

Next Stop...



Tyler Green
[@greent_tyler](https://twitter.com/greent_tyler)

Transportation Camp CO 2016

Transitland = Database + Aggregator

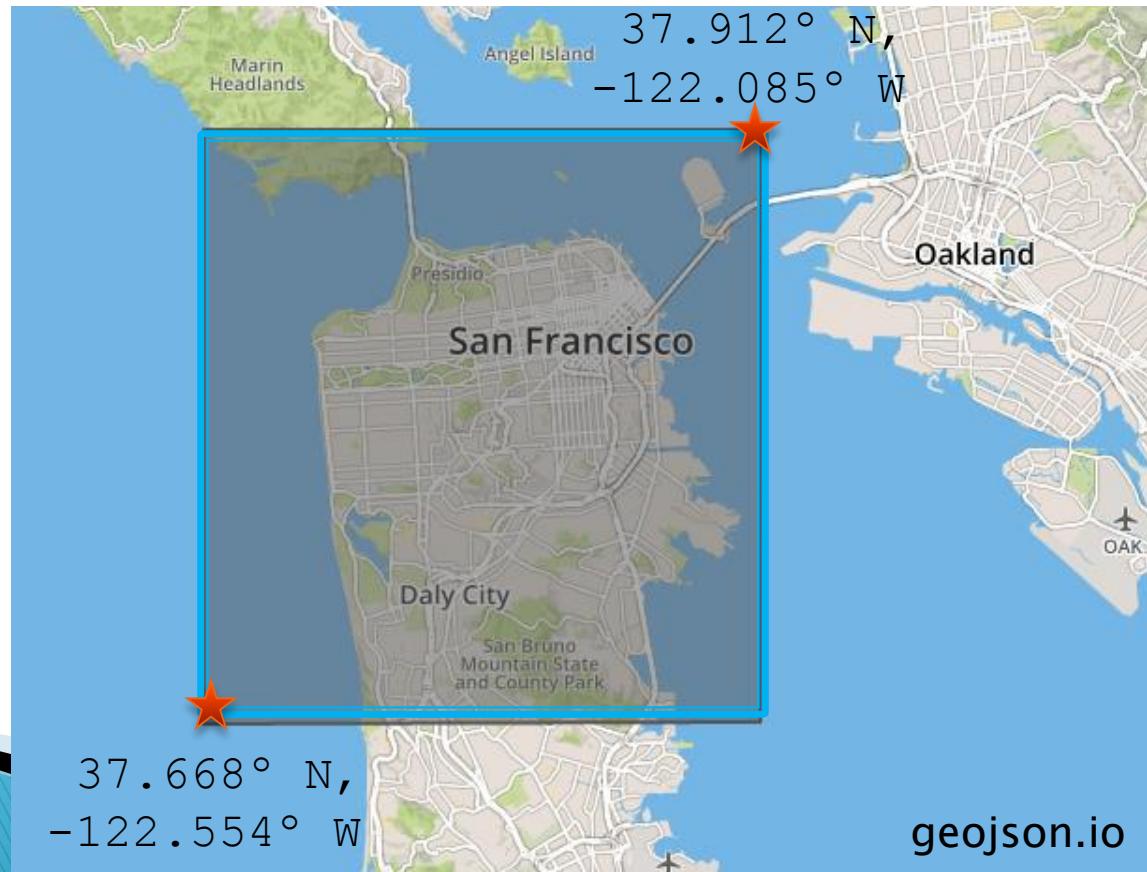
- ▶ Operators
- ▶ Routes
- ▶ Stops
- ▶ Feeds
- ▶ Schedule Stop Pairs



Operators in San Francisco

- Let's say you want to know all the public transit operators in San Francisco...

[https://transit.land/api/v1/operators?bbox=
-122.554,37.668,-122.085,37.912](https://transit.land/api/v1/operators?bbox=-122.554,37.668,-122.085,37.912)



