

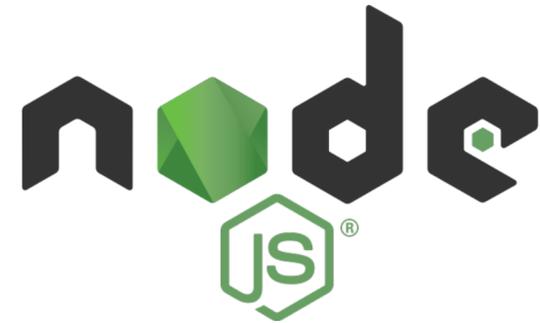
Week 16

All the buzz words

Today

- Overview of buzz words and technical topics related to DB
- Status Checkins

Backend Languages



Very Popular in startups.

Allows for same language to be used in front/
backend

Relies on Async processing



python

Popular for prototyping and smaller web
servers.

In use at several large companies with
Django



Golang

Popular in microservices and high performant
web servers.

Allows for easy to use concurrency.



Java™

Popular in the enterprise and very large
companies.

Very Stable and trusted.
Build once, run anywhere

Javascript and Typescript

JS for large applications

- Javascript: Dynamic, flexible, interpreted language
- Typescript: Superset of Javascript, strongly typed, classes, build system, packages
- Typescript compiler is written in Typescript and compiles into JS
- Javascript is always evolving
 - ECMAScript = javascript standard
 - 6th edition (2015) added classes to JS
 - Recent browsers support latest ECMAScript standards

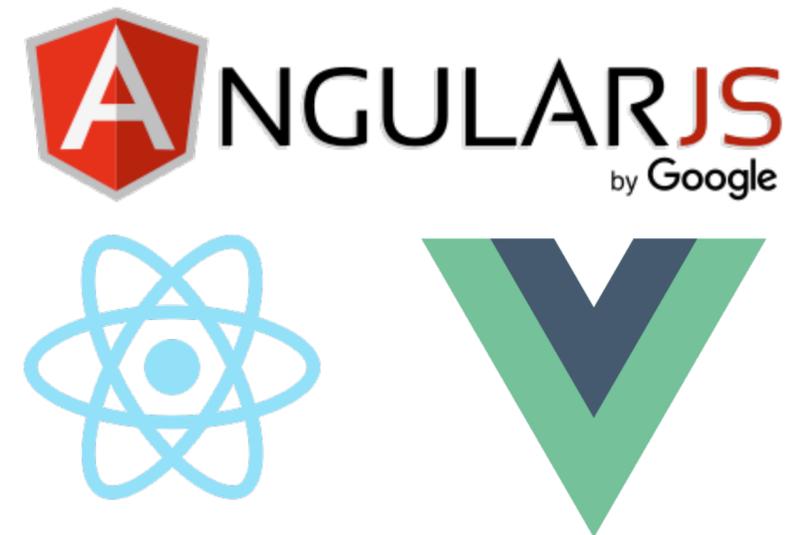
Websockets

https://developer.mozilla.org/en-US/docs/Web/API/WebSockets_API

- A way to provide two way communication between servers and clients.
- A connection is established over http and then upgraded to be a websocket.
- Write data to a socket to send it and listen on sockets to receive. Very similar to unix sockets but not the same.
- Allows for real time communication between web servers and clients. Perfect for mobile devices and peer to peer systems where you send data back and forth and need low latency.
- Examples of applications that use them:
 - Online games in the web browser
 - Chat applications
 - Several Pub/Sub systems

Single Page Applications (SPA)

- JS lets us entirely rewrite a page... so why ever leave?
- Client detects interactions (button pressed)
- Server returns data (JSON)
- Client updates view (modify DOM)
- Popular frameworks
 - AngularJS, React, Vue.js
- Why do this??



