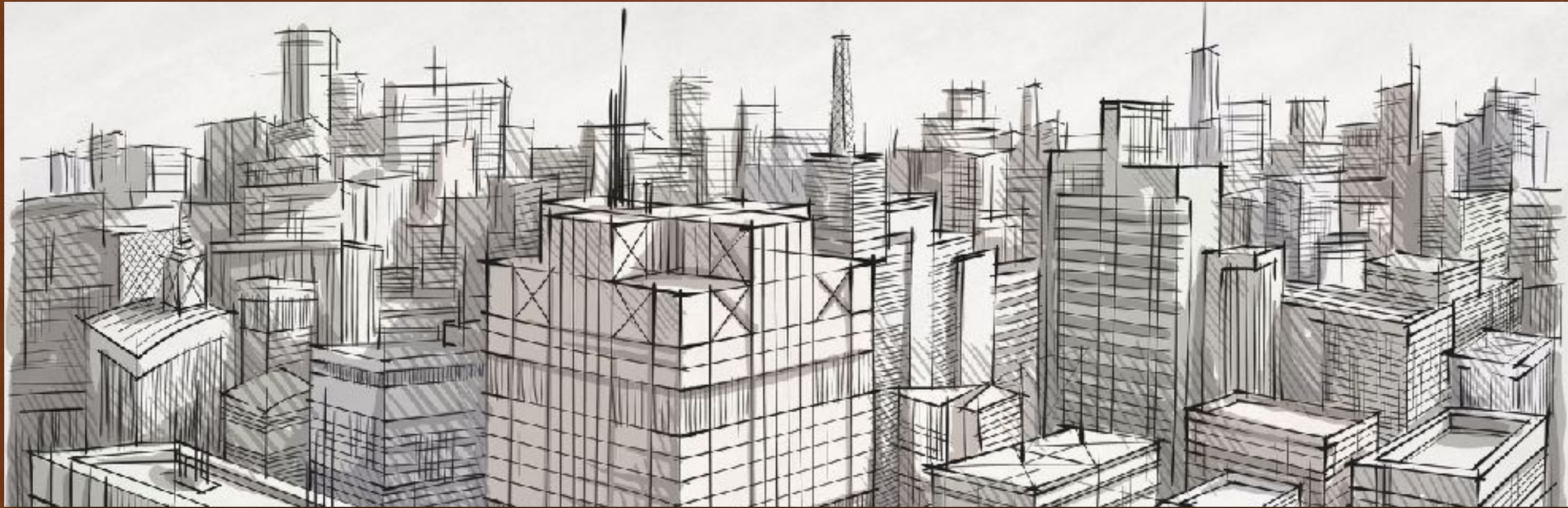# DSA 5900

PRACTICUM PRESENTATION

MINGFEI YIN

112867189

PRESENTATION SCHEMA

- **ETAG project introduction**

- Background study

  - CyberCommons Framework

  - Docker

  - Celery and RabbitMQ

  - MongoDB

- PostgreSQL Database

- Data visualization in JavaScript D3

ELECTRONIC TRANSPONDER ANALYSIS GATEWAY (ETAG)

INTRODUCTION

Work with OU library informatics department and OU biological survey

ETAG is a database and software system

ETAG provides data management and dissemination

Data captured using Radio Frequency Identification Technology(RFID)

RFID: retails short-range wireless communication between small transponder tags and readers

PRESENTATION SCHEMA

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ETAG SCHEMA

CYBERCOMMONS FRAMEWORK

A loosely coupled service-oriented reference architecture

Makes it easier to develop and enhance micro-services

Stick pieces together to build applications

- PostgreSQL: open source database management system

- Docker: an api build, test and deploy platform

  - Web: Ngnix, Celery, RabbitMQ

  - API: Django

  - MongoDB

  - Memory Cache

- File System

CYBERCOMMONS FRAMEWORK

DOCKER CONTAINER

- Microservices

- Software platform allows user to build, test and deploy applications inside containers;

- Container has libs and metadata that provides everything that a user wants to run, such as code, tools.
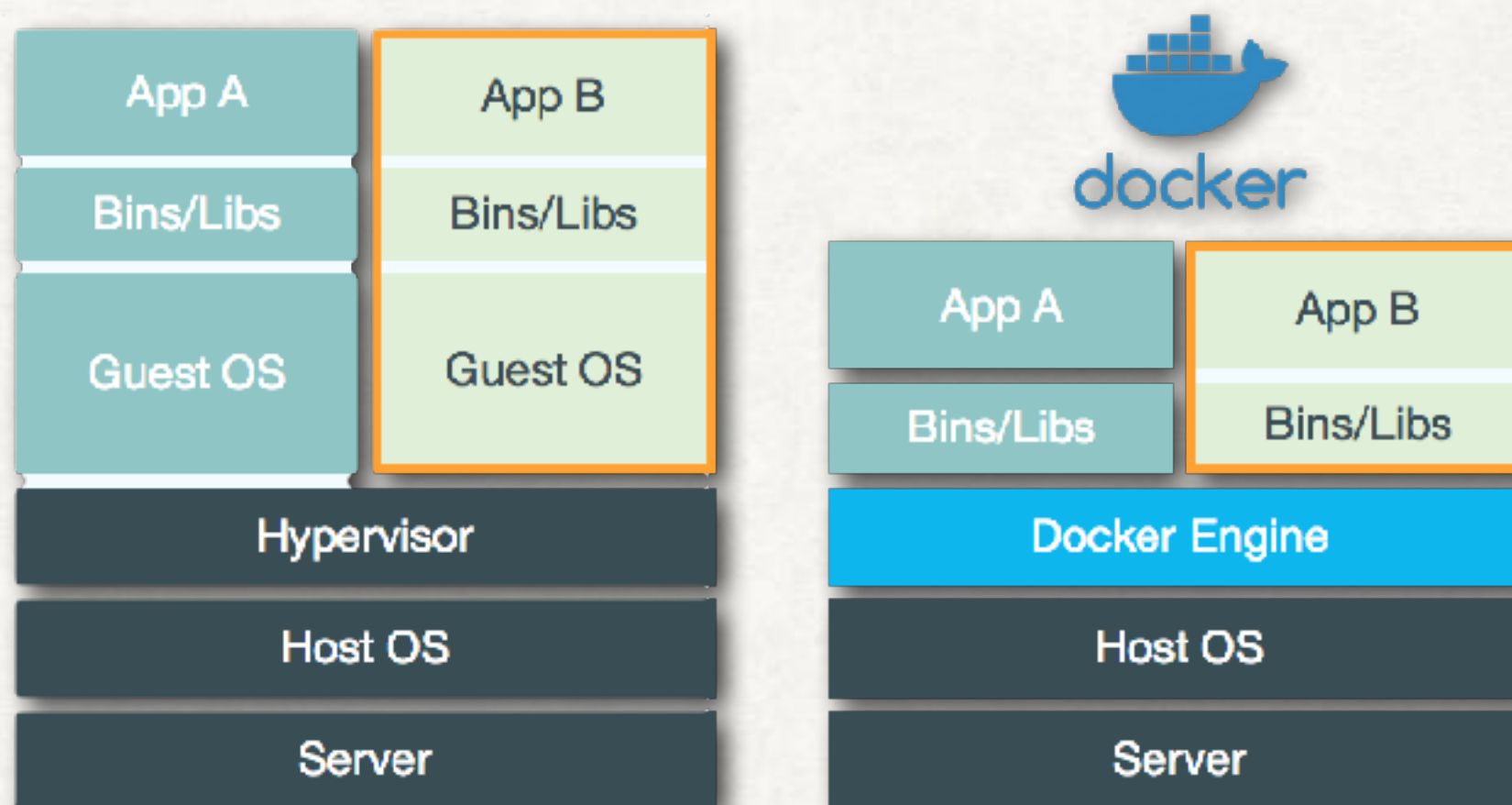
**Virtual machine(left) versus docker container(right)**

CELERY: TASK QUEUE

- Celery is a distributed asynchronous task queue for Django.