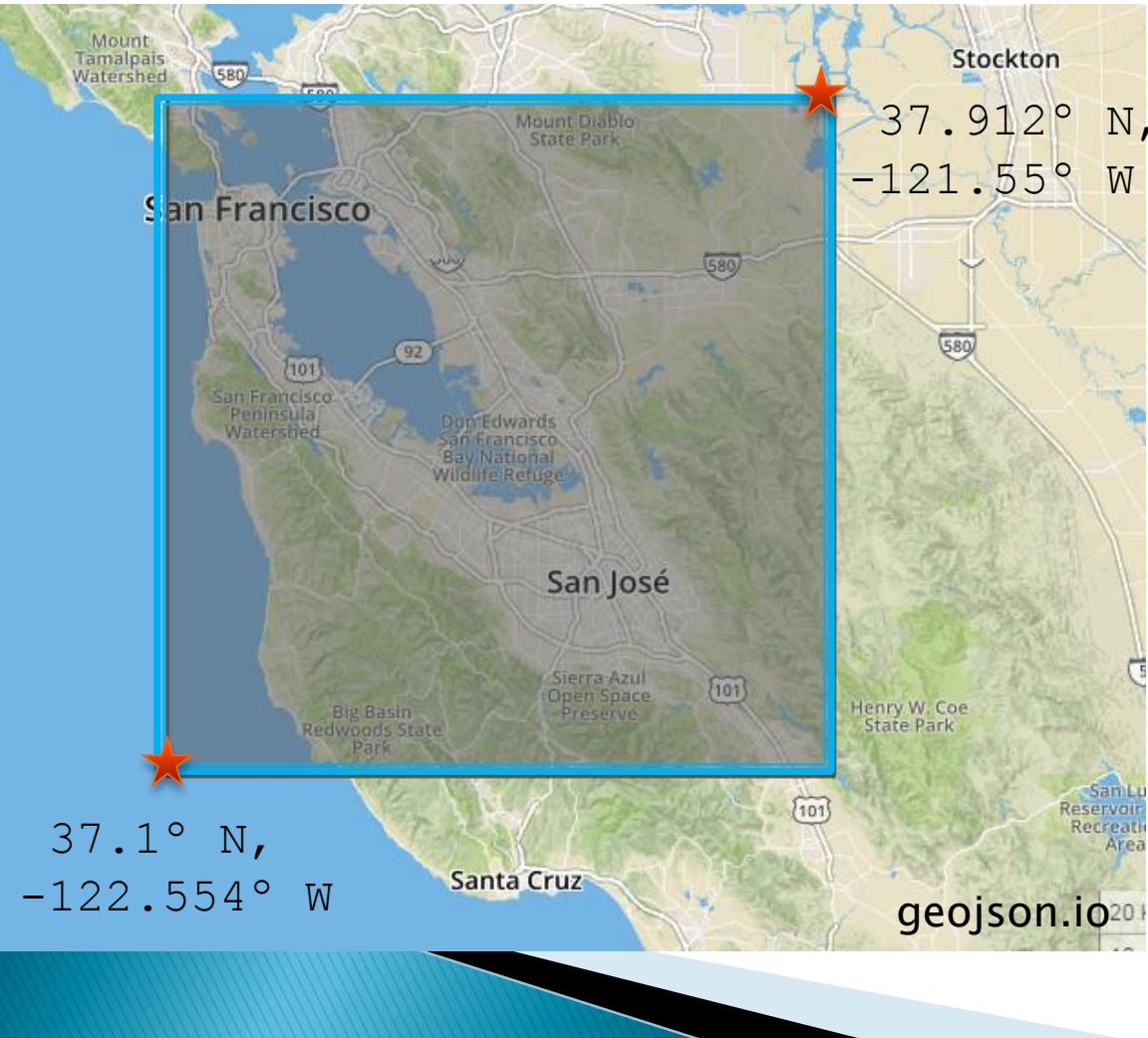
{"operators":[{"identifiers":{"usntd://9134","gtfs://f-9q9-caltrain/o/CT"}],"imported_from_feed_onestop_ids":["f-9q9-caltrain"],"imported_from_feed_version_shals":["22d46513a229c9a10c4d04c8d34bb89d5e422147","36ba71b654ba6ed1e4866822832c11942c4761e5"],"created_or_updated_in_changeset_id":909,"name":"Caltrain","short_name":null,"onestop_id":"o-9q9-caltrain","geometry":{"type":"Polygon","coordinates":[[[-121.56707599999999,37.00544999999999],[[-122.231594,37.48589199999964],[-122.386097,37.59922999999995],[-122.411291,37.629831],[-122.395406,37.77654099999995],[-121.652744,37.131693],[-121.609916,37.085107],[-121.56707599999999,37.00544999999996]]]},"tags":{},"website":"http://www.caltrain.com/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-02-06T20:03:44.620Z","updated_at":"2016-04-11T23:45:03.981Z","represented_in_feed_onestop_ids":["f-9q9-caltrain"]},{"identifiers":{"usntd://9003","gtfs://f-9q9-bart/o/BART"}],"imported_from_feed_onestop_ids":["f-9q9-bart"],"imported_from_feed_version_shals":["a0a0e854e04362c0791629b91c93375f6471a2ea"],"dd7aca4a8e4c90908fd3603c097fabee75fea907],"created_or_updated_in_changeset_id":924,"name":"Bay Area Rapid Transit","short_name":"BART","onestop_id":"o-9q9-bart","geometry":{"type":"Polygon","coordinates":[[[-121.97640000000001,37.557354999999994],[-122.38665999999999,37.59978699999985],[-122.46623299999997,37.68463800000001],[-122.4690807,37.70612055],[-122.35316500000002,37.936887],[-122.024597,38.00327499999964],[-121.945154,38.01891399999995],[-121.900367,37.70169499999994],[-121.97640000000001,37.55735499999994]]]},"tags":{},"website":"http://www.bart.gov/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-02-06T20:03:47.611Z","updated_at":"2016-04-12T02:09:18.384Z","represented_in_feed_onestop_ids":["f-9q9-bart"]},{"identifiers":{"usntd://9014","gtfs://f-9q9-actransit/o/AC9620Transit"}],"imported_from_feed_onestop_ids":["f-9q9-actransit"],"imported_from_feed_version_shals":["b413a1d08799ee6b4af69ea0df5c1101a8590978","e24abb4dfb496123ebc7345437c27415b0306296"],"99a690251c960d301a9f3df4894c6a93f627698d"],"created_or_updated_in_changeset_id":977,"name":"Alameda-Contra Costa Transit District","short_name":"AC Transit","onestop_id":"o-9q9-actransit","geometry":{"type":"Polygon","coordinates":[[[-122.145893,37.39344699999997],[-122.14871499999997,37.3938419999998],[-122.29981799999997,37.53518599999996],[-122.41820599999997,37.752327],[-122.421947,37.77282899999995],[-122.421947,37.77282899999996],[-122.38678600000001,37.92886999999998],[-122.354525,37.99317099999997],[-122.349579,37.99672599999995],[-121.945377,38.01744299999986],[-121.894138,37.43169999999964],[-121.90015699999998,37.413860999999926],[-122.145893,37.39344699999997]]]},"tags":{},"website":"http://www.actransit.org/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-02-06T20:05:25.935Z","updated_at":"2016-04-12T10:14:43.422Z","represented_in_feed_onestop_ids":["f-9q9-actransit"]},{"identifiers":{"usntd://9009","gtfs://f-9q8-samtrans/o/samtrans-ca-us"}],"imported_from_feed_onestop_ids":["f-9q8-samtrans"],"imported_from_feed_version_shals":["2407cca53dc4164c35bfaea369b320d429b090b6"],"177c0958e62ea551eaa45cd7c6b250ef77463703],"created_or_updated_in_changeset_id":920,"name":"San Mateo County Transit District","short_name":"Samtrans","onestop_id":"o-9q8-samtrans","geometry":{"type":"Polygon","coordinates":[[[-122.39250000000001,37.25029999999989],[-122.412922,37.259608],[-122.51796000000002,37.53555999999975],[-122.51575700000001,37.569983],[-122.49301000000001,37.68985000000001],[-122.48510499999999,37.72418499999997],[-122.48333,37.726979999999976],[-122.41845000000002,37.77517999999956],[-122.39727999999987,37.79009999999974],[-122.39649999999997,37.790136999999994],[-122.39243,37.79008999999998],[-122.13207,37.47270999999985],[-122.13037,37.47045000000001],[-122.12491999999997,37.45733999999995],[-122.19462100000001,37.38174499999995],[-122.19610000000002,37.37707999999964],[-122.21142,37.36789000000001],[-122.3828269999998,37.25168599999999],[-122.39250000000001,37.2502999999998]]]},"tags":{},"website":"http://www.samtrans.com/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-02-06T20:05:37.103Z","updated_at":"2016-04-12T01:49:20.823Z","represented_in_feed_onestop_ids":["f-9q8-samtrans"]},{"identifiers":{"usntd://9015","gtfs://f-9q8y-sfmta/o/SFMTA"}],"imported_from_feed_onestop_ids":["f-9q8y-sfmta"],"imported_from_feed_version_shals":["1e7624e6ced0d60dd5f20223cdfee72e651acf1"],"d3b363854a4abc23a252bd044946d22acd7c23dc,"b9f3435201a26b40f76d7283512b6522413e24fd],"created_or_updated_in_changeset_id":1190,"name":"San Francisco Municipal Transportation Agency","short_name":"SFMTA","onestop_id":"o-9q8y-sfmta","geometry":{"type":"Polygon","coordinates":[[[-122.46927299999999,37.7057639999998],[-122.48498,37.70913],[-122.48529399999998,37.7093119999997],[-122.49765999999997,37.71676999999999],[-122.49913,37.71873799999998],[-122.500028,37.71889599999998],[-122.50682100000002,37.73548199999976],[-122.53867,37.83238],[-122.50214,37.83644299999996],[-122.48383,37.8359199999997],[-122.3734769999998,37.82981999999984],[-122.371964,37.82823109999999],[-122.36363000000002,37.8200009999998],[-122.365447,37.72792000000005],[-122.39283599999997,37.70980399999997],[-122.39422000000002,37.70897999999998],[-122.413084,37.70629599999995],[-122.46923900000002,37.70576399999998],[-122.46927299999999,37.7057639999998]]]},"tags":{},"website":"http://www.sfmta.com/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-02-06T20:05:45.606Z","updated_at":"2016-04-26T00:22:30.620Z","represented_in_feed_onestop_ids":["f-9q8y-sfmta"]},{"identifiers":{"gtfs://f-9qb-goldengatetransit/o/"}],"imported_from_feed_onestop_ids":["f-9qb-goldengatetransit"],"imported_from_feed_version_shals":["f712f9ffd4a9060e438be477cd919f9d99dfc41"],"created_or_updated_in_changeset_id":921,"name":"Golden Gate Transit","short_name":null,"onestop_id":"o-9qb-goldengatetransit","geometry":{"type":"Polygon","coordinates":[[[-122.409988,37.77481499999999],[-122.470833,37.78059799999989],[-122.538048,37.88018],[-122.60413399999999,38.00022099999996],[-122.71250899999997,38.32126599999994],[-122.74028000000001,38.47153099999956],[-122.733391,38.47208],[-122.73262,38.47197],[-122.71727799999998,38.4591979999997],[-122.317383,37.925316],[-122.295769,37.880764],[-122.29209900000001,37.86942299999999],[-122.286629,37.8524280000001],[-122.289764,37.841072],[-122.398933,37.78061299999999],[-122.409988,37.77481499999999]]]},"tags":{},"agency_lang":"en","agency_phone":"(415) 455-2000","agency_fare_url":"http://www.goldengatetransit.org/fareprograms/","website":"http://www.goldengate.org/","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-03-18T18:31:36.545Z","updated_at":"2016-04-12T01:57:17.888Z","represented_in_feed_onestop_ids":["f-9qb-goldengatetransit"]},{"identifiers":{"gtfs://f-9qc-westcat-ca-us/o/392"}],"imported_from_feed_onestop_ids":["f-9qc-westcat-ca-us"],"imported_from_feed_version_shals":["c2a005f1fc5e3269c7b9a314204b1a882d9f71c7"],"created_or_updated_in_changeset_id":922,"name":"WestCat (Western Contra Costa)","short_name":null,"onestop_id":"o-9qc-westcatwesterncontracosta","geometry":{"type":"Polygon","coordinates":[[[-122.3928600000001,37.78974999999999],[-122.32175,38.00547999999984],[-122.25795,38.04638],[-122.23068545754701,38.05510498952068],[-122.22011,38.05571999999999],[-122.13516201108.38.01943051792079],[-122.1144999999998,37.99414],[-122.3928600000001,37.78974999999999]]]},"tags":{},"agency_id":392,"agency_lang":"en","agency_phone":":510-724-7993,"agency_fare_url":"http://www.westcat.org/fares/index.html"}, {"website":"http://www.westcat.org/index.html","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-03-19T00:21:50.341Z","updated_at":"2016-04-12T01:59:39.224Z","represented_in_feed_onestop_ids":["f-9qc-westcat-ca-us"]}, {"identifiers":{"gtfs://f-9q8-commuteorgshuttle/o/alliance"}],"imported_from_feed_onestop_ids":["f-9q8-commuteorgshuttle"],"imported_from_feed_version_shals":["15ed57568925c77676526f46a9098f99b8c4d04e"],"created_or_updated_in_changeset_id":1330,"name":"Commute.org Shuttles","short_name":null,"onestop_id":"o-9q8-commuteorgshuttle","geometry":{"type":"Polygon","coordinates":[[[-122.20406300000002,37.48536499999999],[-122.232469,37.48539699999999],[-122.32761100000002,37.55311999999994],[-122.382851,37.58375599999999],[-122.443379,37.66363599999999],[-122.446914,37.72071299999999],[-122.40163699999987,37.7122670001,37.57134200000001],[-122.201074,37.48592000000001],[-122.20406300000002,37.48536499999999]]]},"tags":{},"agency_id":392,"agency_lang":":en,"agency_phone":":(650) 588-8170","website":"http://www.commute.org","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-04-22T22:06:11.652Z","updated_at":"2016-05-07T00:41:22.344Z","represented_in_feed_onestop_ids":["f-9q8-commuteorgshuttle"]}, {"identifiers":{"gtfs://f-9q8-commuteorgshuttle/o/alliance"}],"imported_from_feed_onestop_ids":["f-9q8-commuteorgshuttle"],"imported_from_feed_version_shals":["15ed57568925c77676526f46a9098f99b8c4d04e"],"created_or_updated_in_changeset_id":1330,"name":"Commute.org Shuttles","short_name":null,"onestop_id":"o-9q8-commuteorgshuttle","geometry":{"type":"Polygon","coordinates":[[[-122.20406300000002,37.48536499999999],[-122.232469,37.48539699999999],[-122.32761100000002,37.55311999999994],[-122.382851,37.58375599999999],[-122.443379,37.66363599999999],[-122.446914,37.72071299999999],[-122.40163699999987,37.7122670001,37.57134200000001],[-122.201074,37.48592000000001],[-122.20406300000002,37.48536499999999]]]},"tags":{},"agency_id":392,"agency_lang":":en,"agency_phone":":(650) 588-8170","website":"http://www.commute.org","country":"United States","state":"California","metro":"San Francisco Bay Area","timezone":"America/Los_Angeles","created_at":"2016-04-22T22:06:11.652Z","updated_at":"2016-05-07T00:41:22.344Z","represented_in_feed_onestop_ids":["f-9q8-commuteorgshuttle"]}], {"meta":{"sort_key":"id","sort_order":"asc","offset":0,"per_page":50}}

You said simple?

