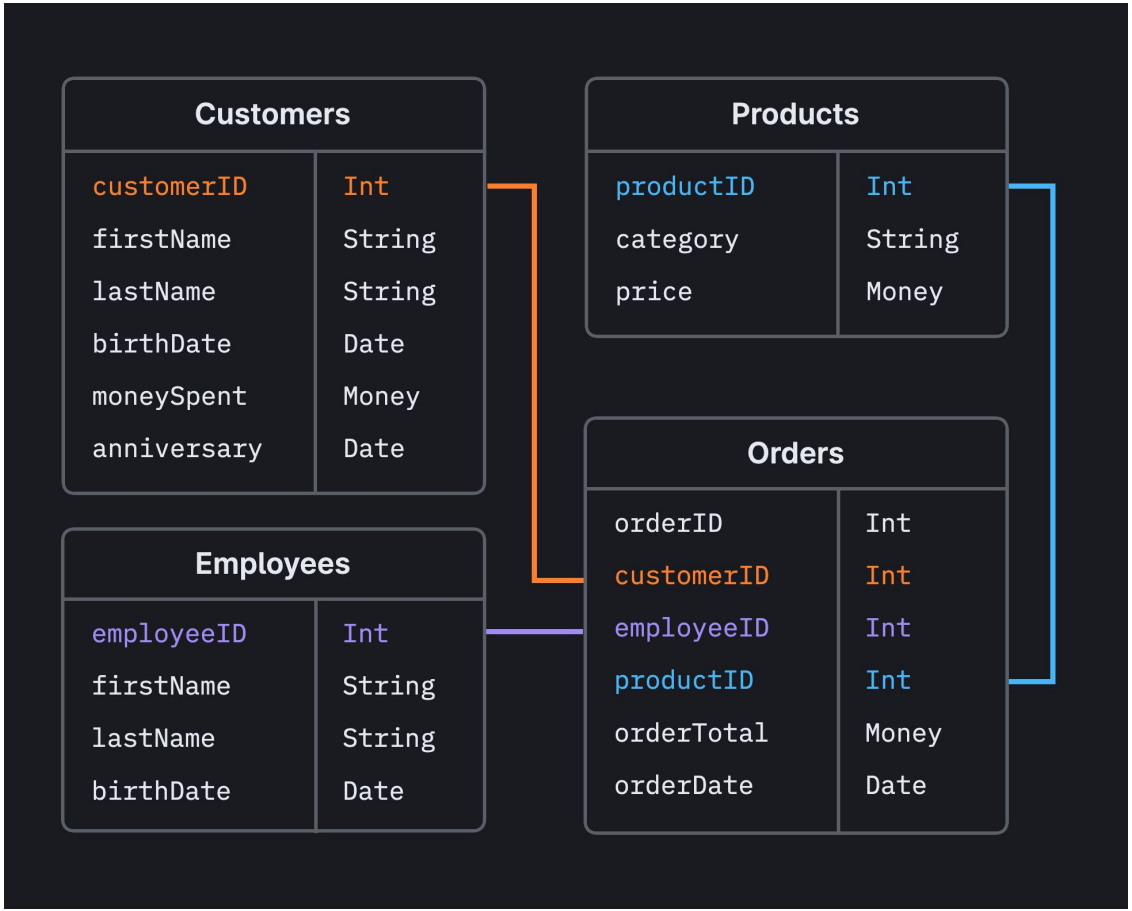


PostgreSQL

# Relational Database

- Multiple tables
- Tables must be related somehow
- Optimized to store and handle lots of large queries
- Cross platform - tabular data is usually stored and queried using SQL and it’s a standard





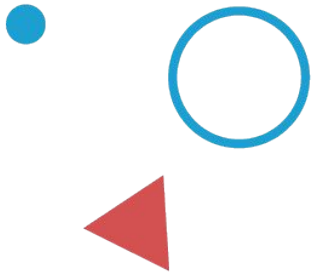

# Why Relational?

# PostgreSQL Data Types

https://www.postgresql.org/docs/current/datatype.html

Most common:

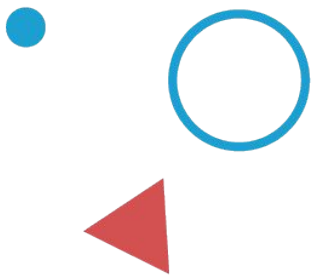
- **Integers (int):** whole numbers
- **Double precision (float):** number with decimals
- **Varchar:** varying character (text string)
- **Boolean:** true / false



