

Architecting the Internet of Things

@blimpyacht

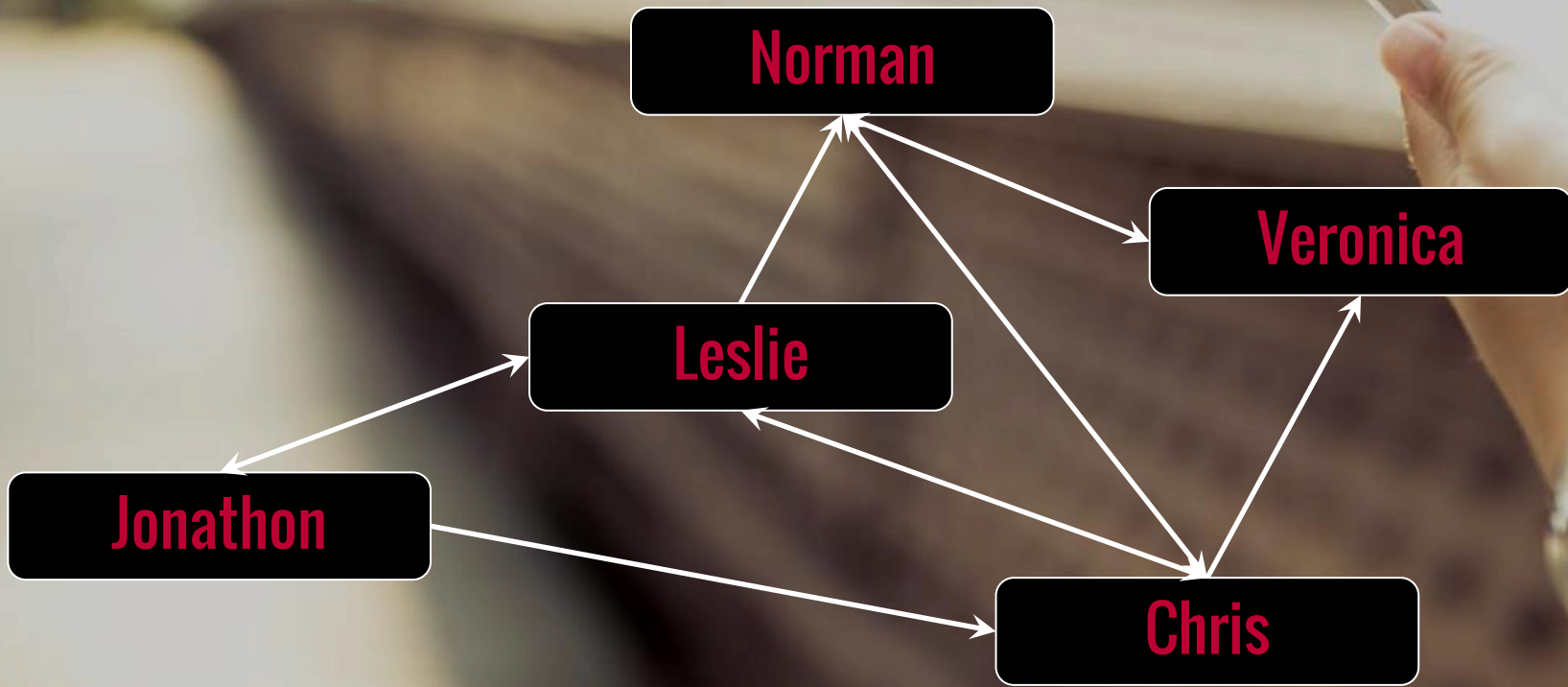




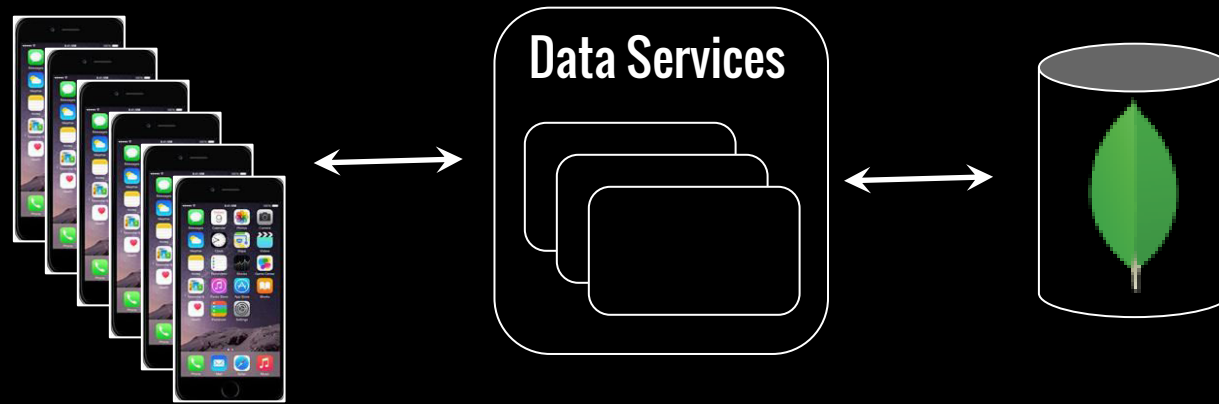








High Level Architecture

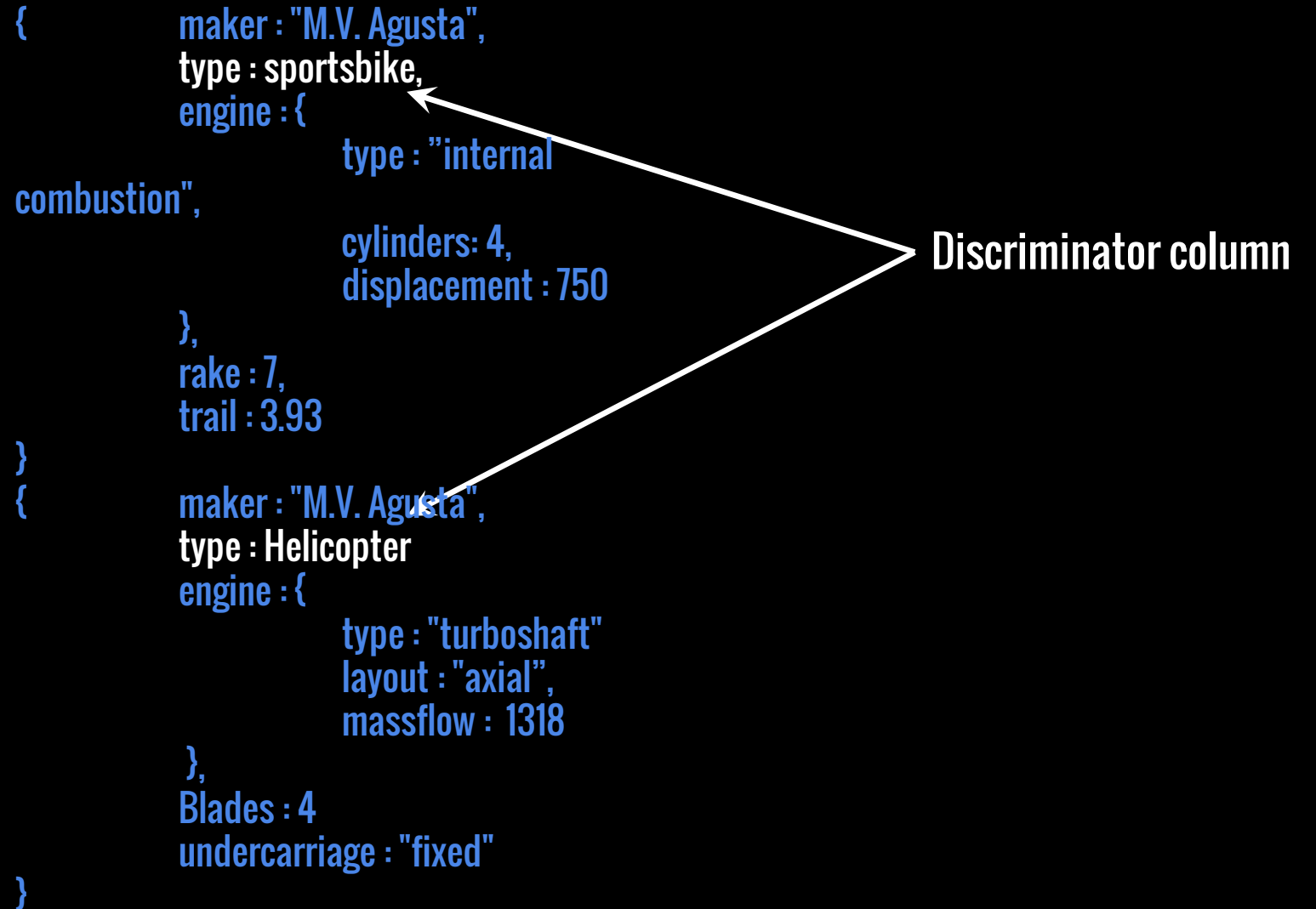


Data Strategy

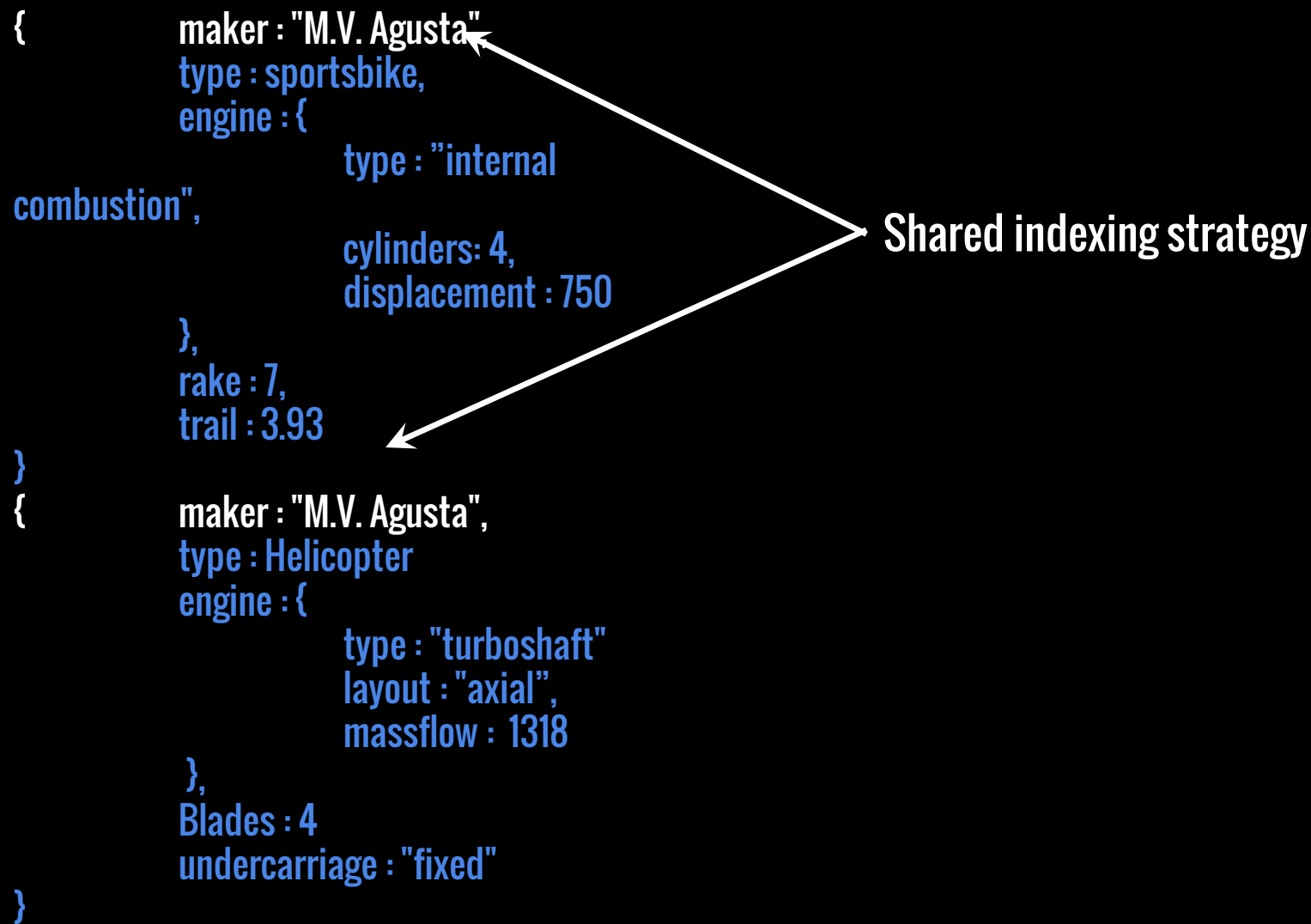
Flexible Schemas

```
{
  maker : "M.V. Agusta",
  type : sportsbike,
  engine : {
    type : "internal
combustion",
    cylinders: 4,
    displacement : 750
  },
  rake : 7,
  trail : 3.93
}
{
  maker : "M.V. Agusta",
  type : Helicopter
  engine : {
    type : "turboshaft"
    layout : "axial",
    massflow : 1318
  },
  Blades : 4
  undercarriage : "fixed"
}
```