- ▶ The human-readable version of that already human-readable format:
 1. Caltrain
 2. Bay Area Rapid Transit
 3. Alameda-Contra Costa Transit District
 4. San Mateo County Transit District
 5. San Francisco Municipal Transportation Agency
 6. Golden Gate Transit
 7. WestCat (Western Contra Costa)
 8. Commute.org Shuttles

Where about the whole Bay Area?

[https://transit.land/api/v1/operators?
bbox=-122.554,37.1,-121.55,37.912](https://transit.land/api/v1/operators?bbox=-122.554,37.1,-121.55,37.912)



1. Caltrain
2. Bay Area Rapid Transit
3. Santa Clara Valley Transportation Authority
4. Alameda-Contra Costa Transit District
5. San Mateo County Transit District
6. San Francisco Municipal Transportation Agency
7. County Connection
8. San Joaquin Regional Transit District
9. Golden Gate Transit
10. Fairfield and Suisun Transit
11. Modesto Area Express
12. SolTrans
13. WestCat (Western Contra Costa)
14. Marin Transit
15. Commute.org Shuttles

Transitland = Database + Aggregator

- ▶ Operators
- ▶ **Routes**
- ▶ Stops
- ▶ Feeds
- ▶ Schedule Stop Pairs

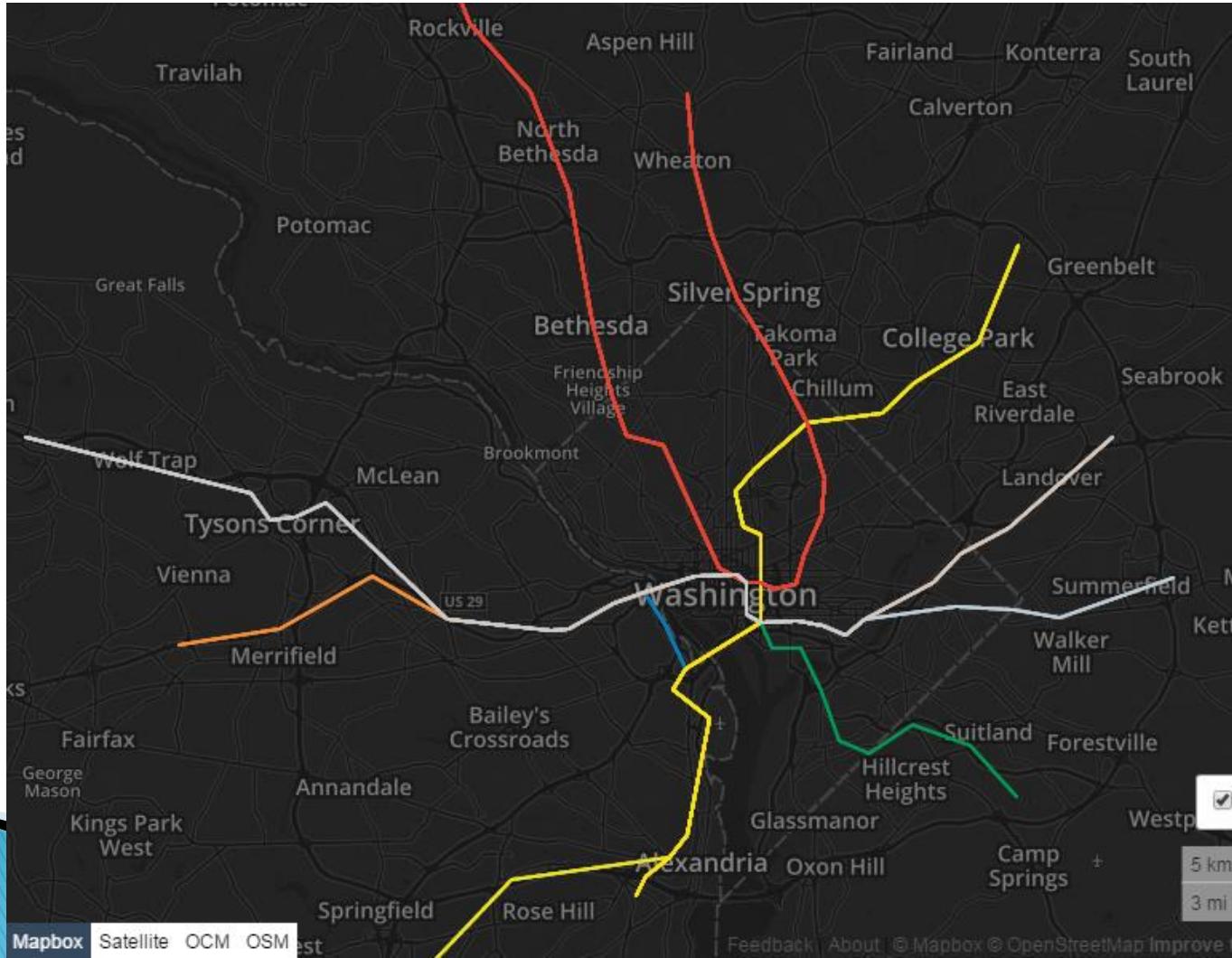


MAPZEN

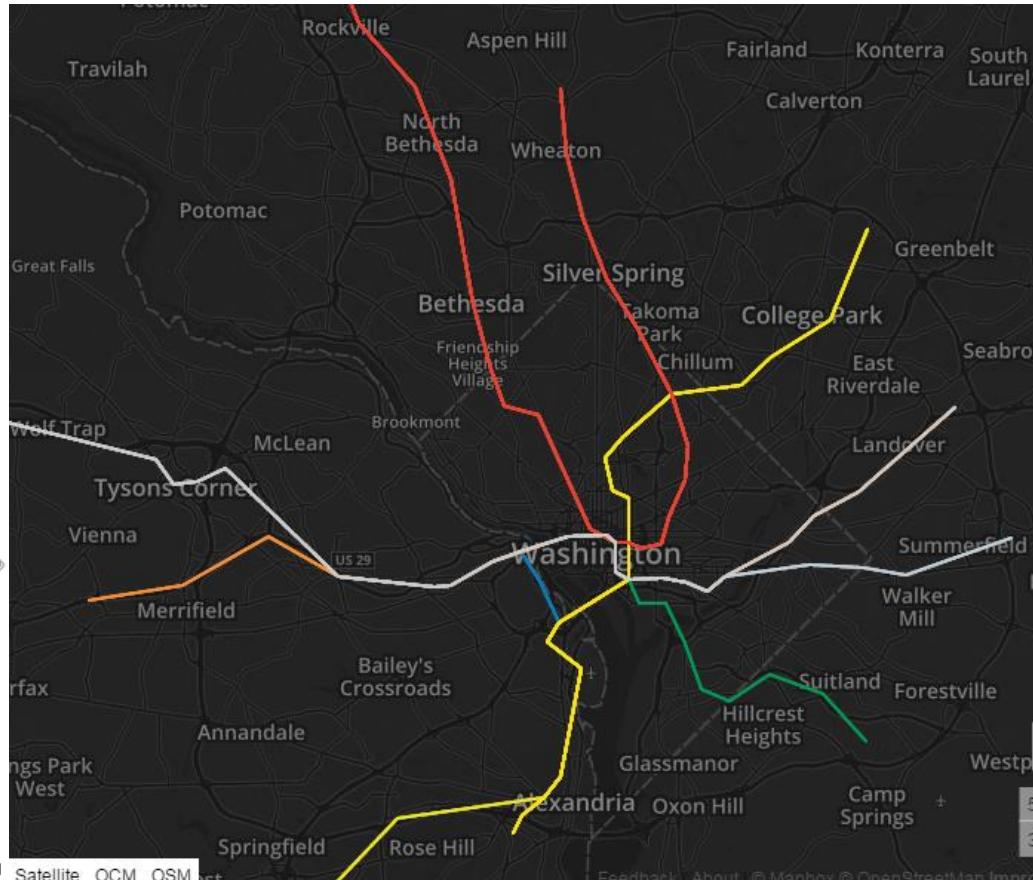


Routes in Washington, D.C.

[https://transit.land/api/v1/**routes**.geojson?
vehicle_type=**metro**&operatedBy=**o-dqc-met**](https://transit.land/api/v1/routes.geojson?vehicle_type=metro&operatedBy=o-dqc-met)



Where does the metro *actually* go?