# PostgreSQL Data Language

- **Definition (DDL)**
  - Create database
  - Delete database
  - Create, modify or delete table

- **Manipulation (DML)**
  - INSERT
  - UPDATE
  - DELETE
  - SELECT



# Anatomy of a Query

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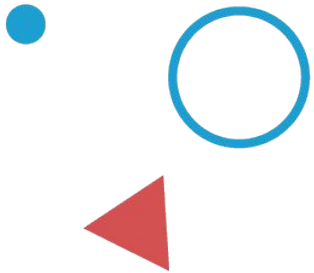
# Table Relation

- Tables have id columns, Primary Key (PK)
  - PK is unique identifier for each row
  - PK ensures that each row is in fact unique, part of data validation

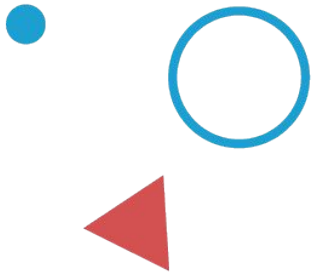
- Tables have Foreign Keys (FK), containing id value of a table that it references
  - FK is further step in data validation
  - FK prevents manipulation errors

- ERD for database



# Anatomy of a Query

**SELECT** [ columns and functions ]
[ **FROM** from_item ]
[ **WHERE** condition ]
[ **GROUP BY** [ ALL | DISTINCT ] grouping_element ]
[ **HAVING** condition ]
[ **ORDER BY** expression [ ASC | DESC ] ]
[ **LIMIT** [ count | ALL ] ]
[ **OFFSET** start [ ROW | ROWS ] ];