- Software platform allows user to build, test and deploy applications inside container;

- Container has complete file system that provides everything that a user wants to run, such as code, tools and runtime.

User   Broker   Celery workers   Task store
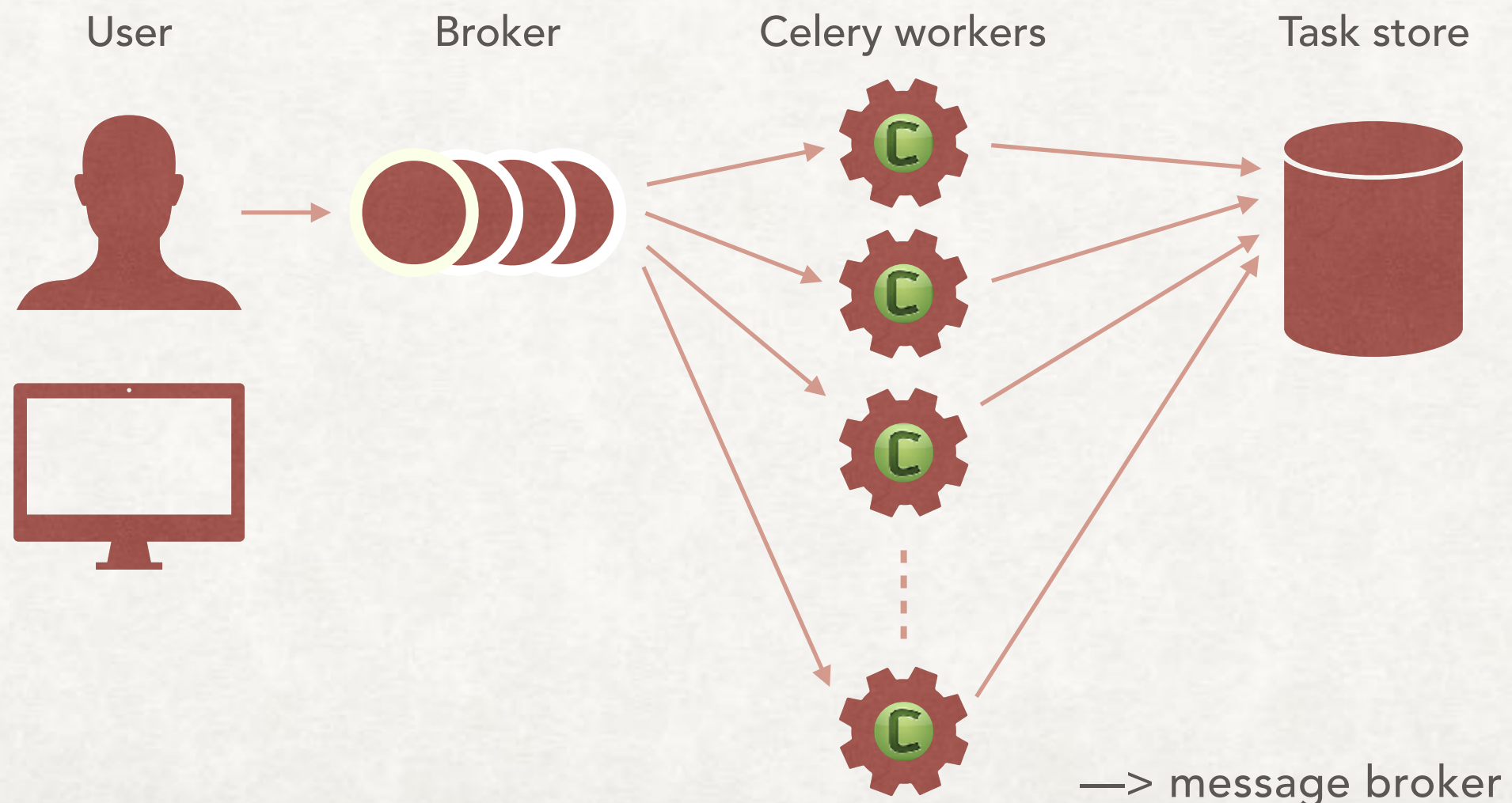
—> message broker

RABBIT MESSAGE QUEUE(RABBITMQ)

- A message broker is an intermediary program, known as middleware

- Open source

- Translates message from the formal messaging protocol of the publisher to the formal messaging protocol of receiver