Transitland = Database + Aggregator

- ▶ Operators
- ▶ Routes
- ▶ **Stops**
- ▶ Feeds
- ▶ Schedule Stop Pairs

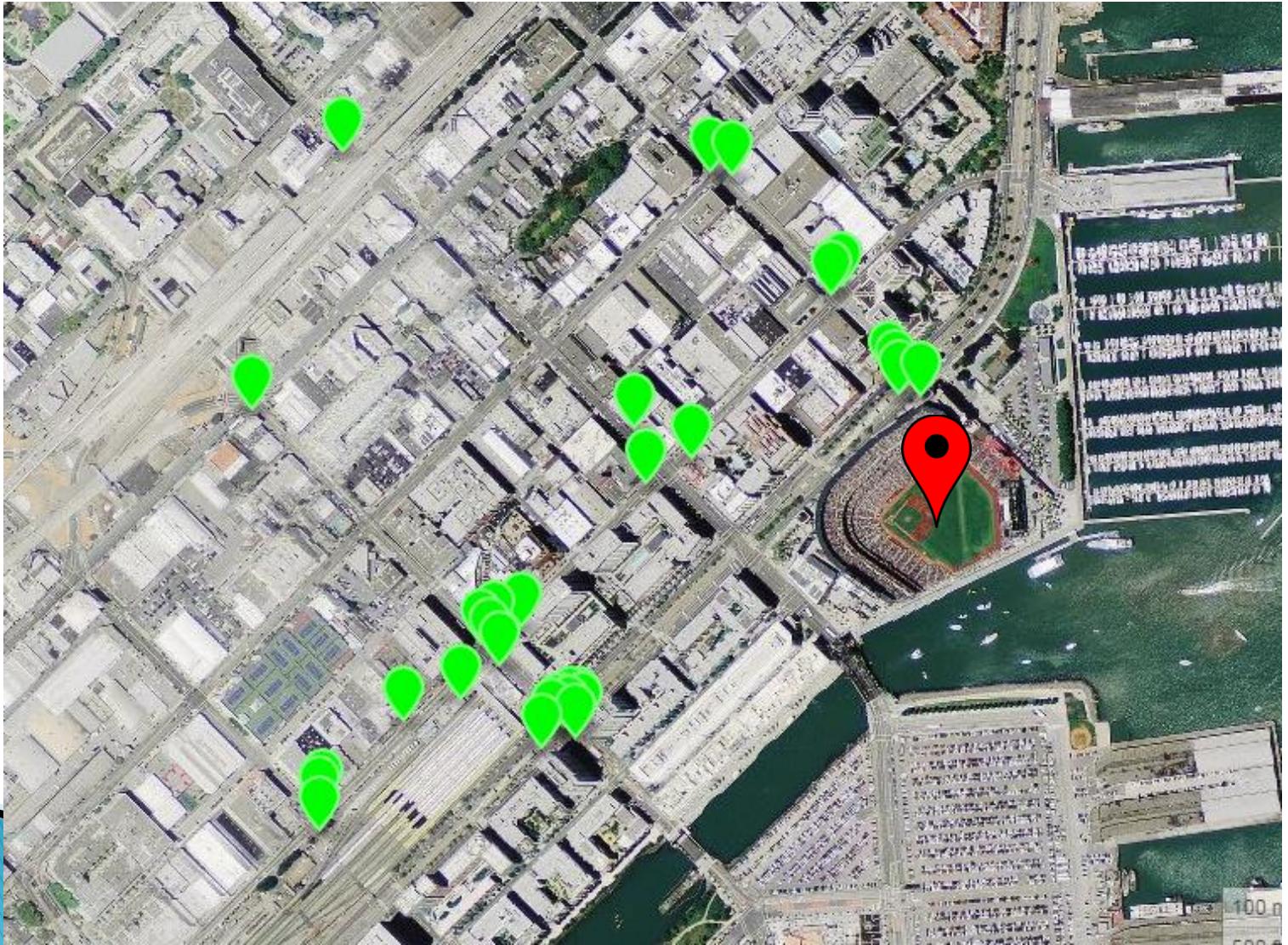


MAPZEN



Stops in San Francisco

[https://transit.land/api/v1/stops.geojson
?lon=-122.389167&lat=37.778611&r=804](https://transit.land/api/v1/stops.geojson?lon=-122.389167&lat=37.778611&r=804)



Transitland = Database + Aggregator

- ▶ Operators
- ▶ Routes
- ▶ Stops
- ▶ Feeds
 - Feed Versions
- ▶ Schedule Stop Pairs



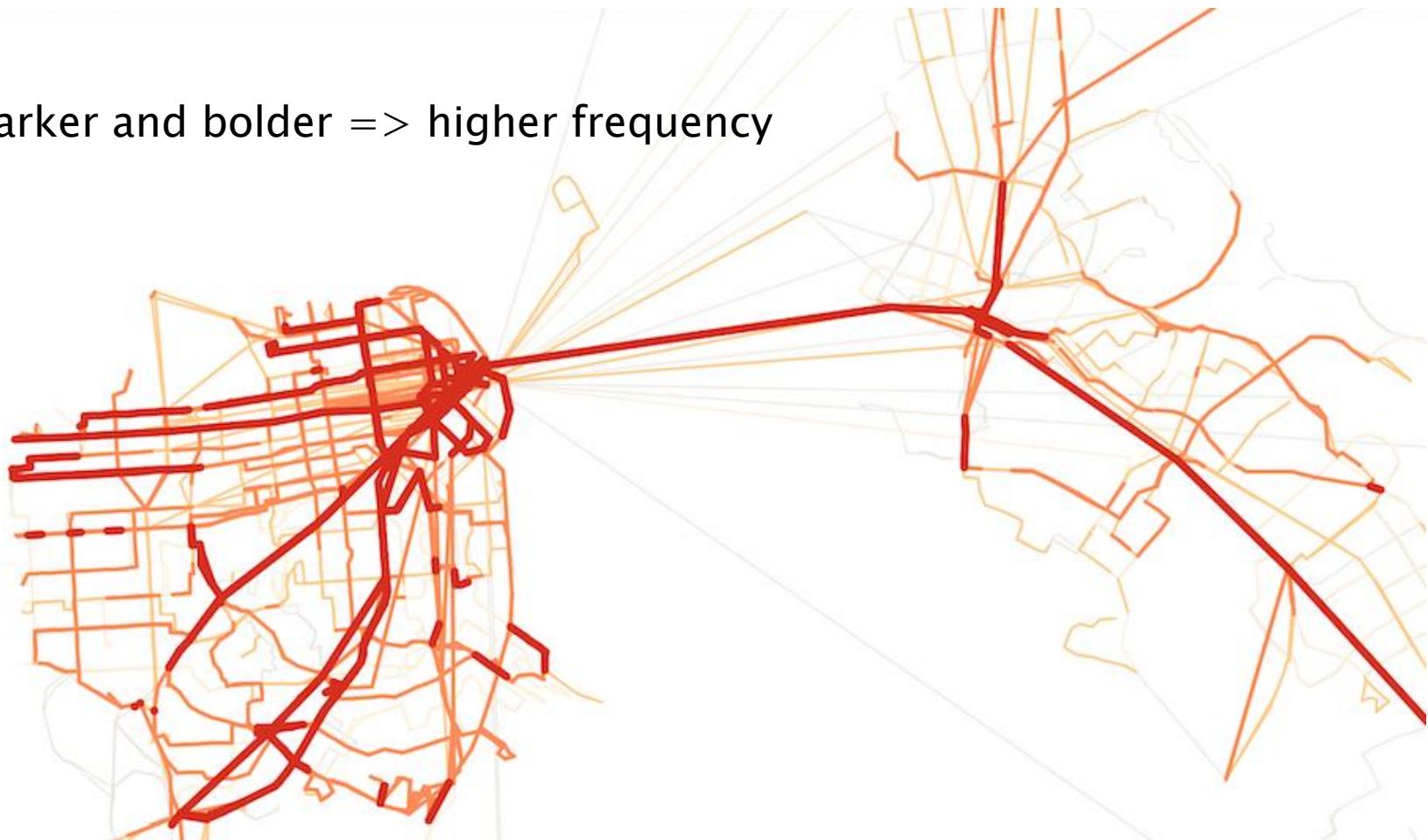
How about a real
project with
Transitland?



How about a real project with Transitland?