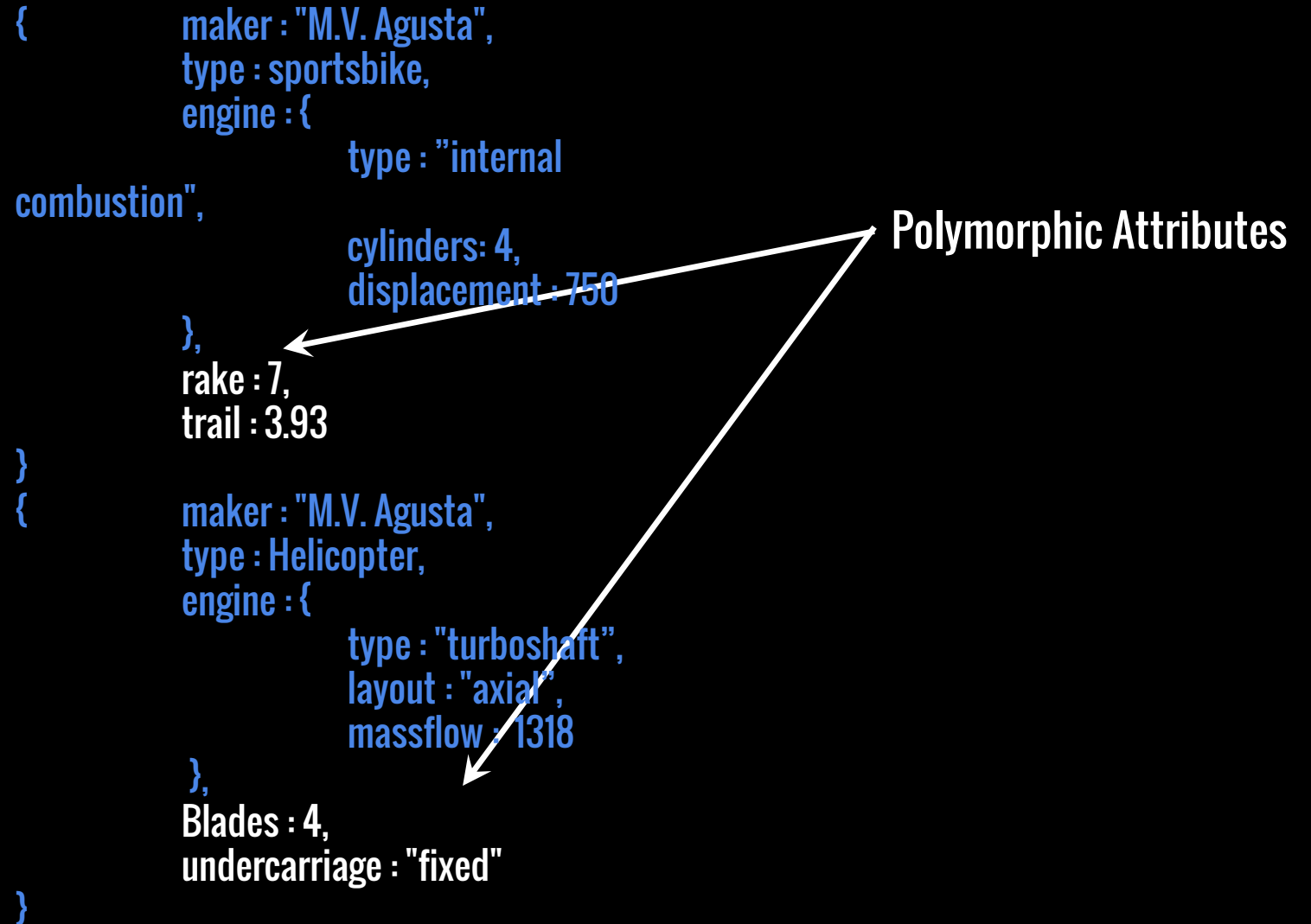
Flexible Schemas



Flexible Schemas



Flexible Schemas

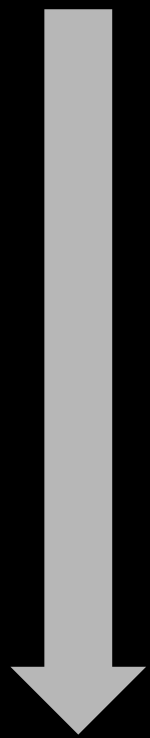


Event Sourcing

Event Sourcing



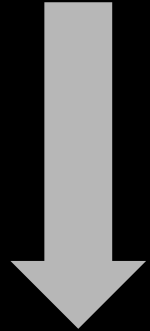
Event Sourcing



+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

$$t(12) = 9$$

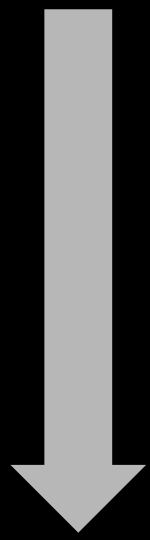
Event Sourcing



+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

$t(5) = 10$

Event Sourcing



+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

$$t(9) = 12$$

Event Sourcing

+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

$$a = f'(x)$$

Event Sourcing

+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

← $t(4) = 14$

← $t(8) = 10$

← $t(12) = 9$

Event Sourcing

+4
-2
+5
+7
-4
+9
-3
-6
+2
+1
+1
-5

← $t(4) = 14$ $t'(4) = -2$

← $t(8) = 10$ $t'(8) = -17$

← $t(12) = 9$ $t'(12) = -22$