- Implements AMQP

Exchanges   Queues

Producer   RabbitMQ Broker   Consumer
(publisher)   (receiver)
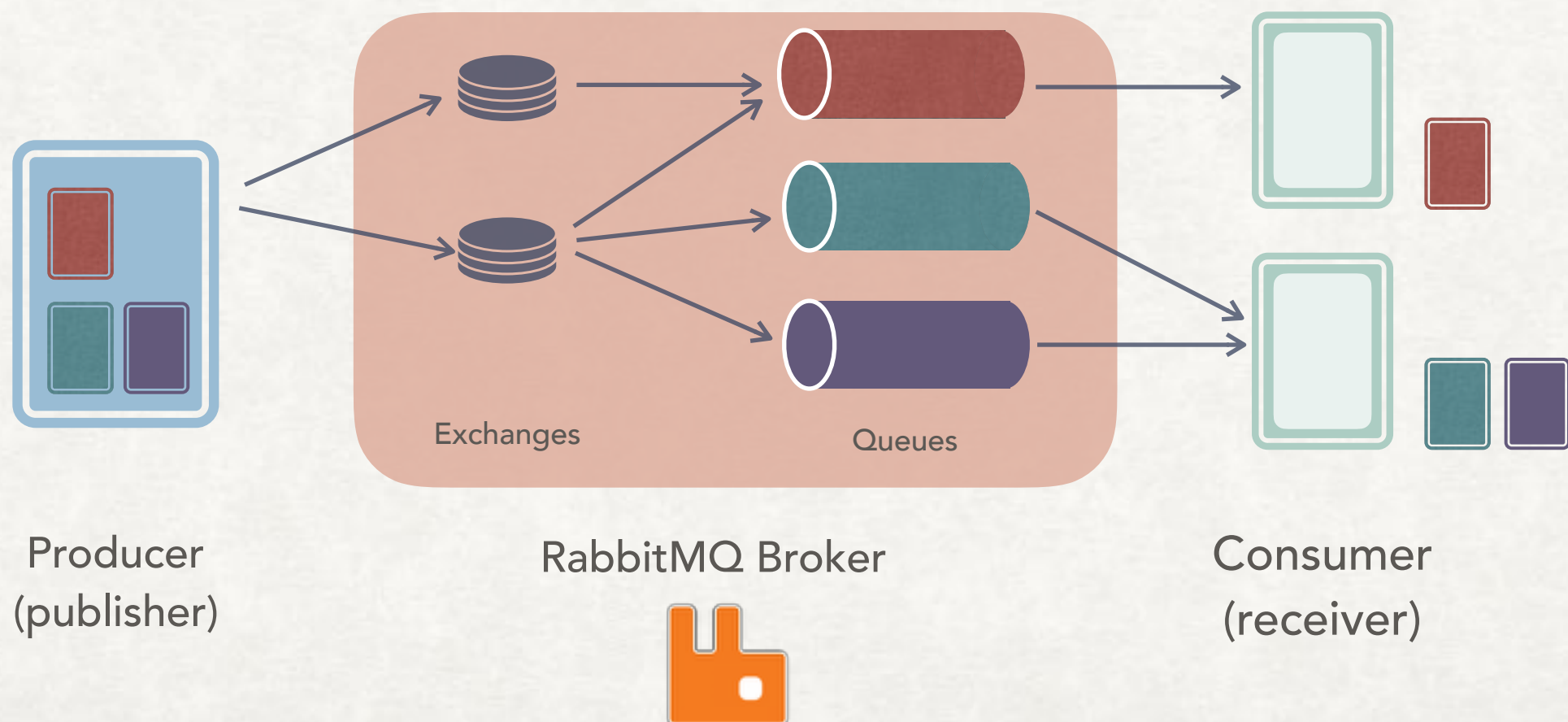
MONGODB (NOSQL DATABASE)

- JSON format

- Key-value/object oriented programing, easy to use and very flexible

- Structure of a single object is more clear

- Number of fields, content and size of the document can be different from one to another

- Rapidly change structure with large volume

SQL DB	NoSQL DB
Use SQL languages	Do not use SQL languages
Support relational model	Do no support relational model
Have join querries	Usually no join querries
Difficult to scale horizontally	Easy to scale horizontally

PRESENTATION SCHEMA

- ETAG project introduction

- Background study

  - CyberCommons Framework

  - Docker and

  - Celery and RabbitMQ

  - MongoDB

- **PostgreSQL Database**

- Data visualization in JavaScript D3

POSTGRESQL DBMS

- Open source relational DBMS

- Free and stable

- Have advanced features that other enterprise DBMS such as Oracle and mySQL provide.

- Features include:

  - User-defined types

  - Table inheritance

  - Nested transactions

  - Foreign key referential integrity

ETAG RELATIONAL DIAGRAM
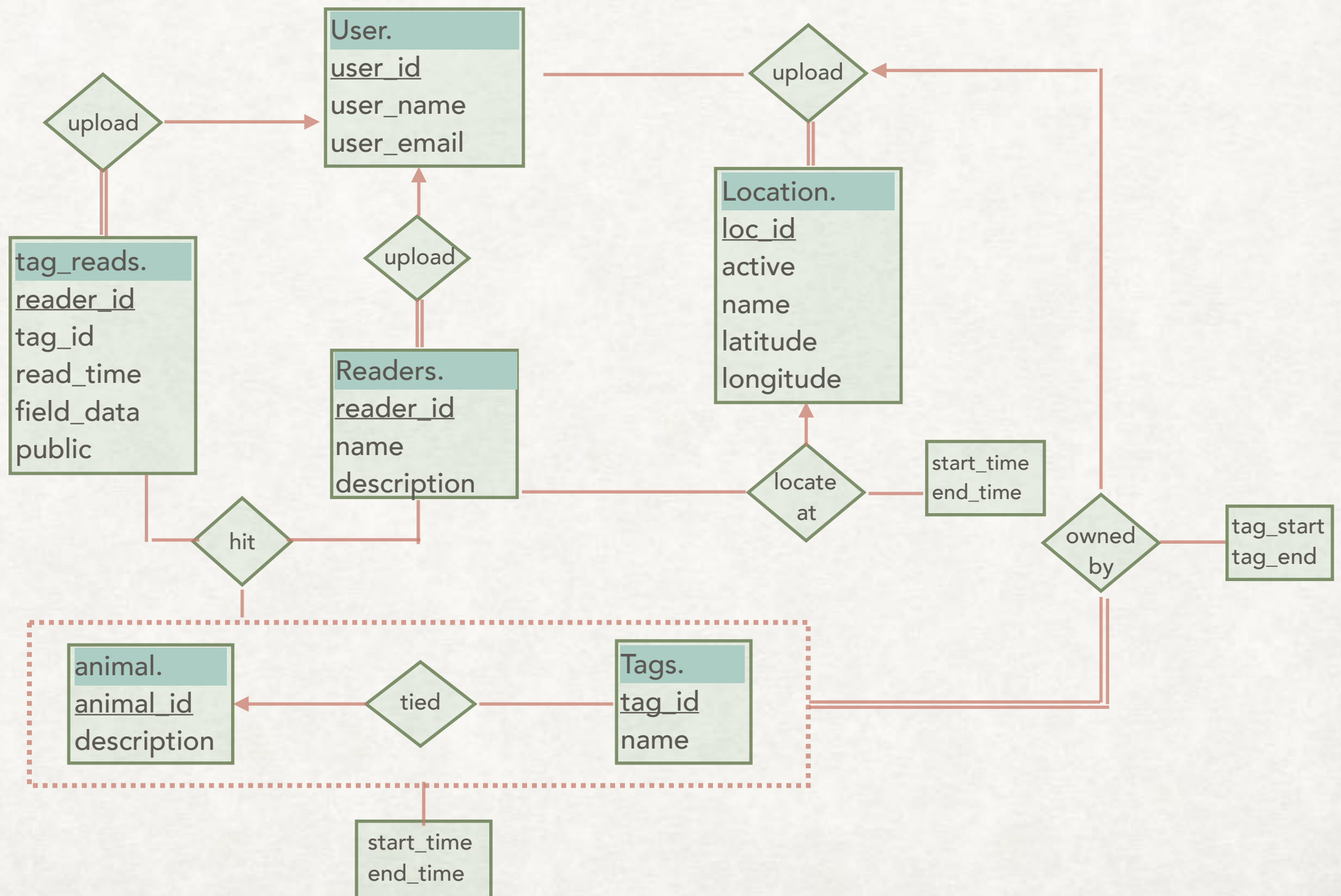
PRESENTATION SCHEMA

- ETAG project introduction

- Background study

  - CyberCommons Framework

  - Docker

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  - MongoDB

- PostgreSQL Database

- **Data visualization in JavaScript D3**

DATA VISUALIZATION WITH JAVASCRIPT D3

JAVASCRIPT D3 INTRODUCTION

- D3 is shorten for "data driven document"