Mobile Apps

- Modern websites usually have a mobile view - just CSS if site is well structured!
- Native mobile apps written for Android / iOS mainly replace the front-end
- Backend web service does processing to provide JSON data and serves static content (images, videos, etc)
- Most of your code would be the same! Instead of filling data into HTML template you would just return JSON object and frontend would fill it into native UI elements (textboxes, labels, etc)

Object-Relational Mapping (ORM)

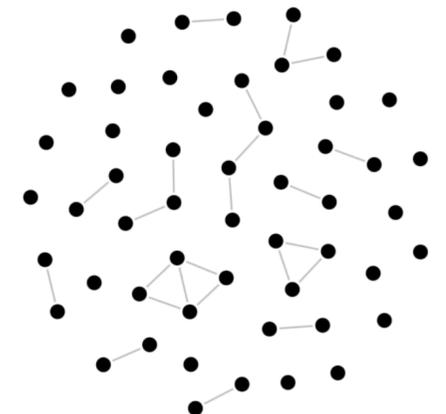
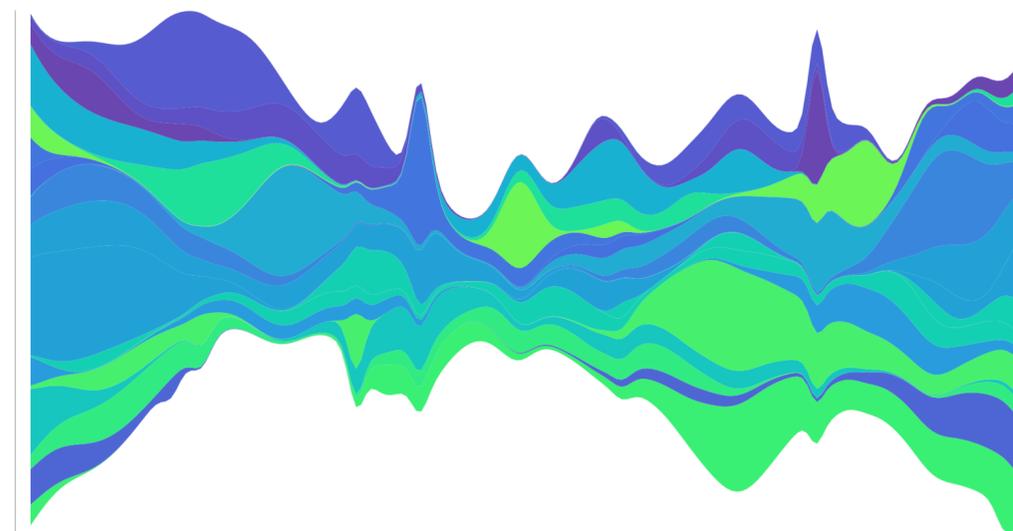
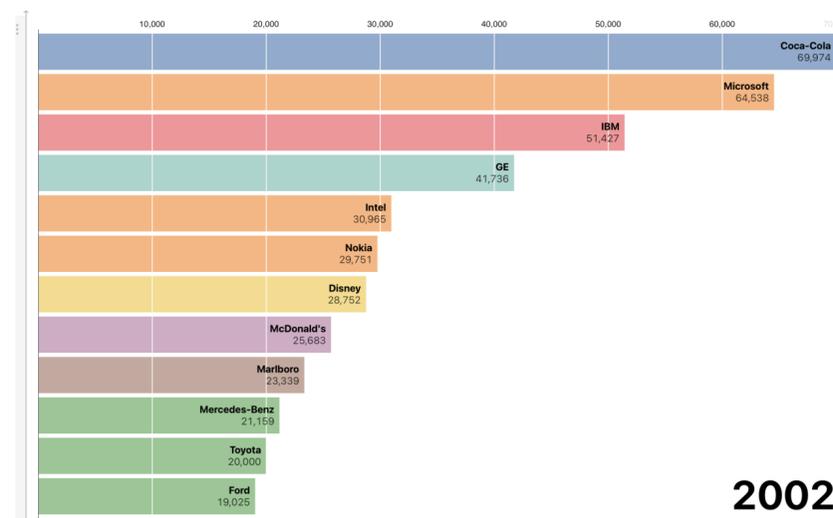
- Each database record is similar to an object
 - Table defines class, columns are attributes, rows define instances
- ORM lets you automatically transform database data into code objects
 - Manipulate data object in code -> update fields in DB
 - Update fields in DB -> object will get new data
- Eliminates the need to use SQL!
- But... can lead to very messy DB structure, abstraction obscures what DB is doing
- SQLAlchemy - Python ORM -- **You cannot use this in your projects!**