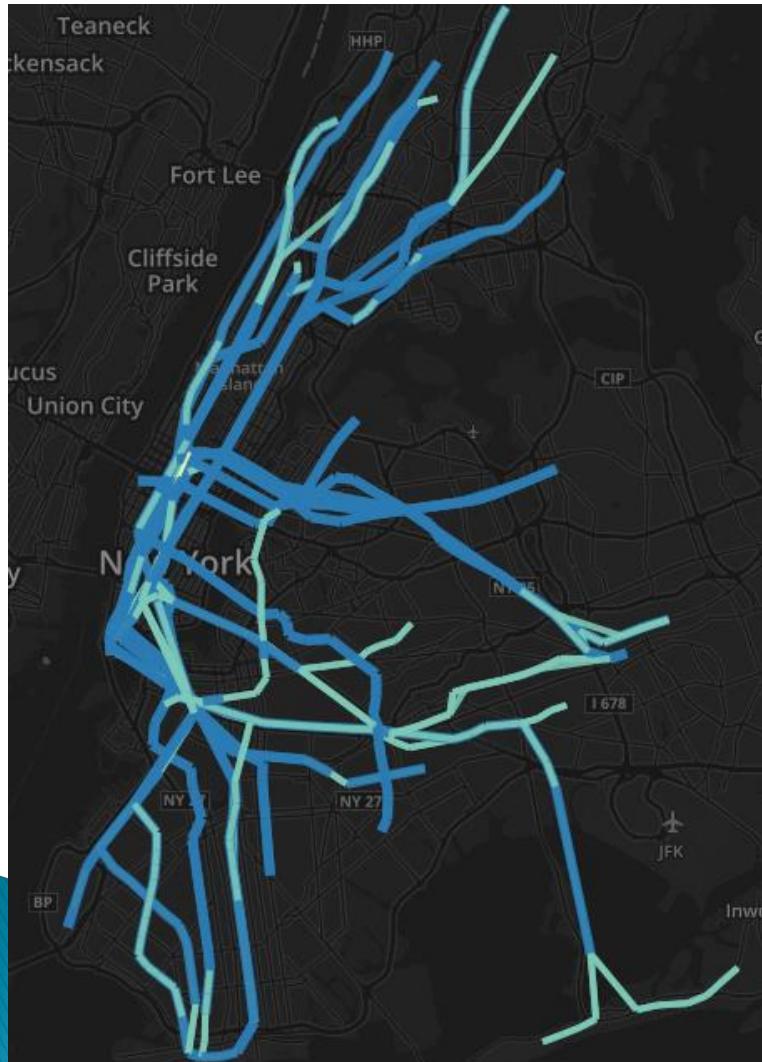
San Francisco Transit Frequency

Darker and bolder => higher frequency

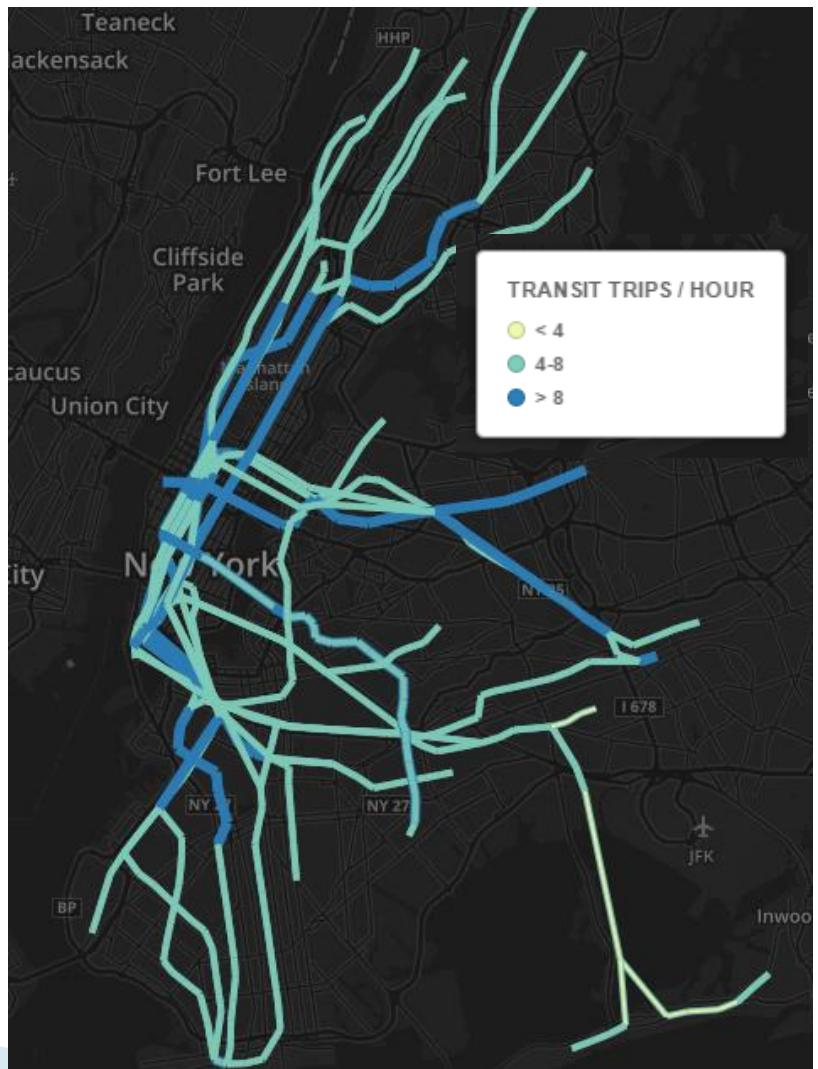


NYC Subway Frequency

Friday Morning Rush Hour

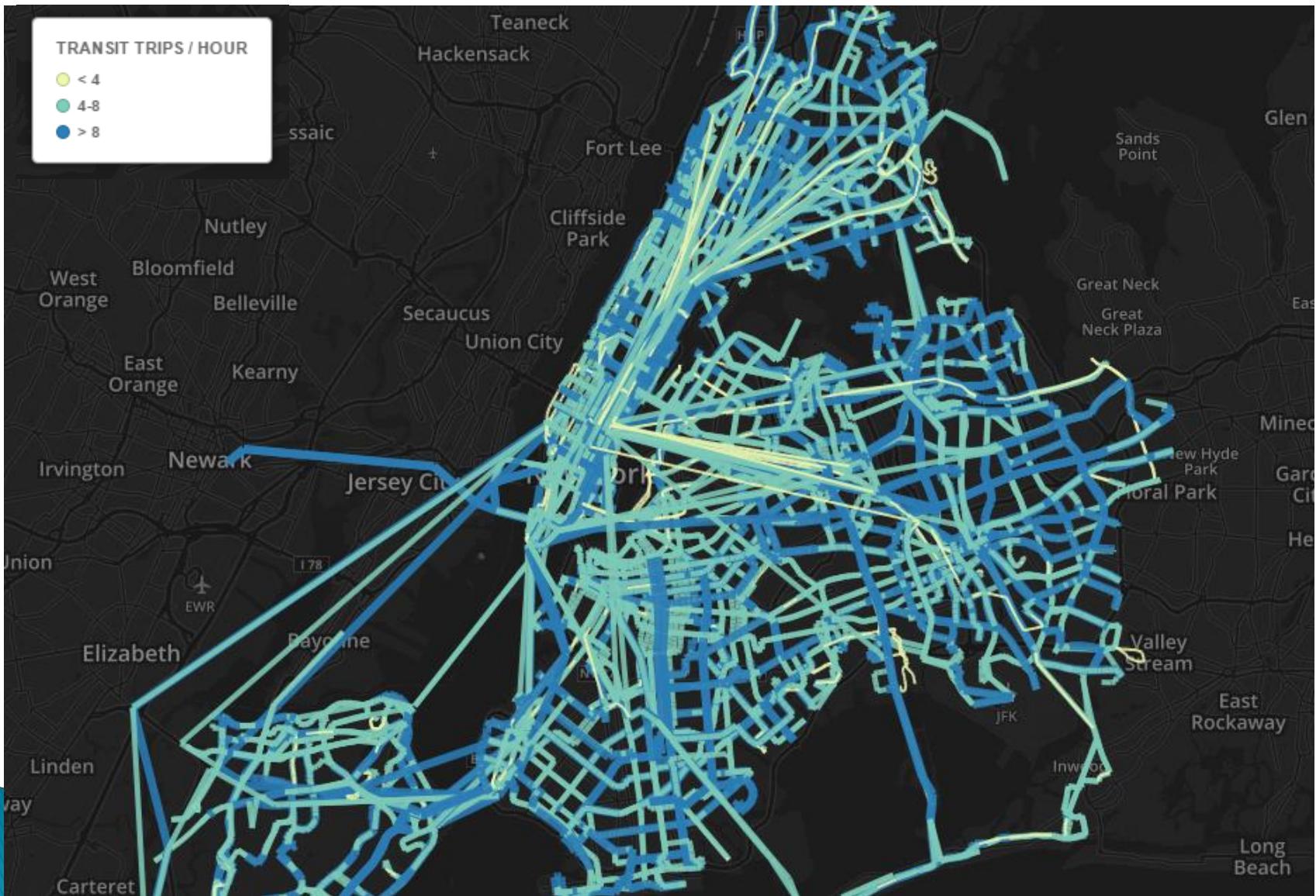


Saturday morning, same time



NYC Bus Frequency

Friday Morning Rush Hour

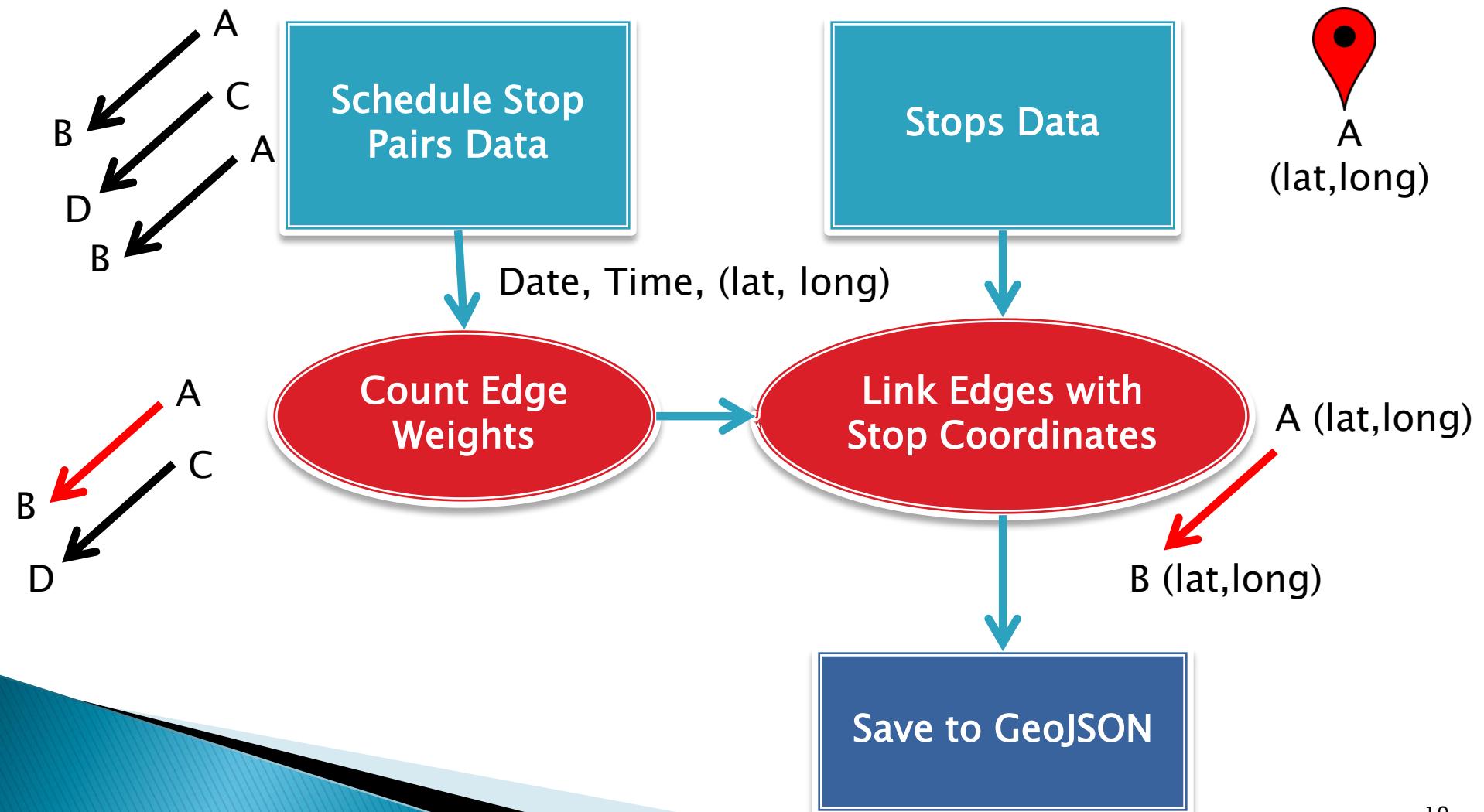


NYC Bus Frequency

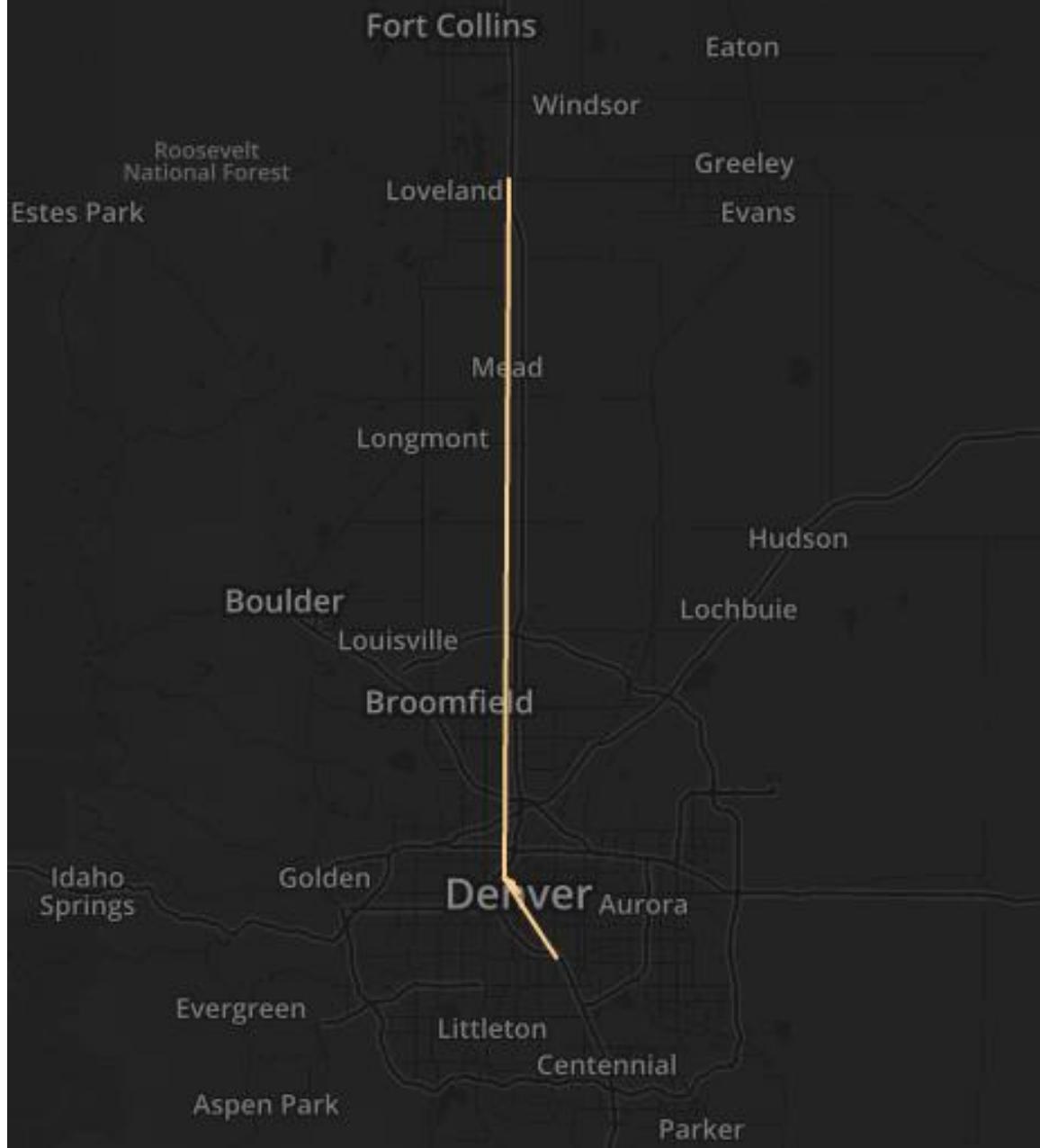