- D3 is a JavaScript library for manipulating document based on data

- D3 allows you to bind arbitrary data to a Document Object Model (DOM)

- It is a tool to produce dynamic, interactive data visualization in web browsers

JAVASCRIPT D3 INTERACTIVE EXAMPLES
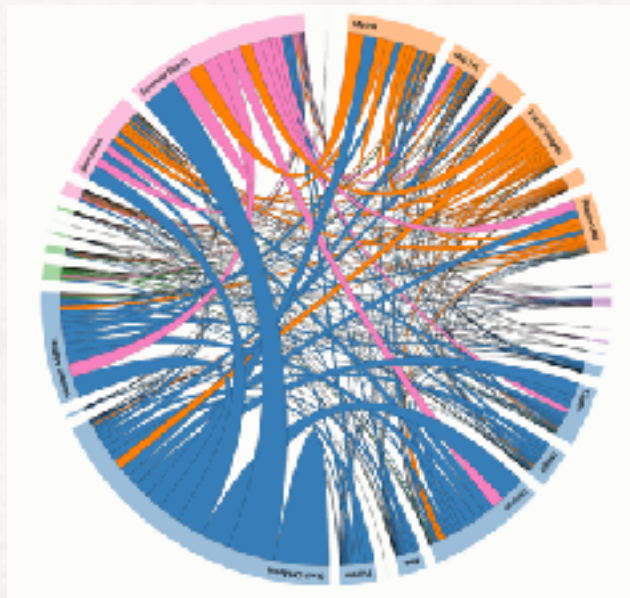
Chord
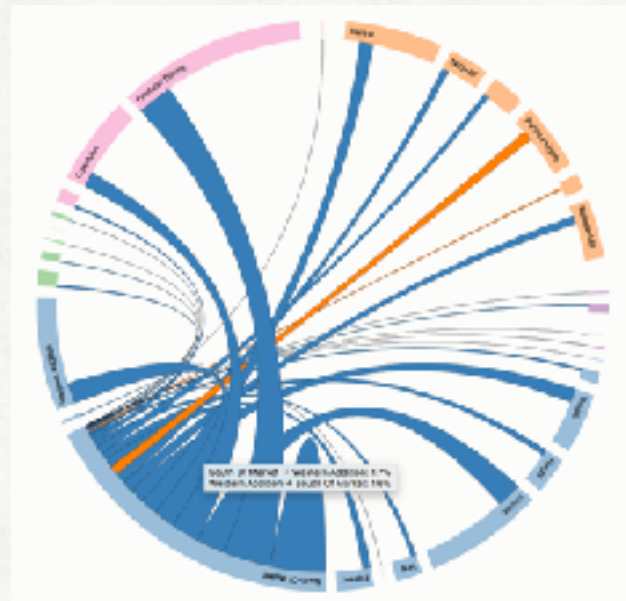
South of market - Western Addition: 1.7%
Western Addition - South of market: 1.6%

Financial District - Western Addition: 1.1%
Western Addition - Financial District: 1.1%

Sunburst
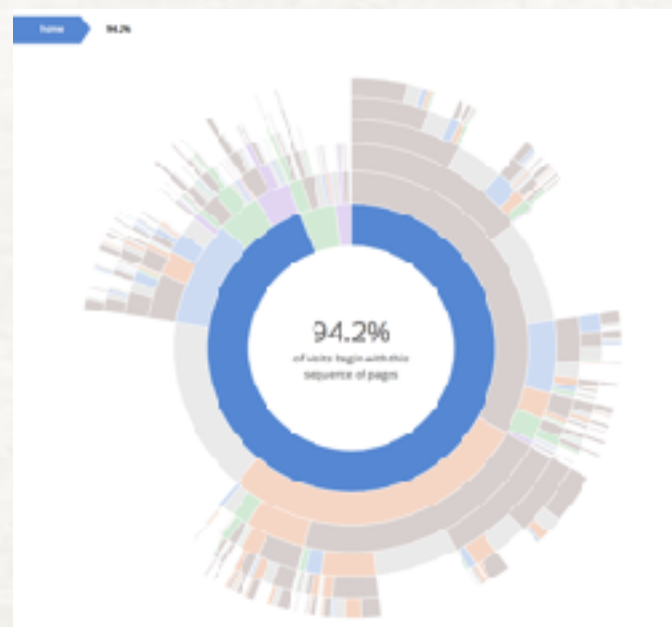
94.2% visits begin with sequence with home page
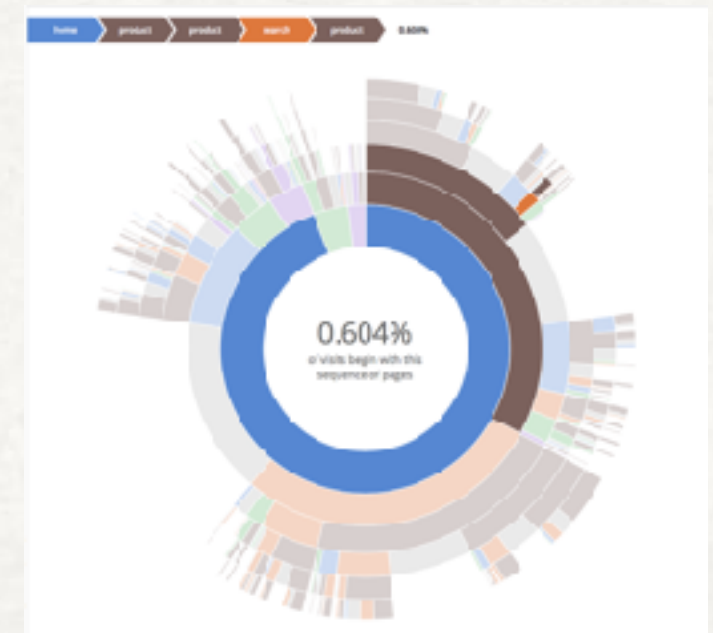
0.604% visit website with this sequence (home-product-product-search-product)