# Order of Execution

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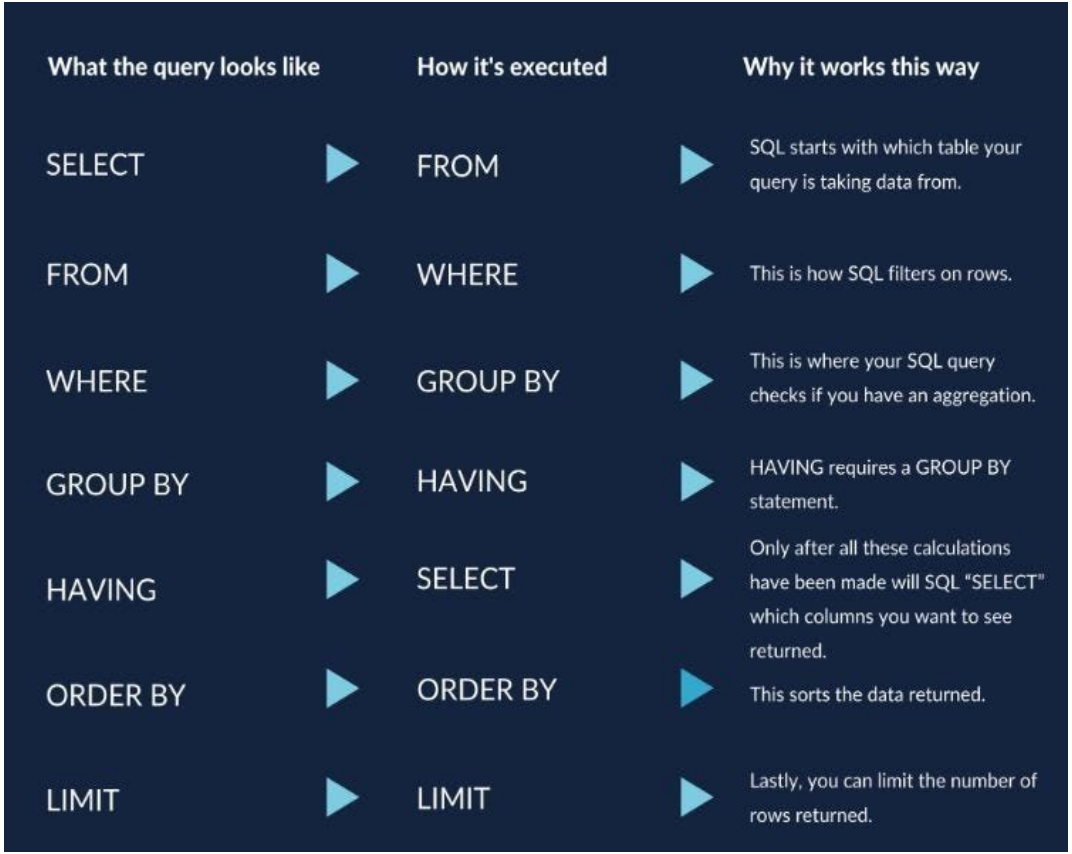
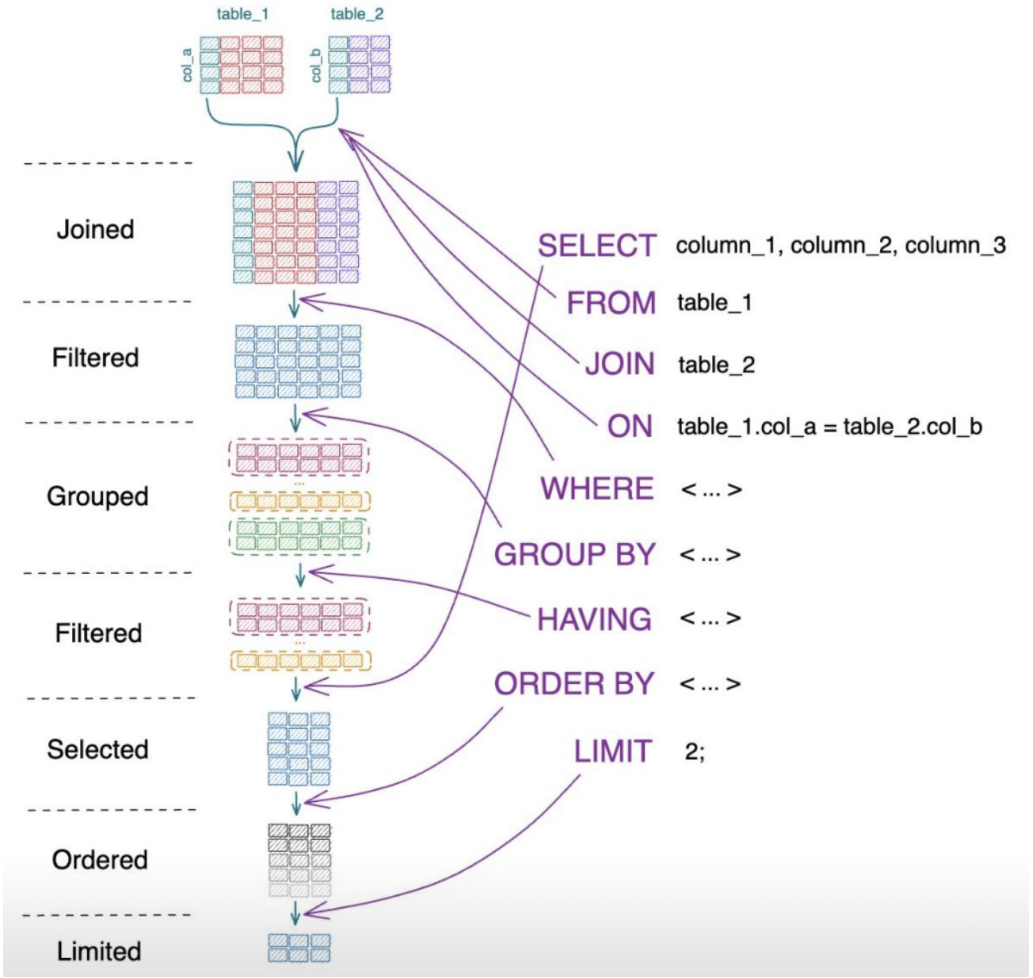



https://www.postgresql.org/docs/9.5/sql-select.html

# Order of Execution



# Let's Query Some Data!

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# Debugging a Query

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# Common Errors

- Error: syntax error at or near…
  - Locate the error
  - Check for typos
  - Check order of execution
  - Check brackets / semicolons
- Column does not exist
  - Check for typos
  - Check aliases
- Permission denied for relation…
  - Correct user / password / database?