Saturday Morning, same time



Visualization Methodology



Colorado Transit Frequency



Colorado Transit Frequency



<https://www.codot.gov/travel/bustang>

Transitland Playground

SHOW ME ROUTES BY OPERATOR

IN

UNITED STATES

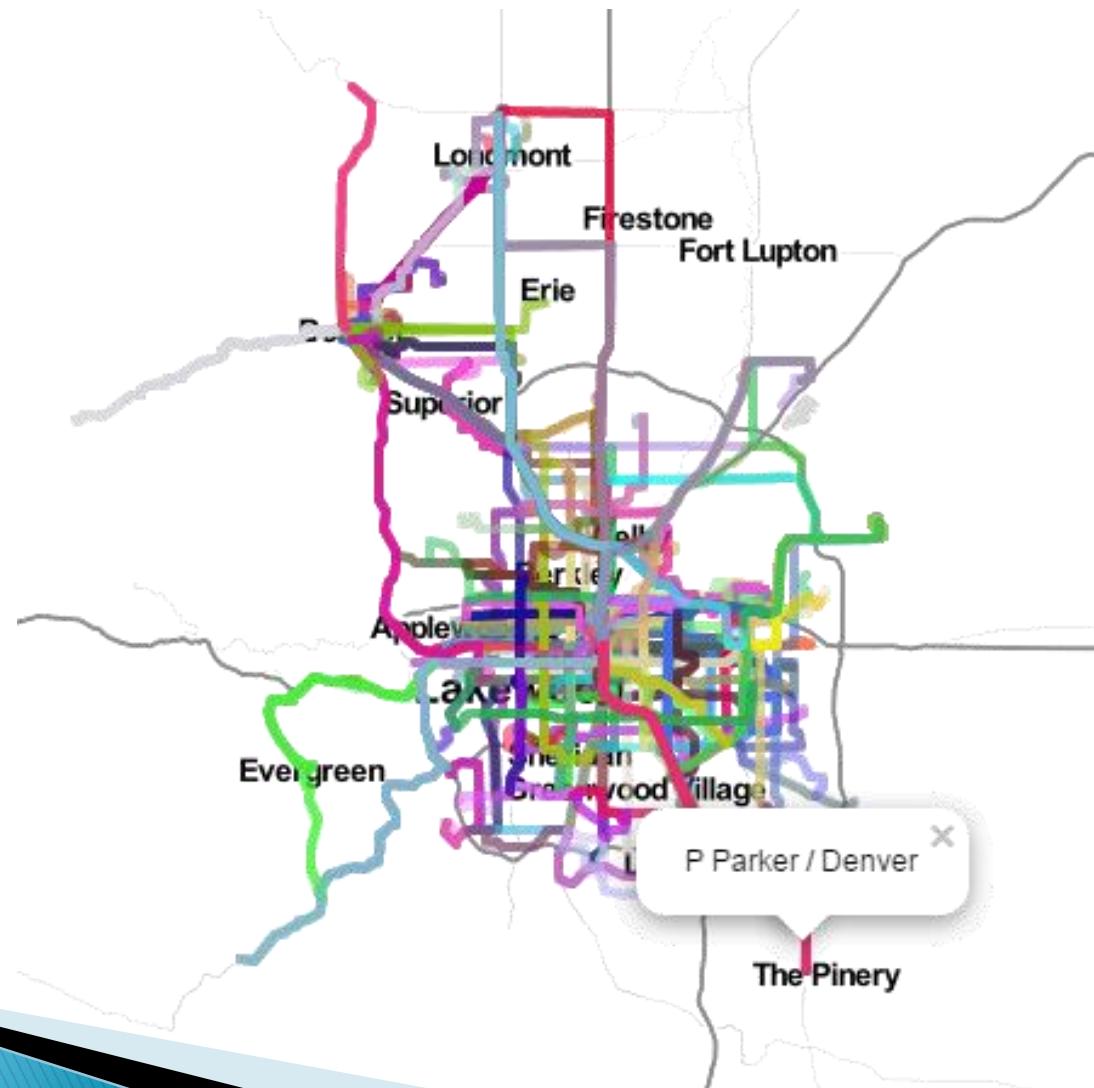
COLORADO

DENVER

REGIONAL TRANSPORTATION DISTRICT

RUN QUERY

RTD Routes through Playground



Let's Contribute!