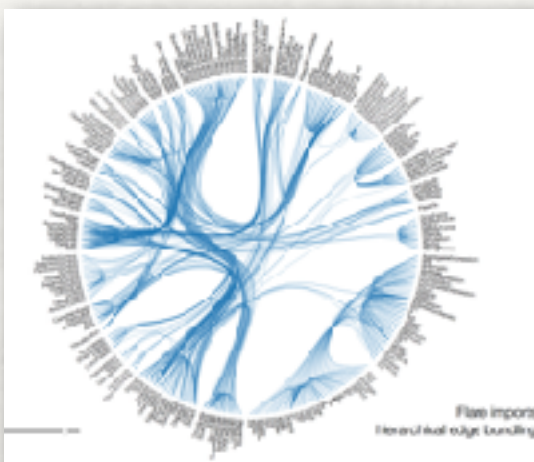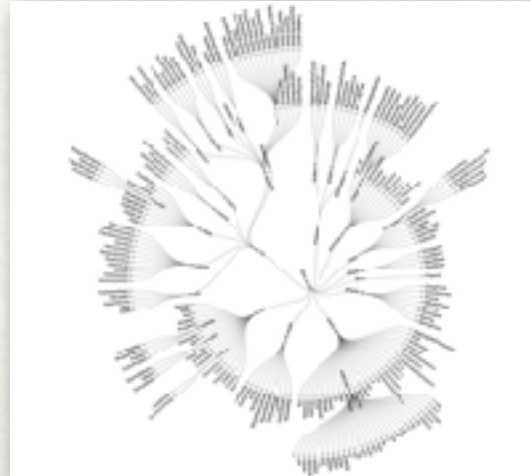# JAVASCRIPT D3 INTERACTIVE EXAMPLES

Bubble

Halo
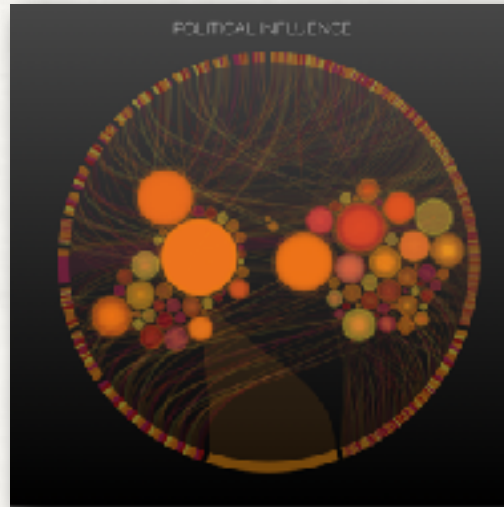
Word cloud

Circle packing

Corona
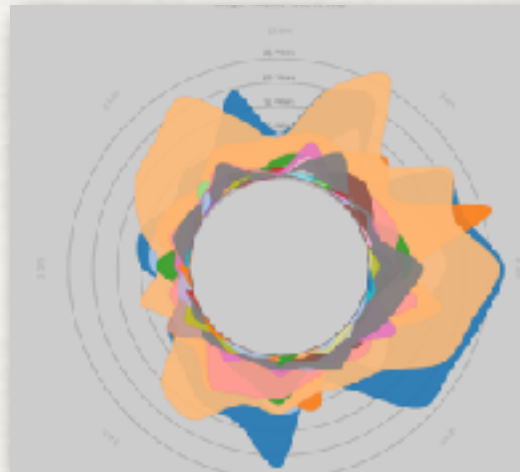
Voronoi
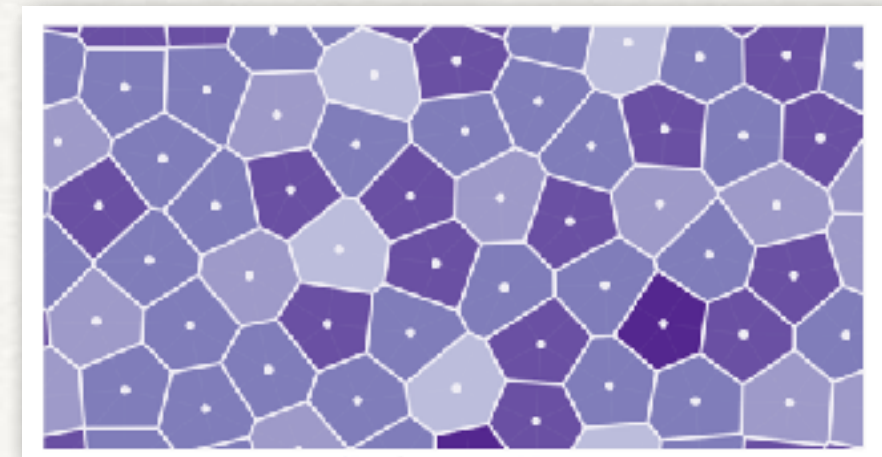
Chord