Schema

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
    type: "Point",  
  },  
  fare: 0,  
  ts: ISODate("2008-06-10T07:58:07Z")  
}
```


Schema

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
    type: "Point"  
  },  
  fare: 0,  
  ts: ISODate("2008-06-10T07:58:07Z")  
}
```


Schema

Primary Key

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
    type: "Point"  
  },  
  fare: 0,  
  ts: ISODate("2008-06-10T07:58:07Z")  
}
```


Schema

GEOJSON

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
  },  
  fare: 0,  
  ts: ISODate("2008-06-10T07:58:07Z")  
}
```


Schema

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
    type: "Point"  
  },  
  fare: 0,  
  ts: ISODate("2008-06-10T07:58:07Z")  
}
```

Occupancy

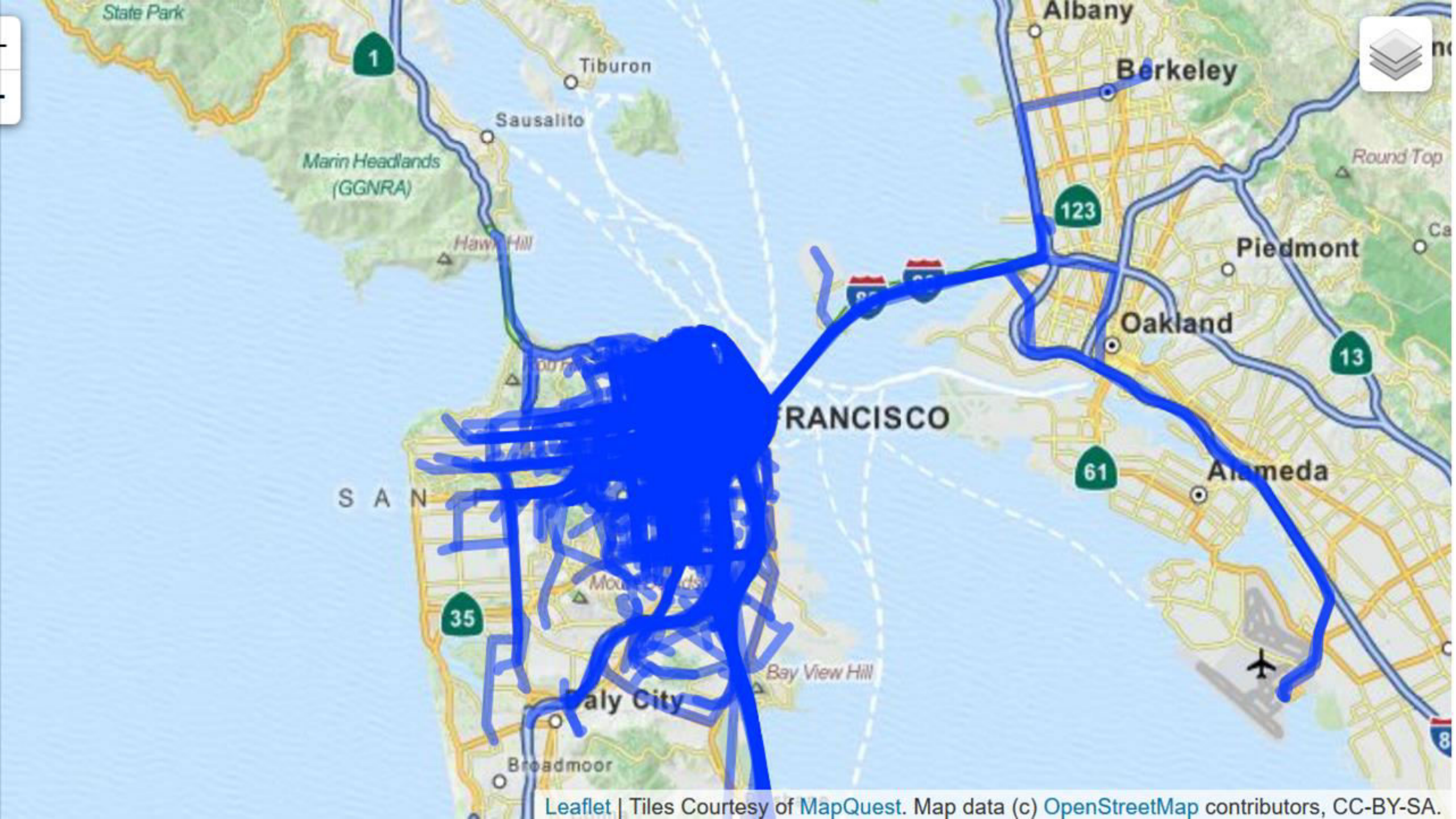
Schema

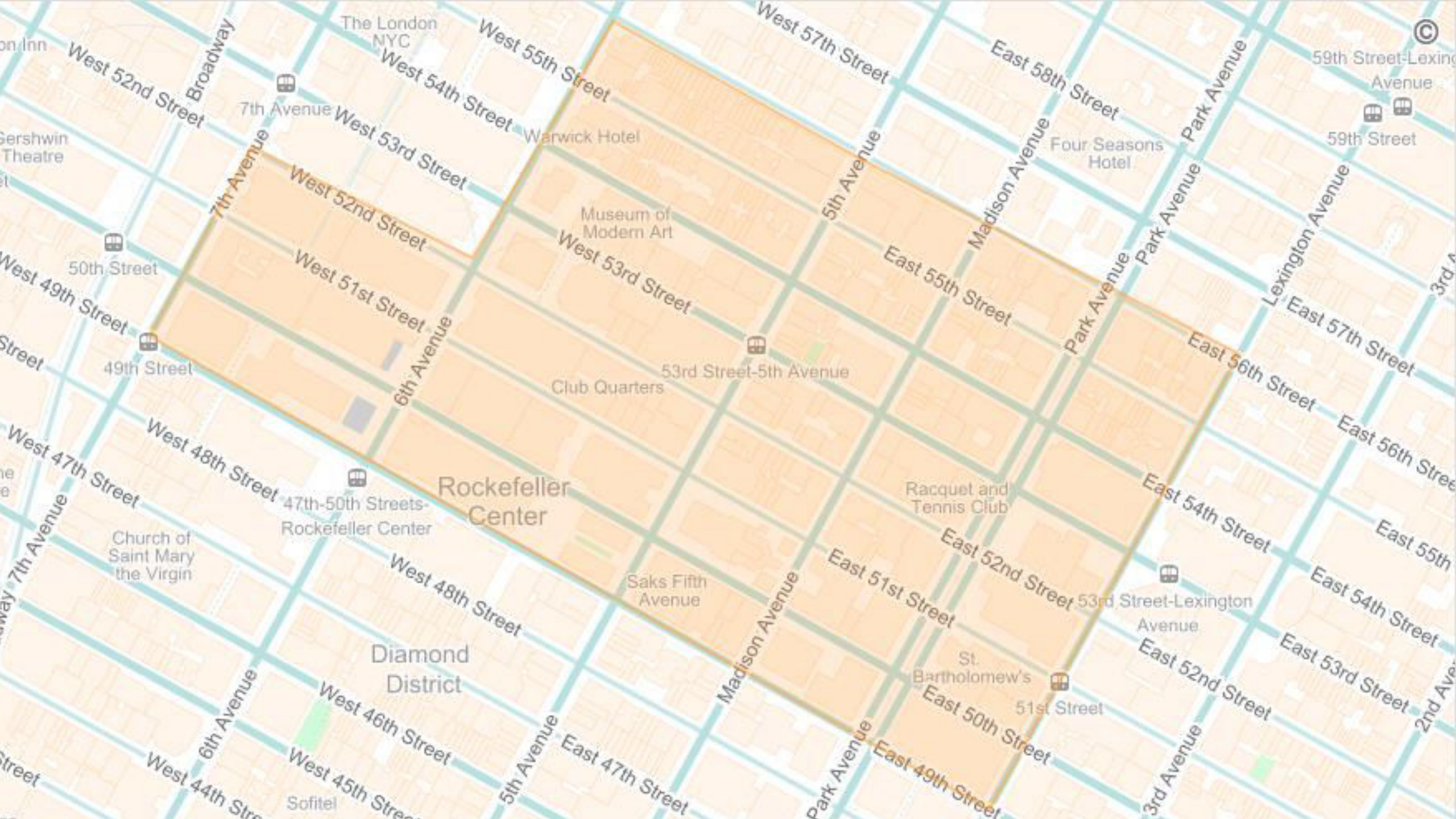
"abboip|1213084687000"