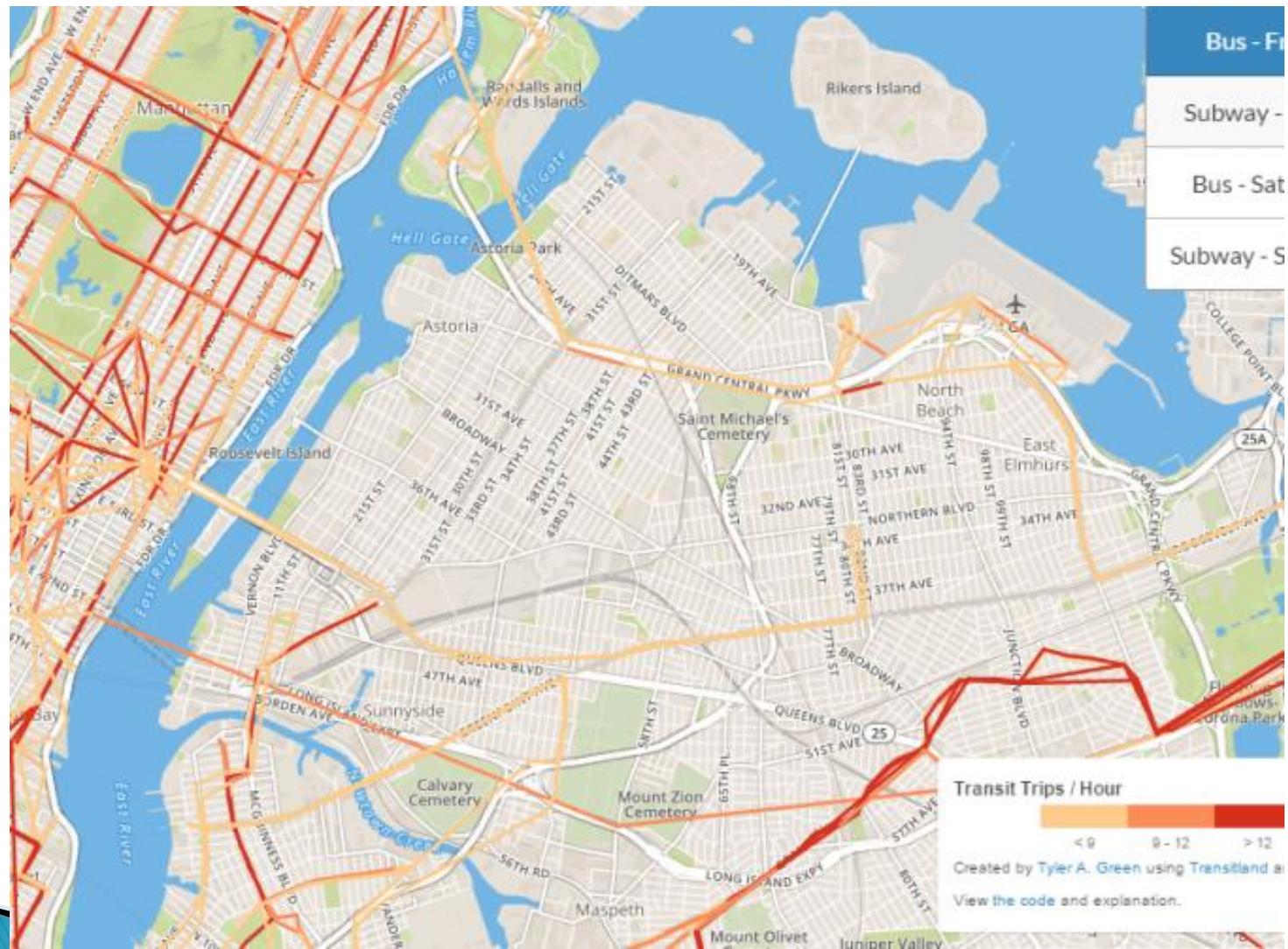
- ▶ You can submit feeds to transit.land
- ▶ The entire project is open source!

My Contribution

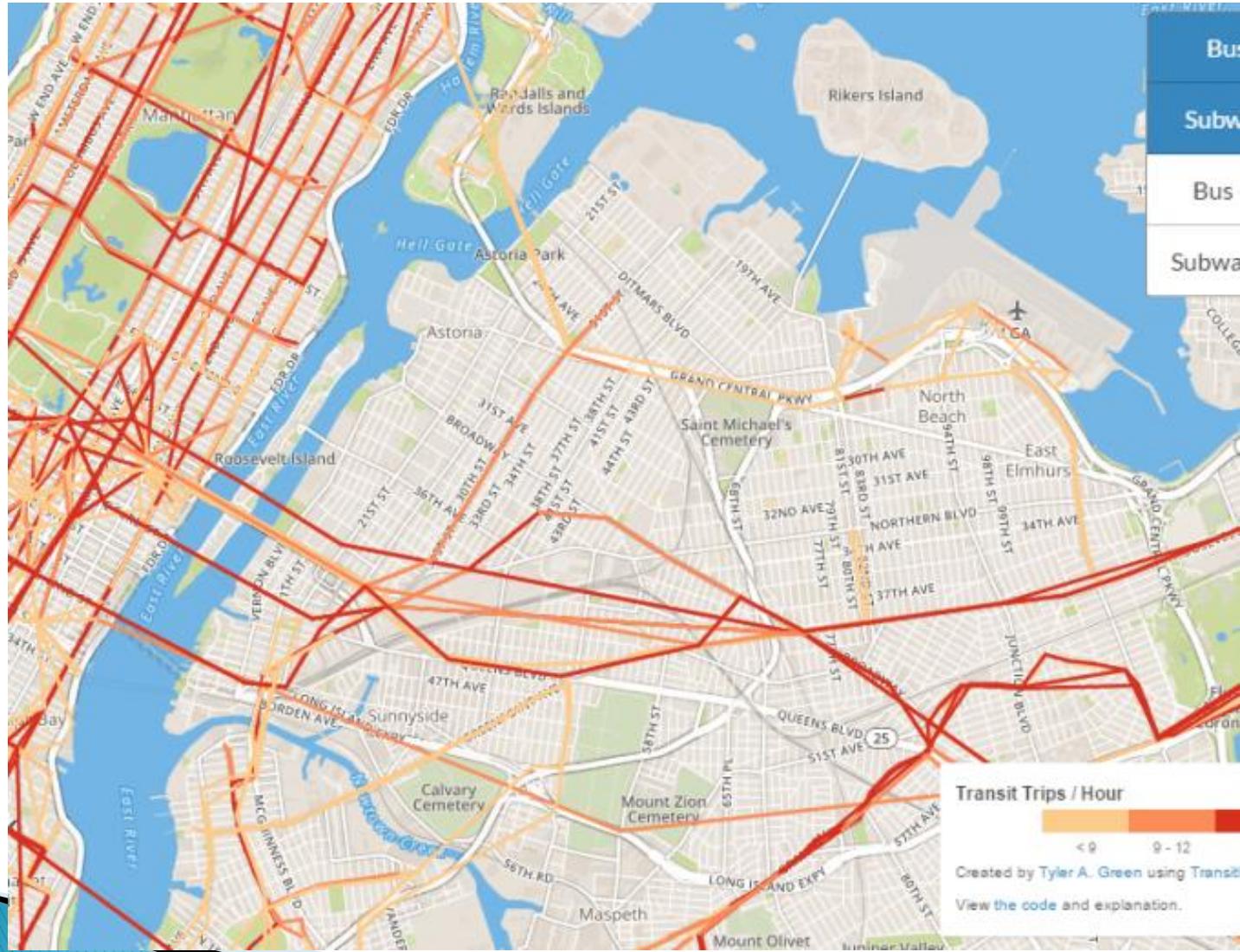
Ruby

```
require 'transitland_client'  
bbox = '-122.35,37.668,-122.554,37.84'  
ops = TransitlandClient::Operator.find_by(bbox: bbox)  
names = ops.map { |op| op.get(:name) }  
puts names  
  
["Caltrain", "Bay Area Rapid Transit", "Alameda-Contra Costa  
Transit District", "San Mateo County Transit District", "San  
Francisco Municipal Transportation Agency", "Golden Gate  
Transit", "WestCat (Western Contra Costa)", "Commute.org  
Shuttles"]
```