Node-link-tree

Stacked bars
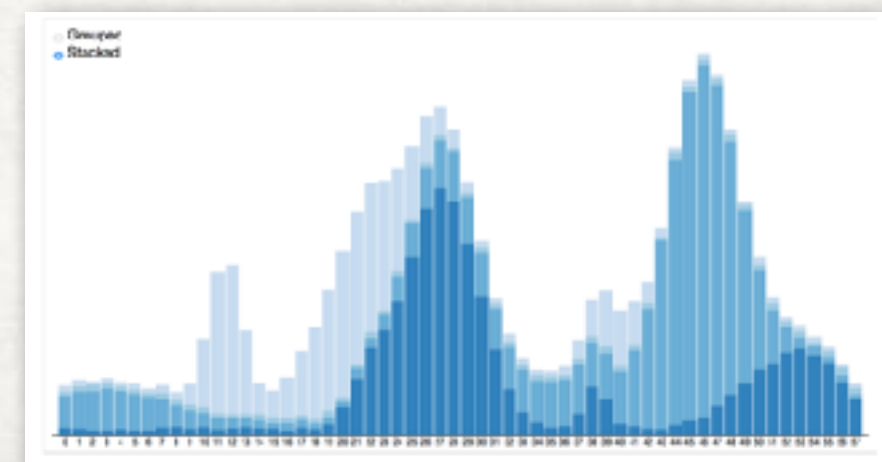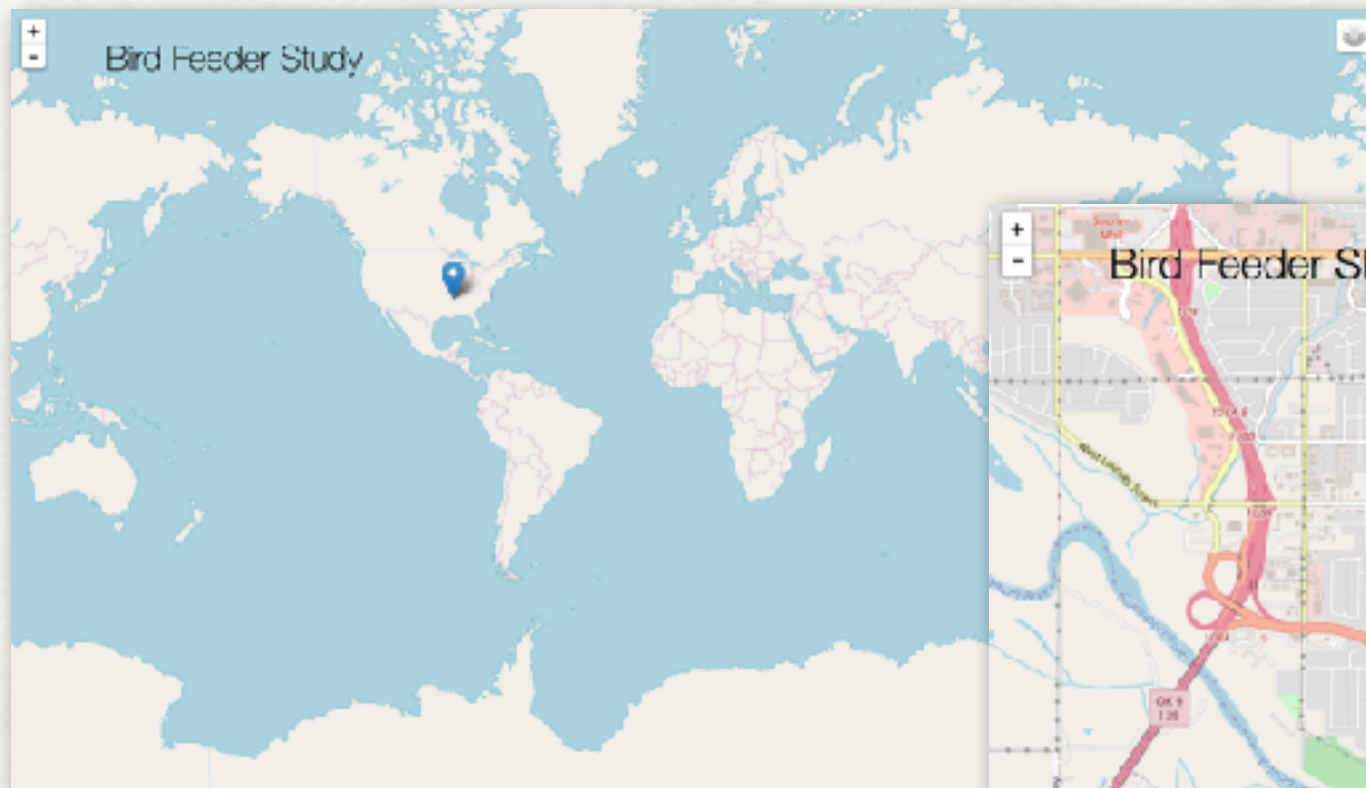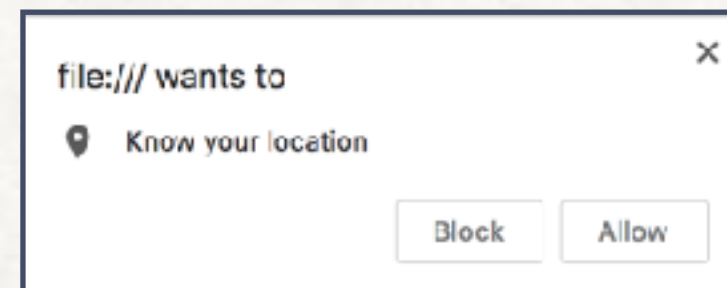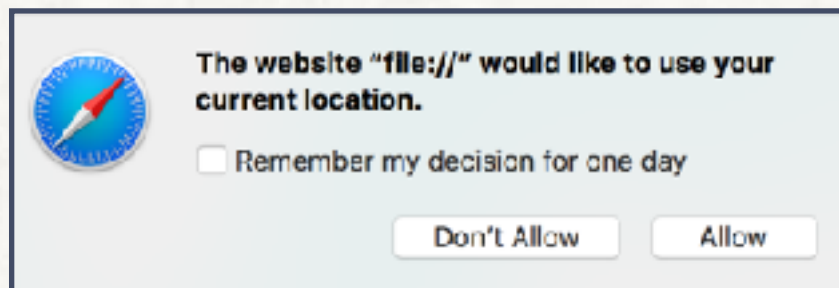
JAVASCRIPT D3 LEAFLET

INTRODUCTION

- Leaflet is a D3 open-source library that visualize data with interactive maps

- Work across all major desktops, mobile platforms and could be extended with plugins

- ETAG use Leaflet to visualize bird movement tracking data

- Map has popup showing filtered data and feature selected

- Map has multiple choices of layers of different styles

- Map has time slider to provide interactive (play back) result (next phase)

- Map has tools such as piechart embedded to help with statistical analysis (next phase)

- Provide more screening options (base on beta test review)
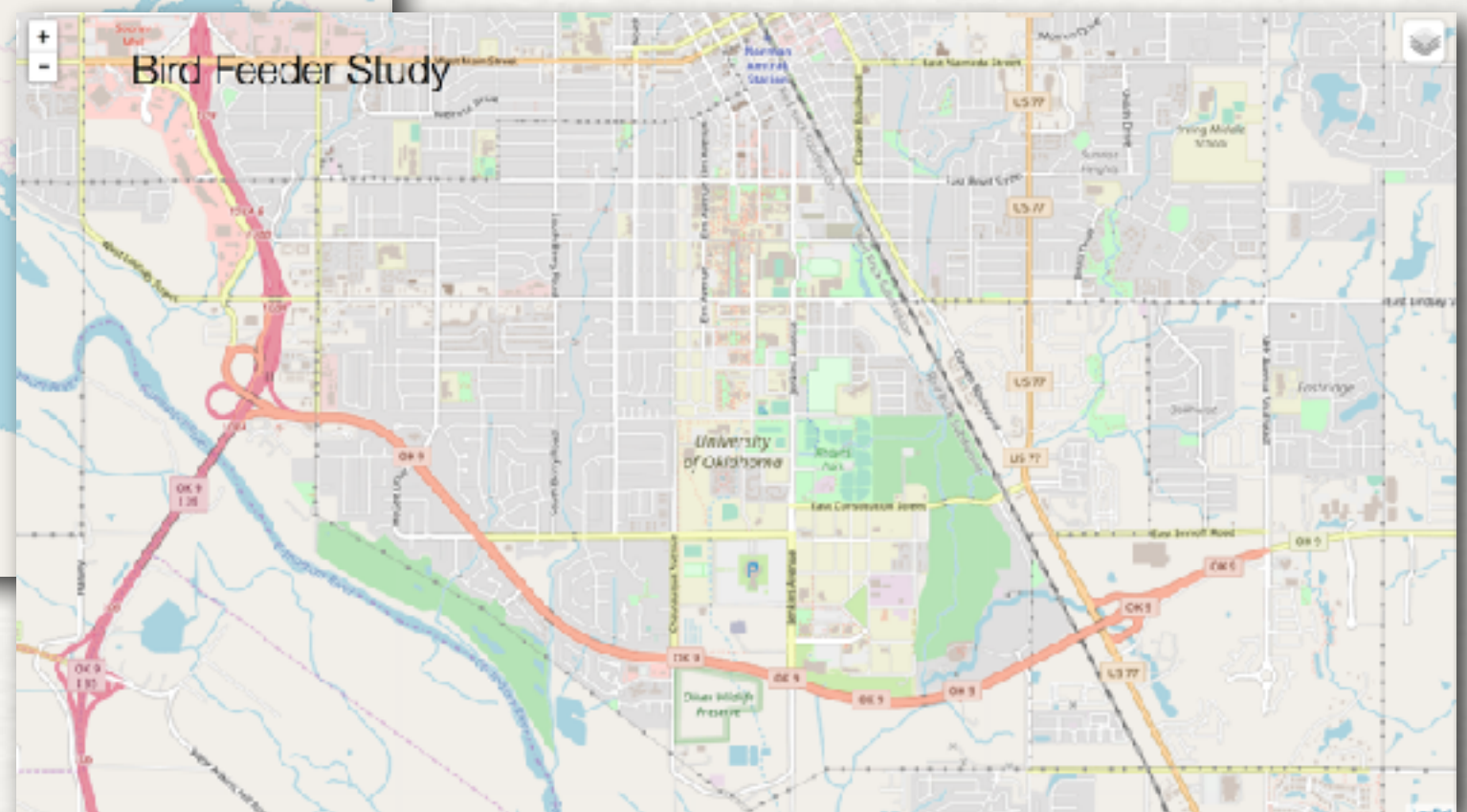
JAVASCRIPT D3 LEAFLET
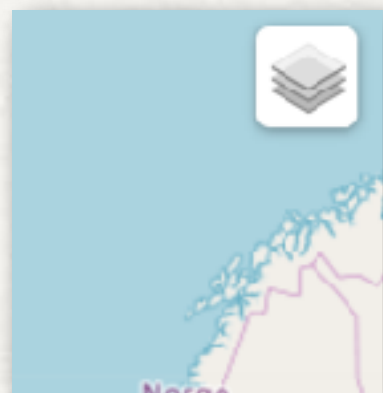
GPS LOCATING