```
{  
  _id: "abboip|1213084687000",  
  taxi: "abboip",  
  loc: {  
    geometry: [  
      -122.39488,  
      37.75134  
    ],  
    fare: 0,  
    ts: ISODate("2008-06-10T07:58:07Z")  
  }  
}
```

Timestamp





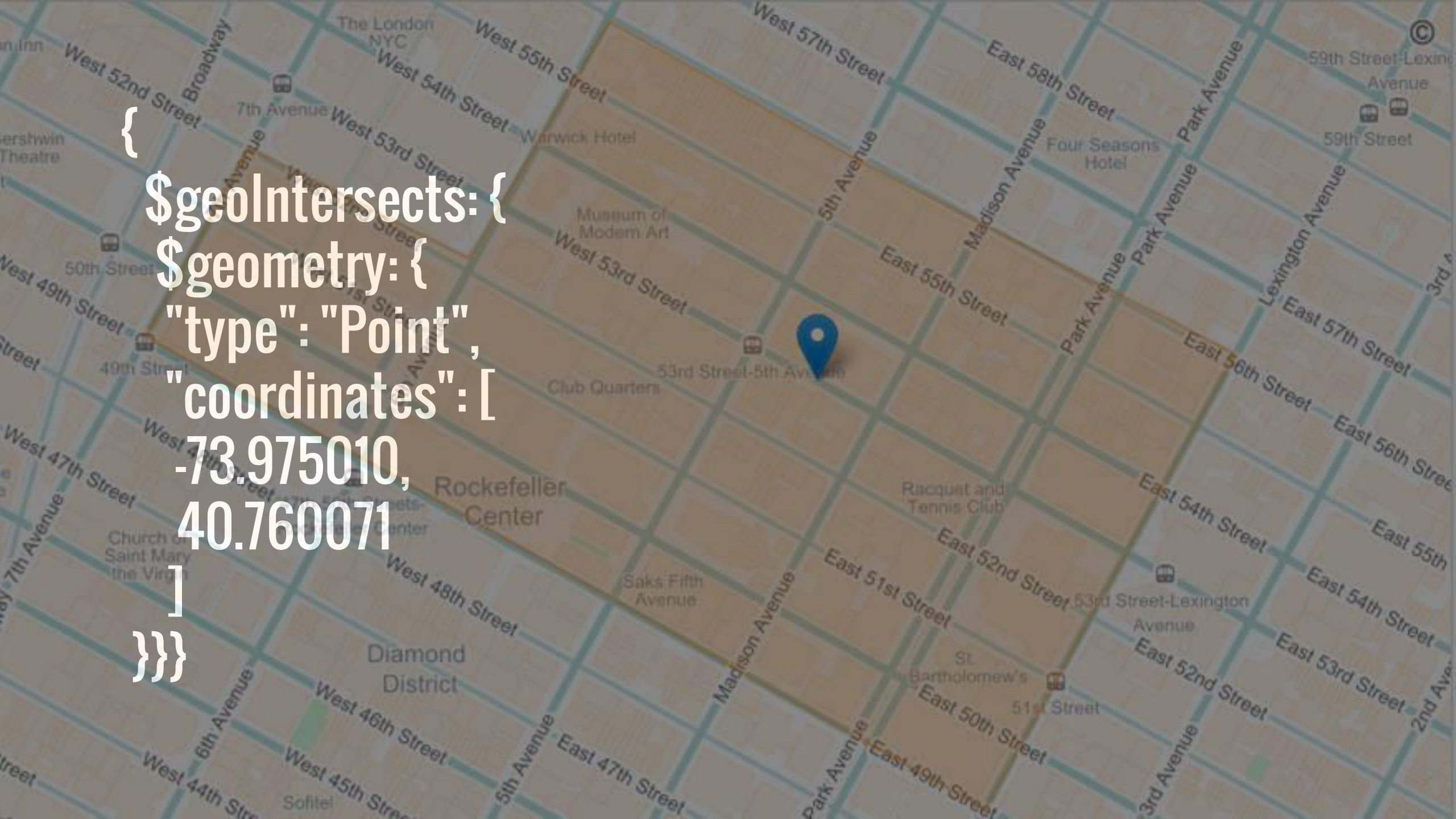




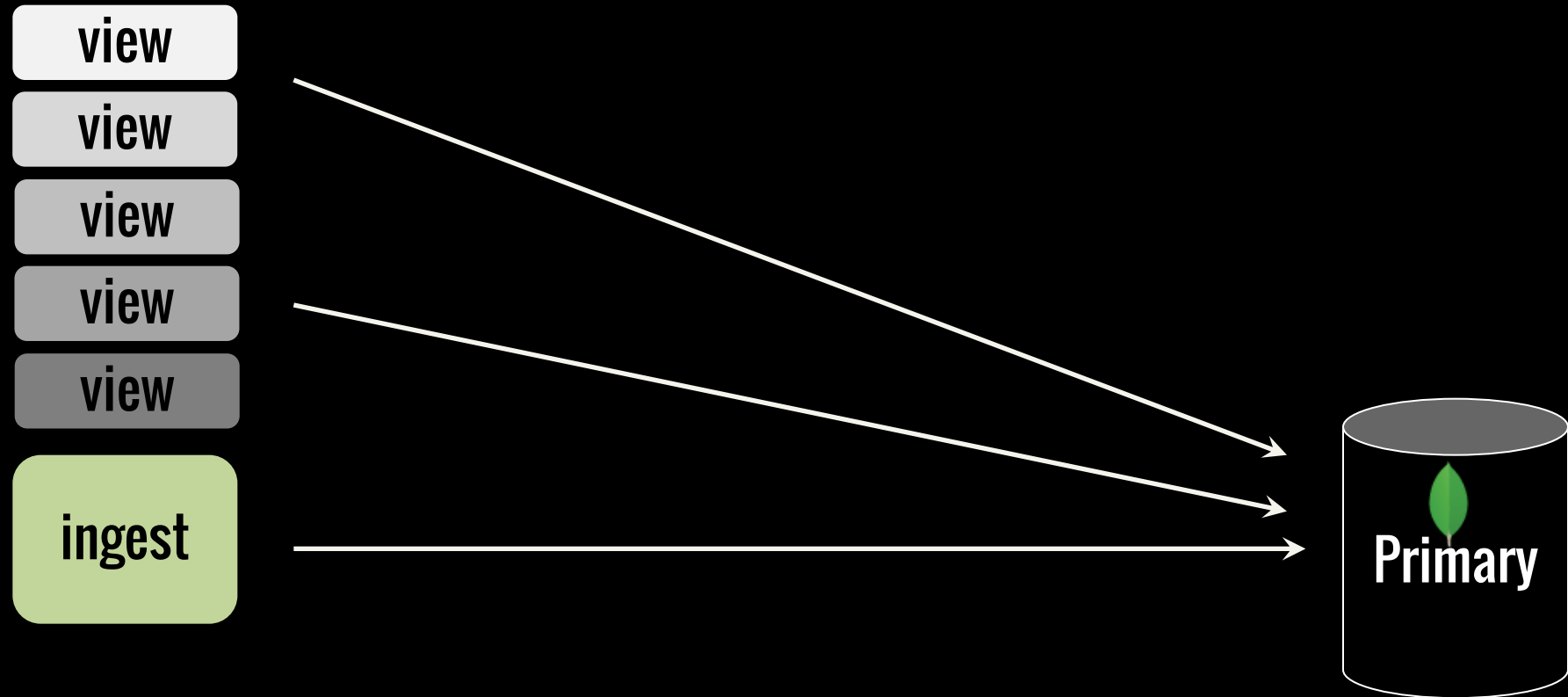
```
{  
  "type": "Polygon",  
  "coordinates": [  
    [  
      [-73.969581, 40.760331],  
      [-73.974487, 40.762245],  
      [-73.977692, 40.763598],  
      [-73.979508, 40.761269],  
      [-73.982364, 40.762358],  
      [-73.983692, 40.760497],  
      [-73.972821, 40.755861],  
      [-73.969581, 40.760331]  
    ]  
  ]  
}
```

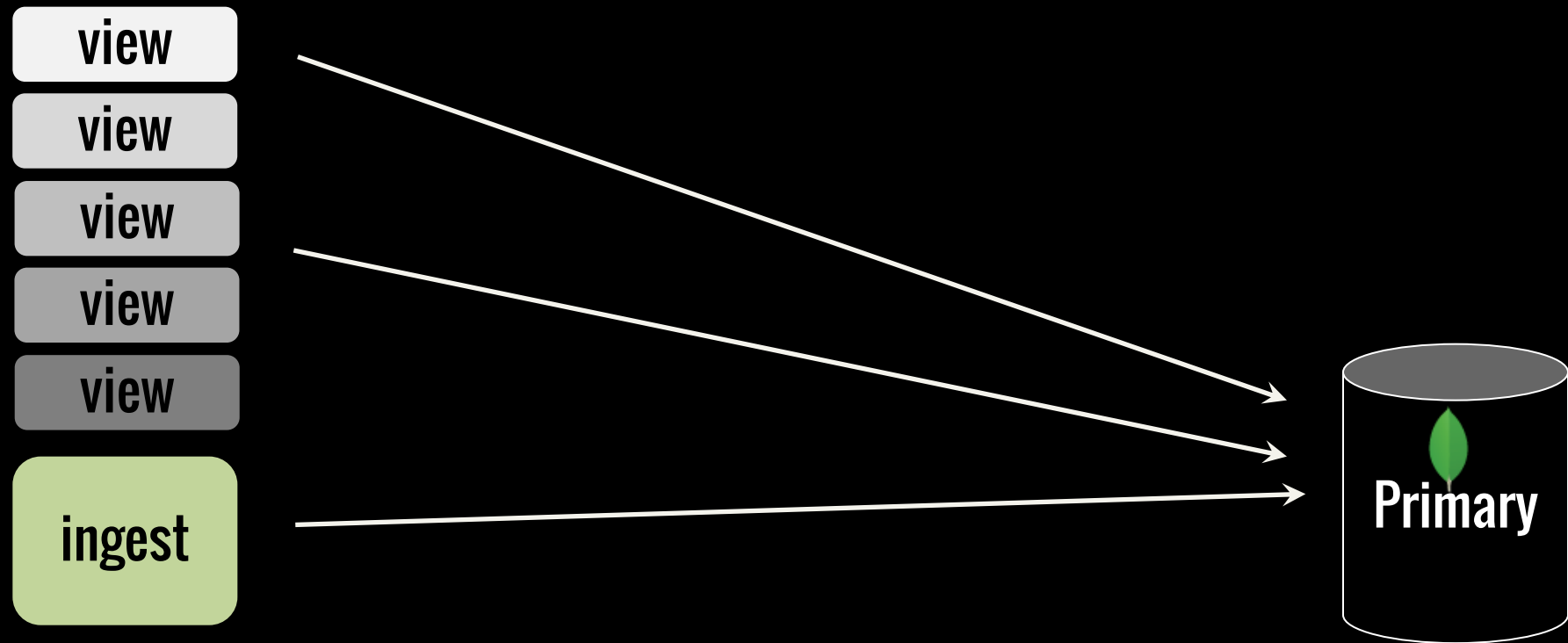