Django

- Python web framework similar to Flask
- "Heavy weight" and "opinionated"
 - Designed for larger scale projects
 - Requires you to follow certain patterns
 - Expects you to use ORM for DB interaction

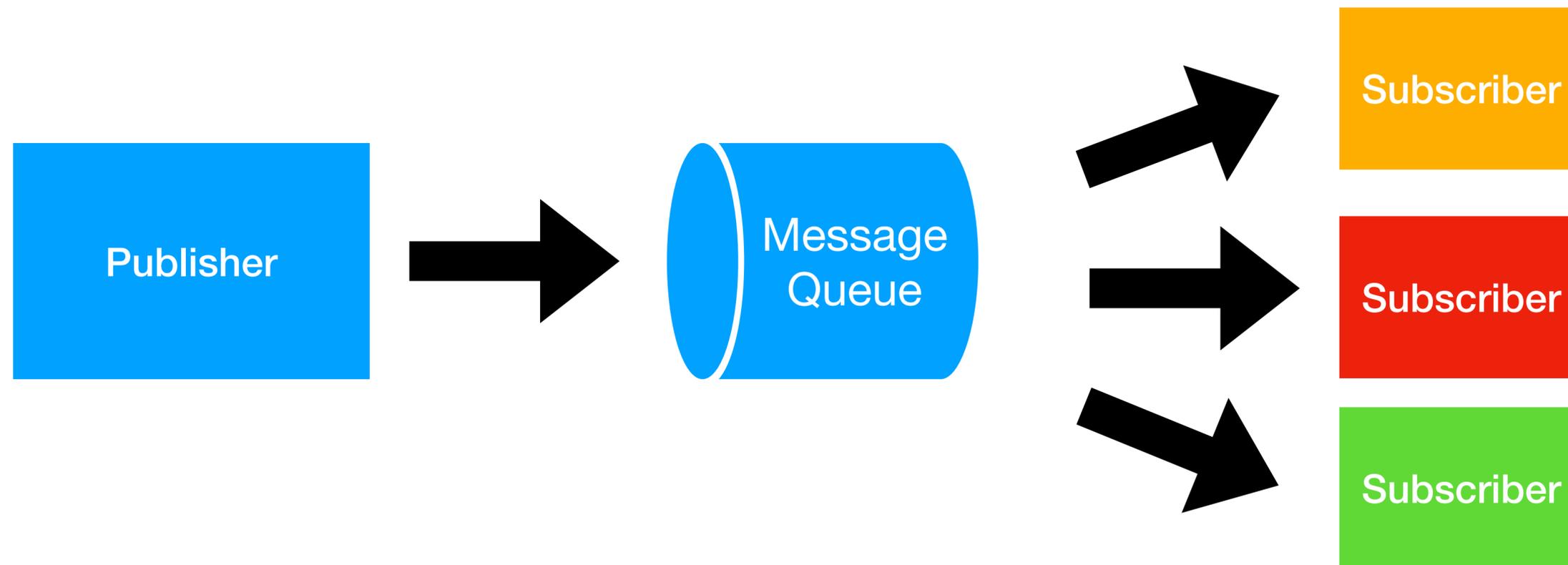
Data Visualization

- A large field that studies how to represent information and data with a focus on users.
- Libraries like D3.js, Chart.js, Bokeh make it easy to take your data and create stunning visualizations from them.
- VAST Challenge:
 - <http://www.vacommunity.org/About+the+VAST+Challenge>
 - <https://vast-challenge.github.io/2021/>