Use default setting if user location is not available
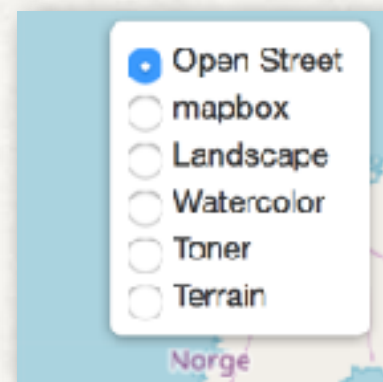
Center map using user location if authorized

JAVASCRIPT D3 LEAFLET

LAYERS SELECTING

Click on icon

Select layer

- Open Street
- mapbox
- Landscape
- Watercolor
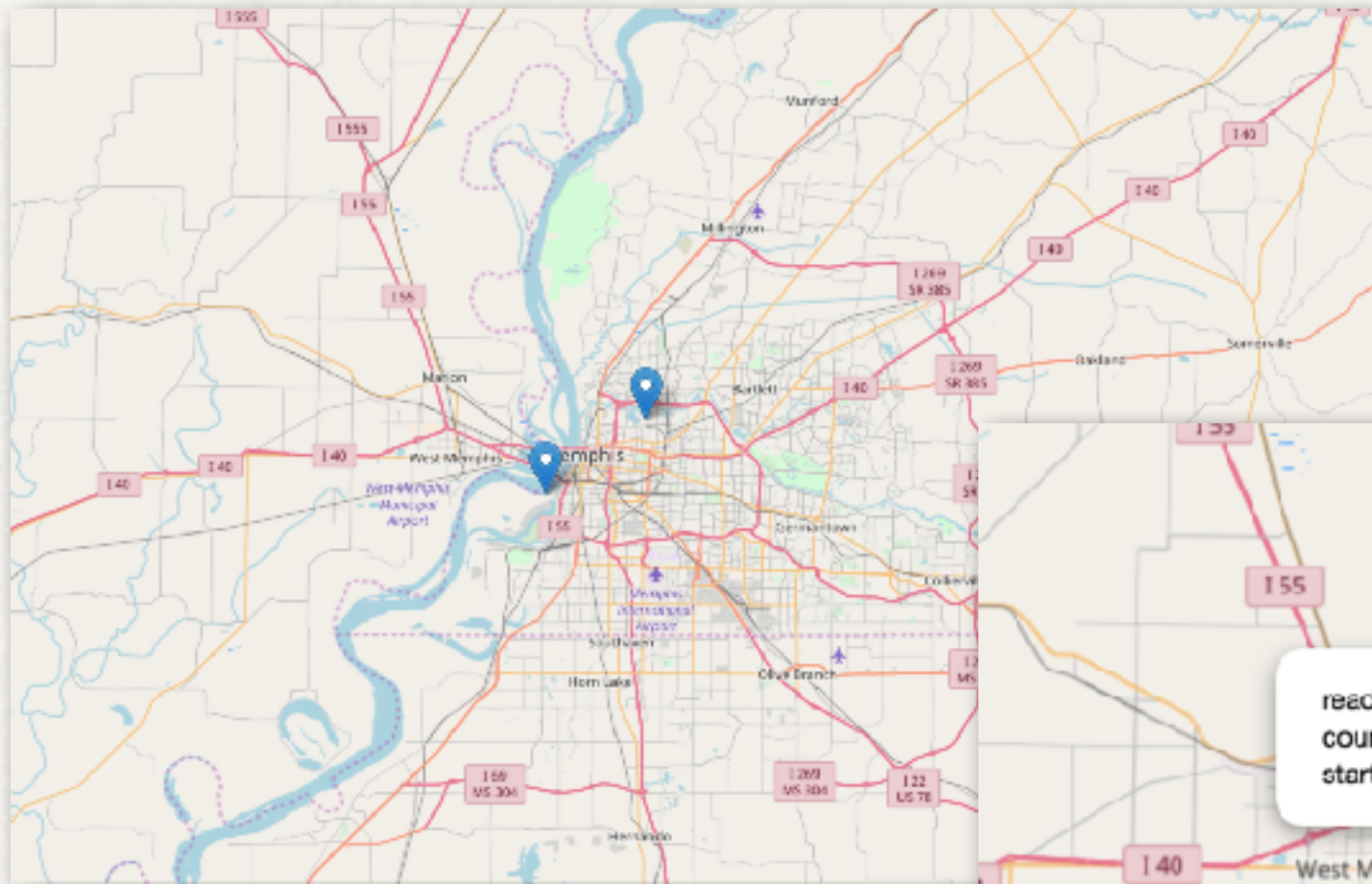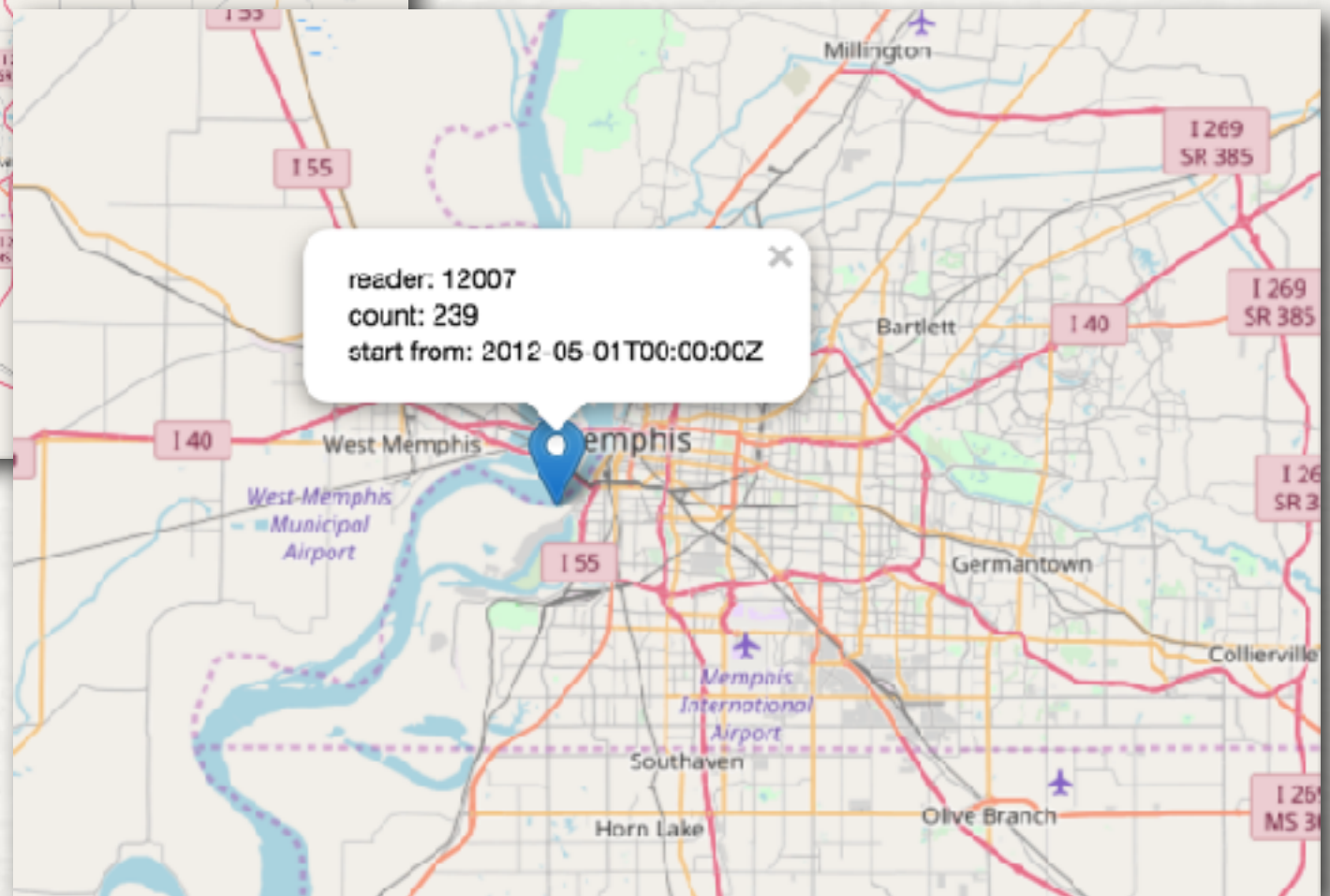- Toner