```
{  
  $geoIntersects: {  
    $geometry: {  
      "type": "Point",  
      "coordinates": [  
        -73.975010,  
        40.760071  
      ]  
    }  
  }  
}
```

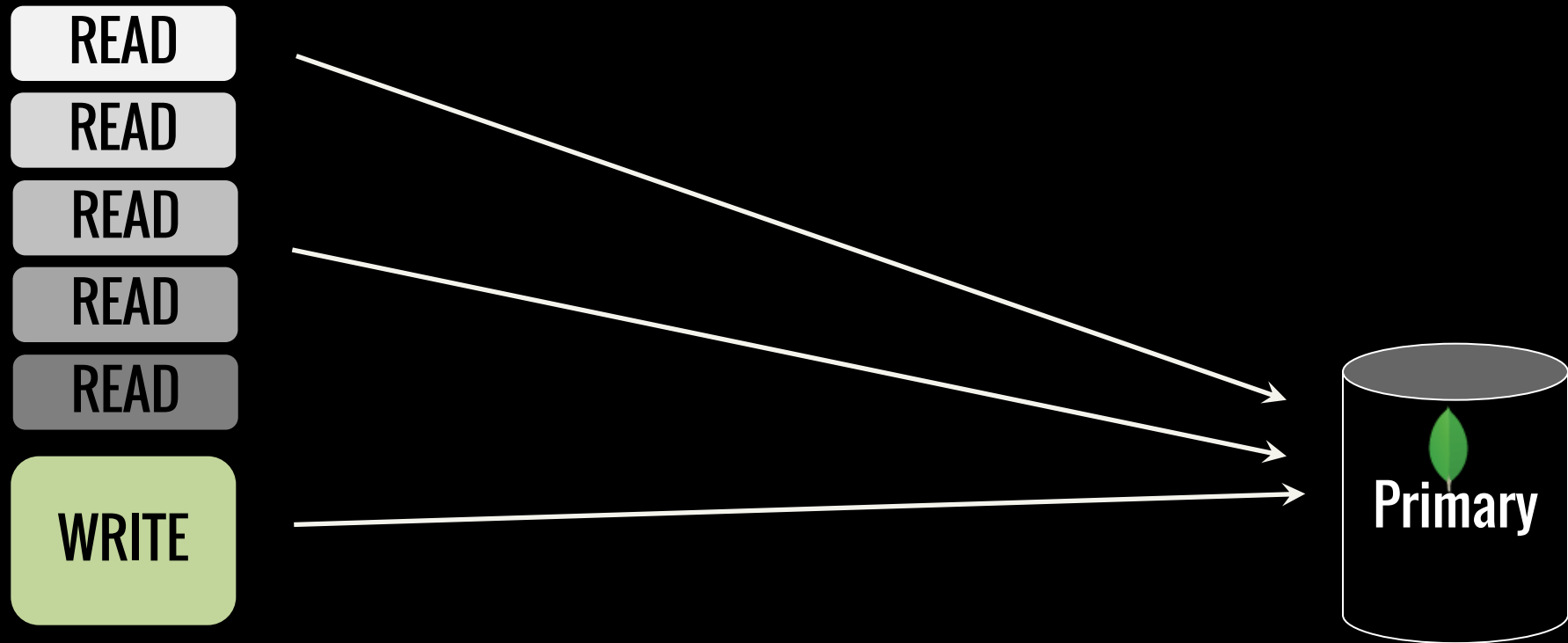


Variant Read Models: *VIEWS*

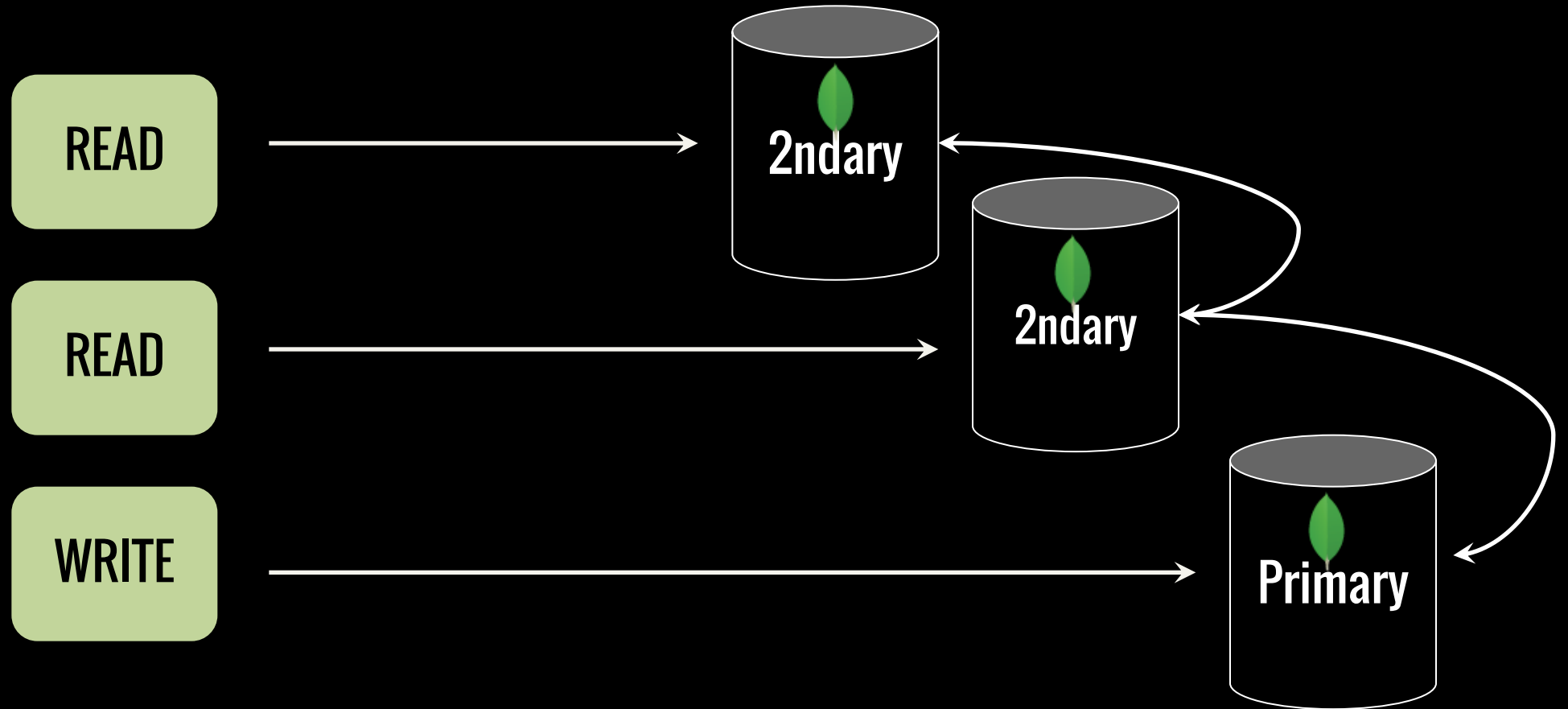




Command Query Responsibility Segregation CQRS



CQRS

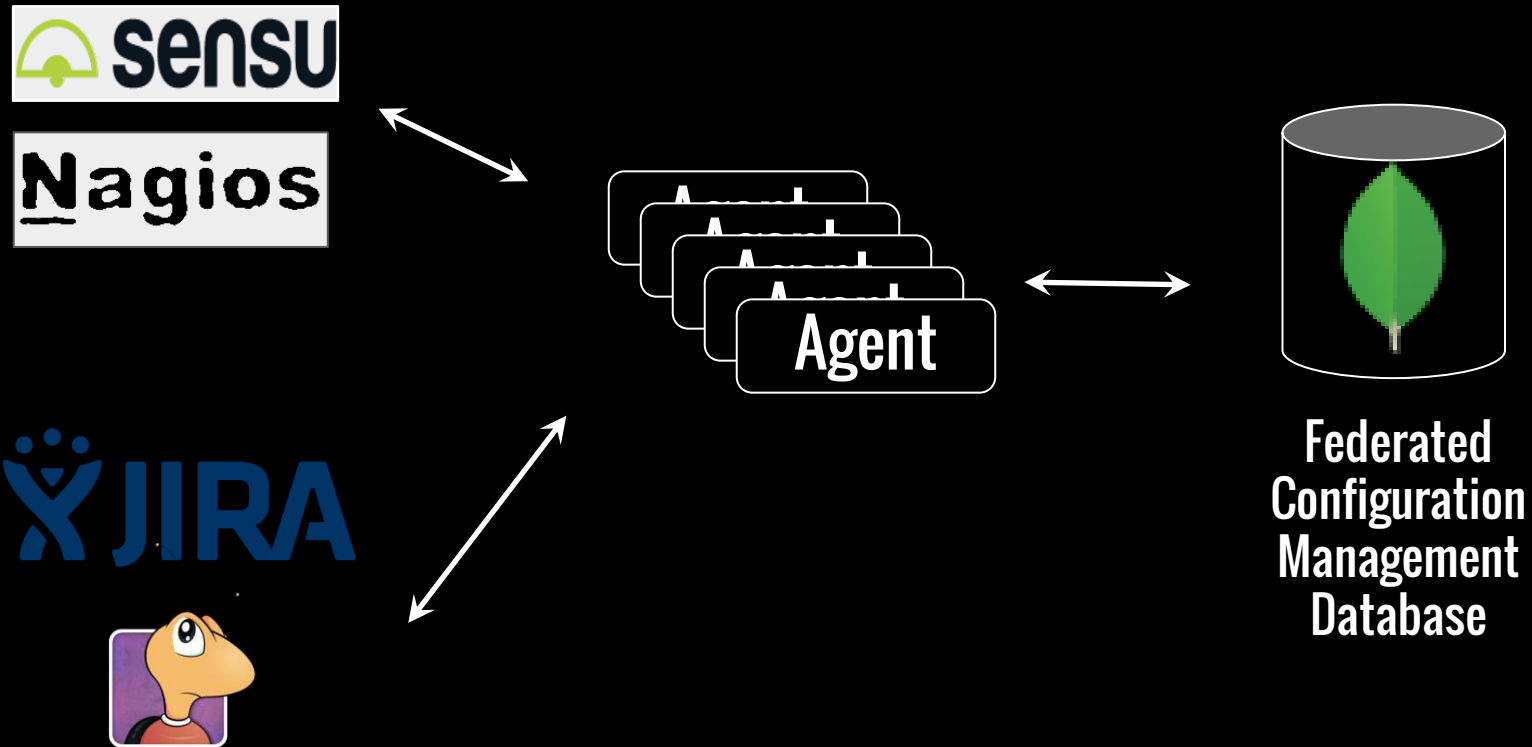