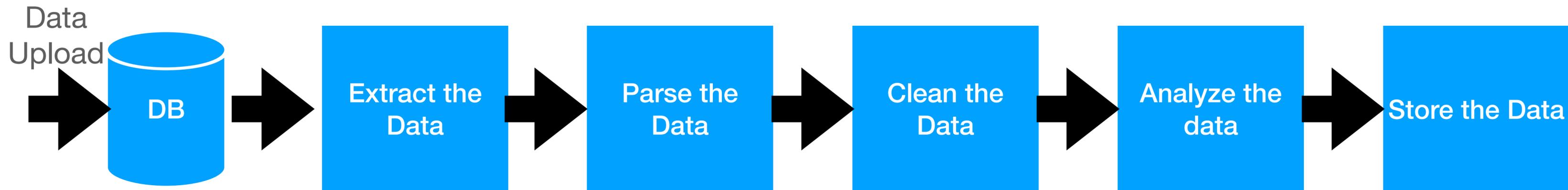
Pub Sub Architectures

- An asynchronous messaging service that decouples events from services
- A good use case for streaming data, microservice communication, and event processing.



Data Engineering

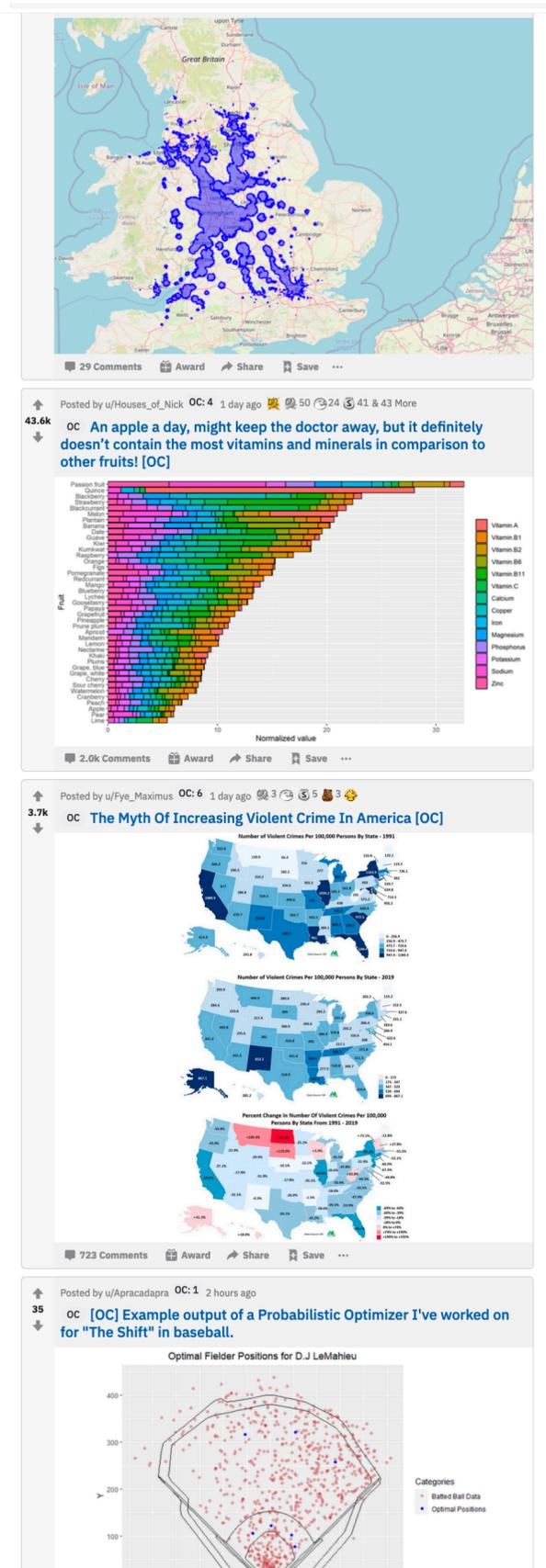
- Engineers that build and deploy pipelines for the entire data lifecycle.
- They are responsible for how data gets ingested, cleaned, processed, and stored in an application.
- A large responsibility is building ETL pipelines



Data Analytics

<https://www.reddit.com/r/dataisbeautiful/>

- How to turn data into something useful?
- Data Engineering + Machine Learning + Data Visualization
- Many python packages: Pandas, scikitlearn, numpy, tensorflow
- Interested? Consider 5 year MS degree in Data Analytics (CS + EMSE)



Viewer Questions

- Ask us anything!