- Terrain
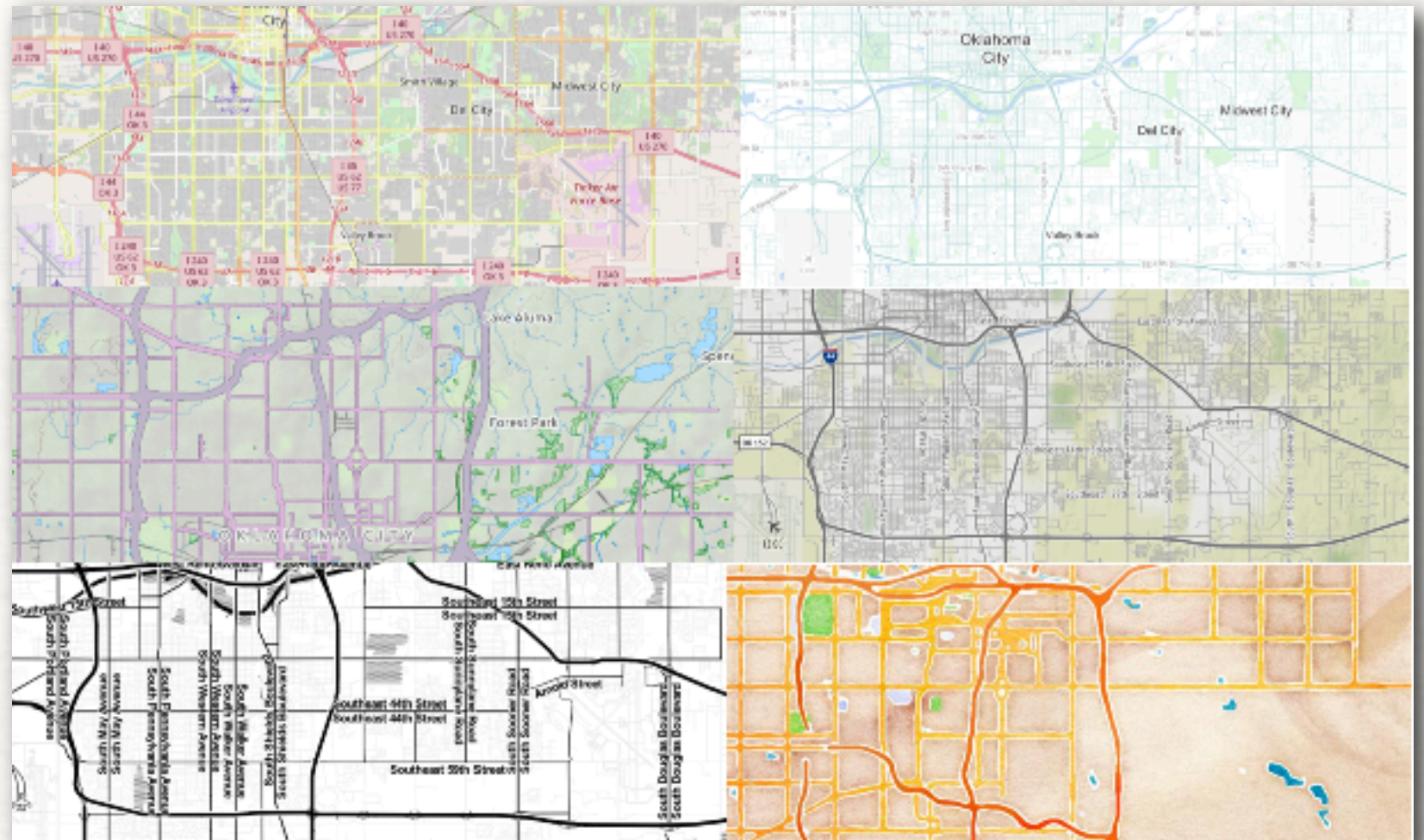
Visualize with different map layers/styles

JAVASCRIPT D3 LEAFLET

ADDING POPUPS

Popups show all the reader locations

Clicking on popup will show reader id, tag reads count and starting timestamp

reader: 12007
count: 239
start from: 2012-05-01T00:00:00Z