*Where it Gets **Tricky***





Service Management System









SERIAL#07 000 683

ALL IN METER

27229

BOROUGH OF LANSDALE



WATERMETER

CLONE, 3/4", 200, 800

FW 23, WetStar Meter

NO 1.0, 10.00

011/000000

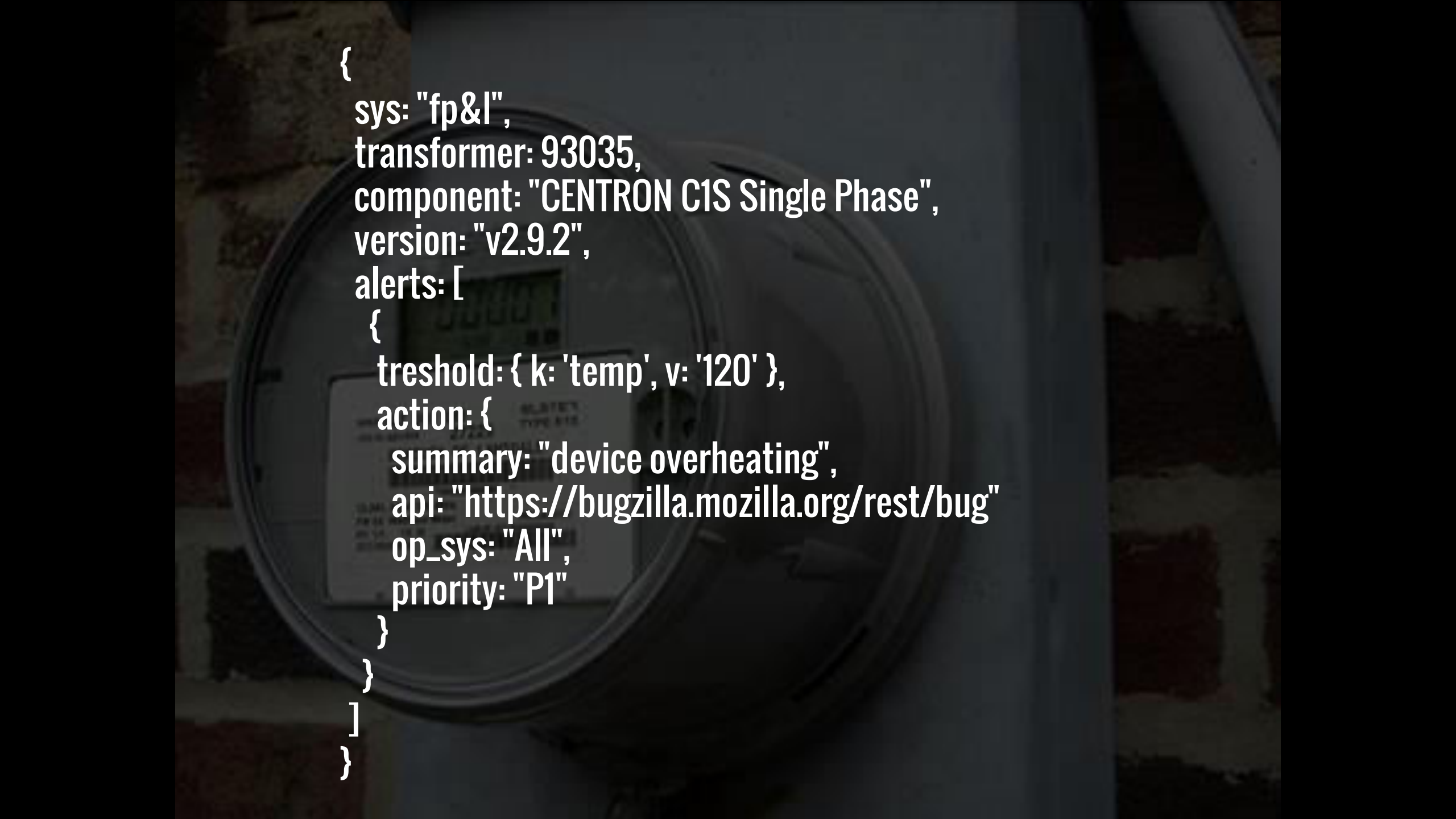
ELSTER

TYPE N18

005540711

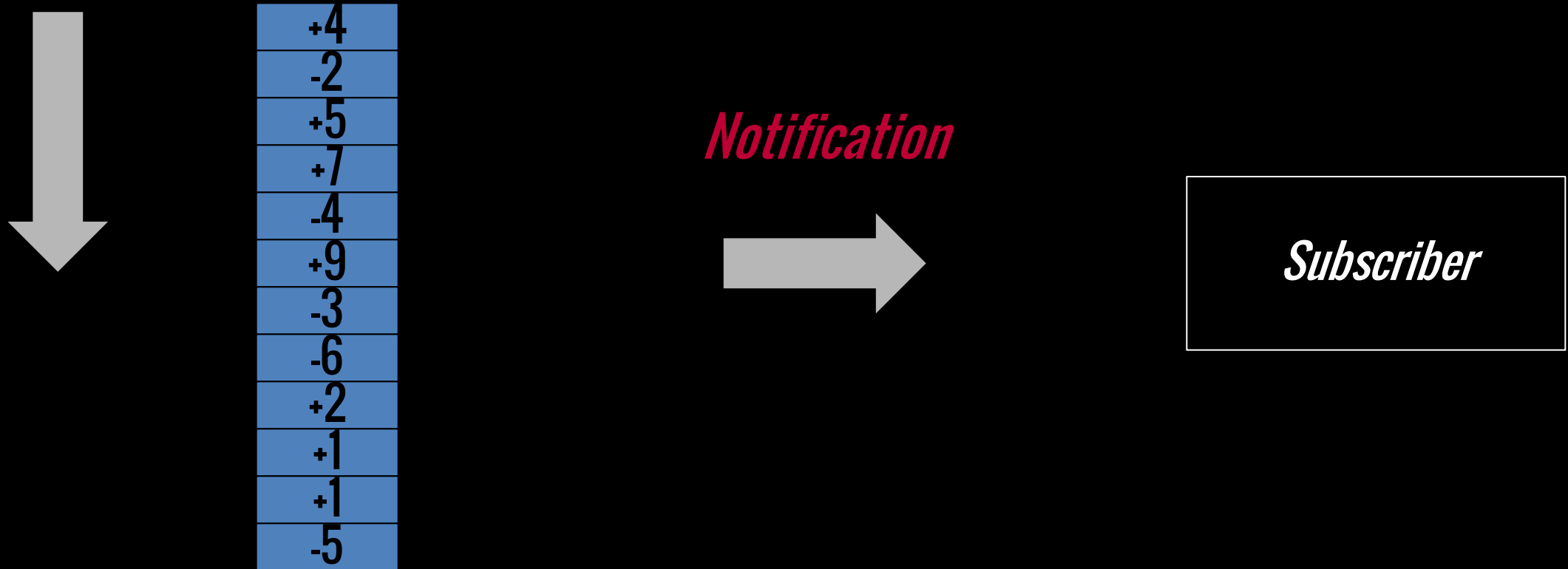
100.00, 0.1, 0.000000