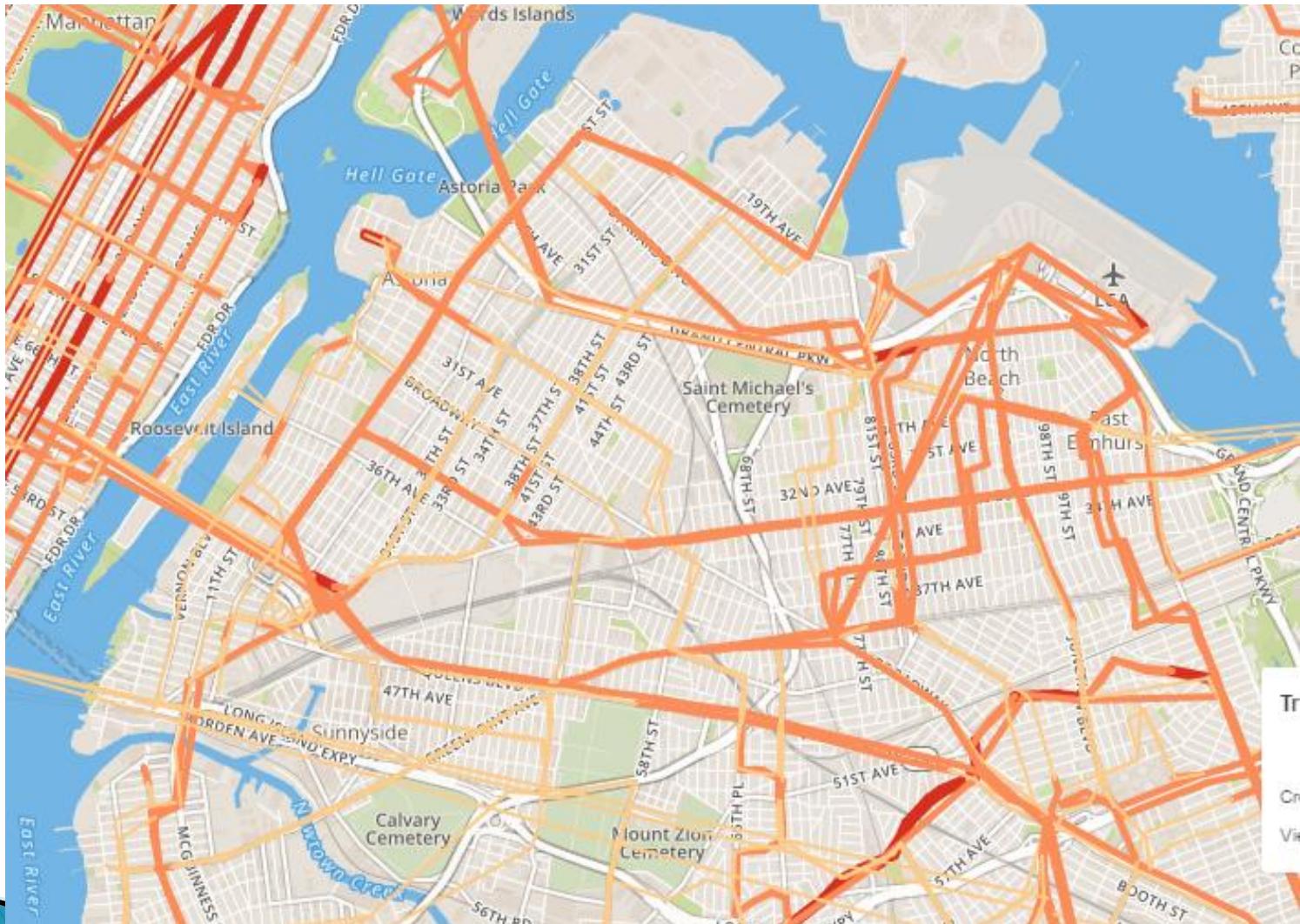
Collaboration at Work



Collaboration at Work



Collaboration at Work



It's up to us!

- ▶ It's a platform, it's up to us to employ it
- ▶ Let's brainstorm! How can we cross...
 - Operators
 - Routes
 - Stops
 - Feeds
 - Schedule Stop Pairs

Backup Slides

Onestop ID

- ▶ Unique identifier for feeds, operators, stops, and routes



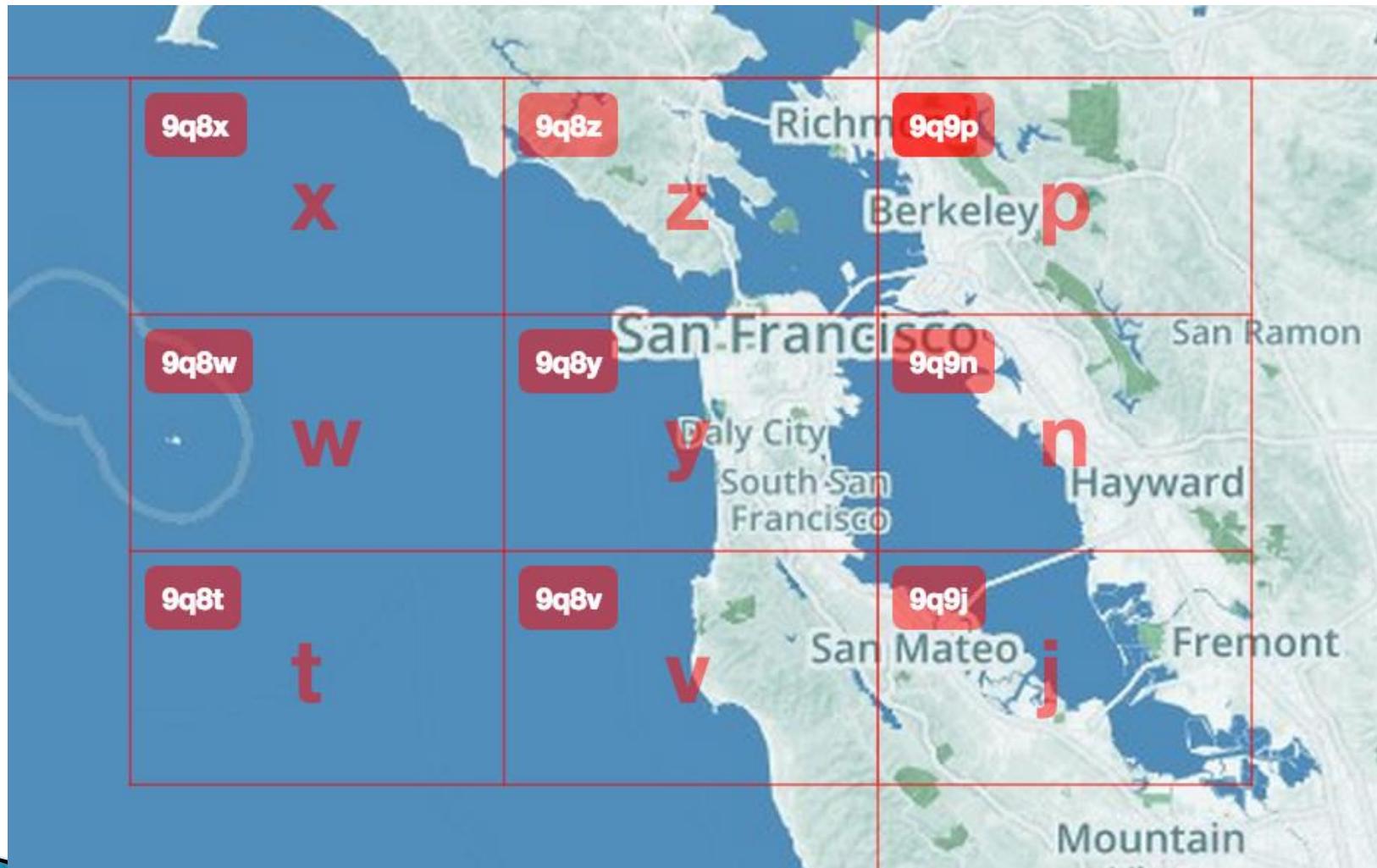
Geohashes Explained



Geohashes Explained



Geohashes Explained



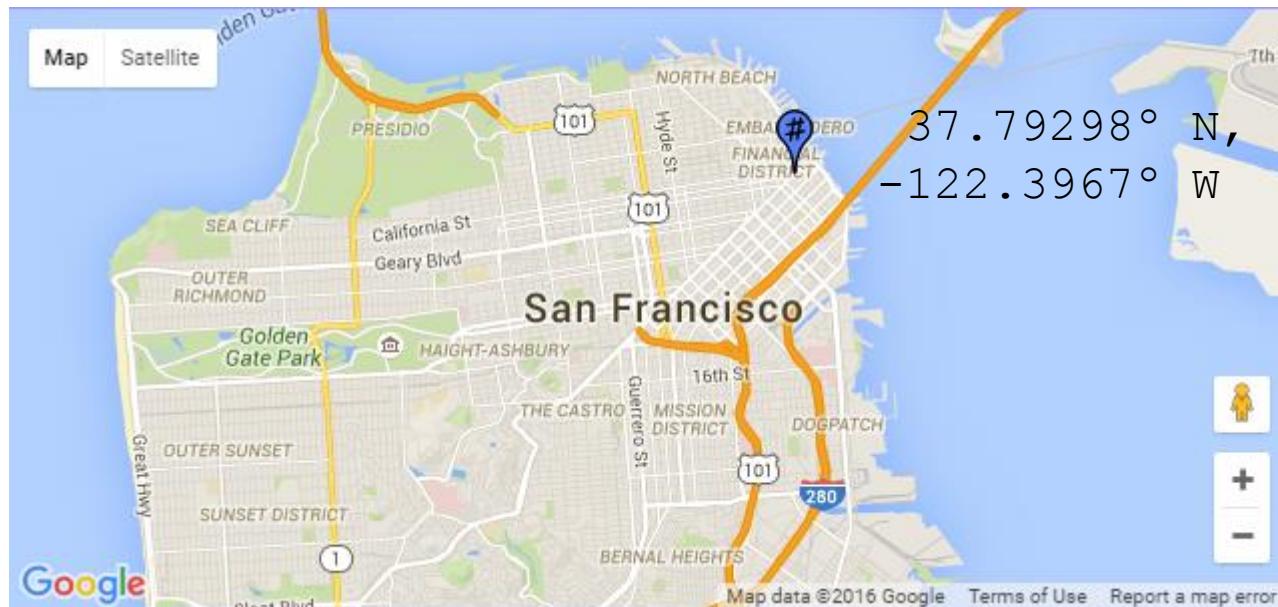
Geohashes Explained



http://mcdonalds.wikia.com/wiki/Hash_Browns
<https://mapzen.com/blog/geohashes-and-you/>

Geohash for a Stop

- ▶ [https://transit.land/api/v1/stops/
s-9q8znb12j1-embarcadero](https://transit.land/api/v1/stops/s-9q8znb12j1-embarcadero)



```
... "onestop_id": "s-9q8znb12j1-  
embarcadero", "geometry": { "type": "Point", "coordinates":  
[-122.396742, 37.792976] }, "name": "Embarcadero" ...
```