```
{
  sys: "fp&l",
  transformer: 93035,
  component: "CENTRON C1S Single Phase",
  version: "v2.9.2",
  alerts: [
    {
      treshhold: { k: 'temp', v: '120' },
      action: {
        summary: "device overheating",
        api: "https://bugzilla.mozilla.org/rest/bug"
        op_sys: "All",
        priority: "P1"
      }
    }
  ]
}
```

External Updates





wttv

MakeAGIF.com

TAKE ORDER
LEFT TO RIGHT
CLOCKWISE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

APPT - SOUP/SAL - ENTREE - VEG/POT - DESSERT - BEV

102502

Line	Food	Price
1	#3 special	8.00
2	lighter sauce	2.50
3	side salad	7.50
4	#2 special	2.00
5	hawaiian sauce	
6	fries	
7	Bar	
8	coke	
9	lemonade	

TAKE ORDER
LEFT TO RIGHT
CLOCKWISE

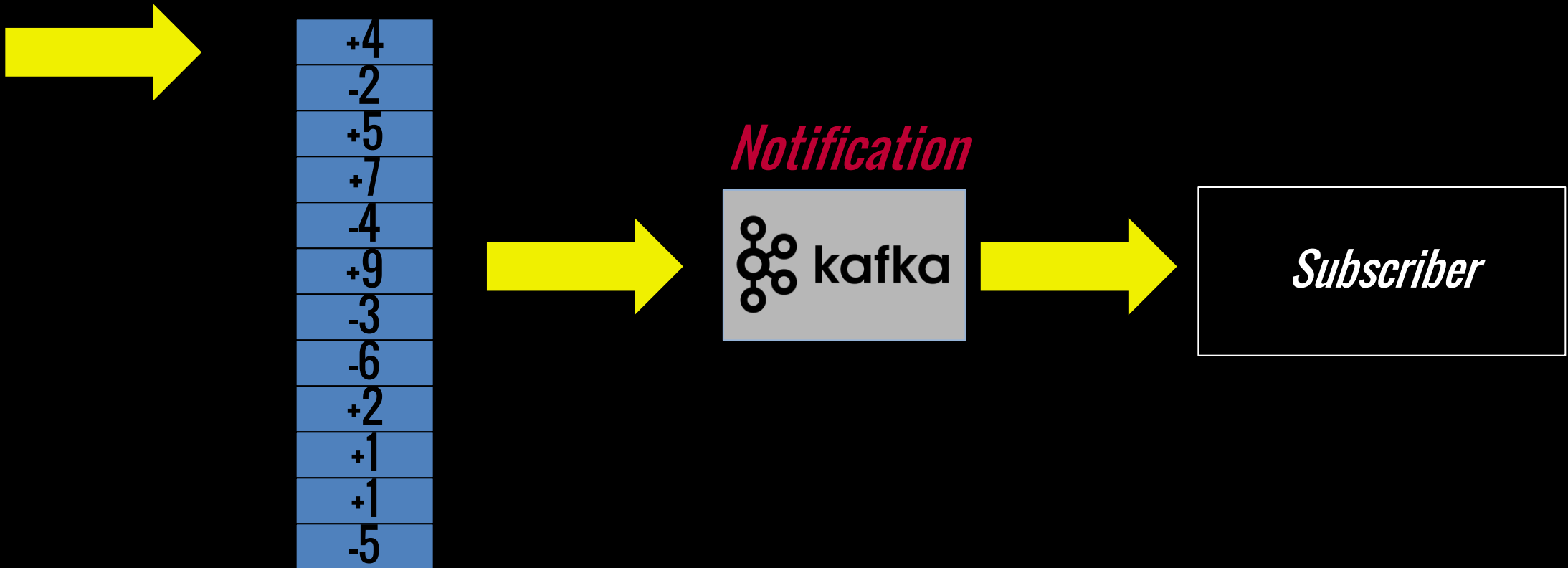
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

APPT - SOUP/SAL - ENTREE - VEG/POT - DESSERT - BEV

102501

Line	Food	Price
1		
2		
3	burger	
4	lettuce	5.00
5	tomato	
6	no mayo	
7		
8	fries	2.00
9		
10		
11	Bar	
12	diet coke	1.50
13		
14		
15		
16		

External Updates



Gaining Insight

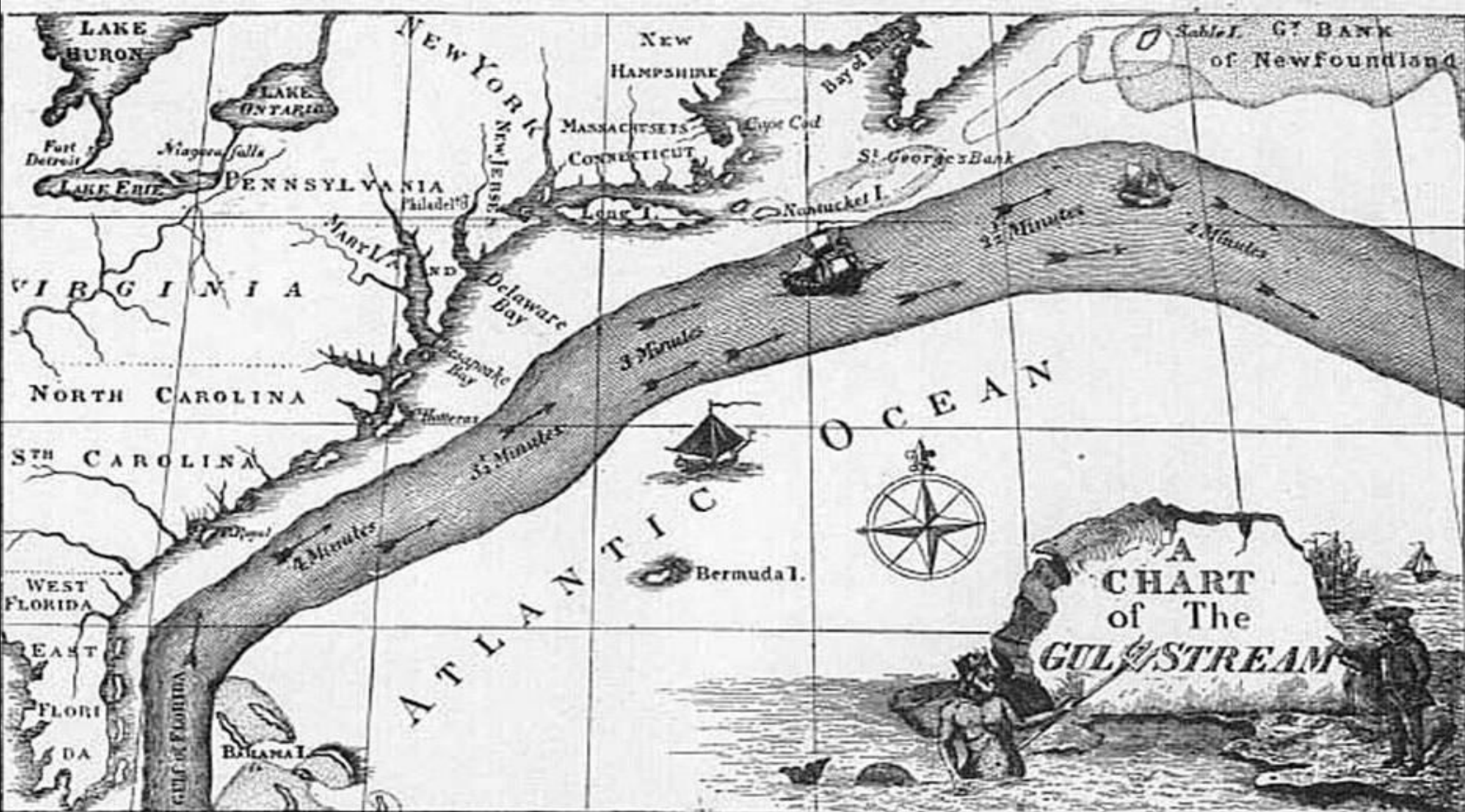
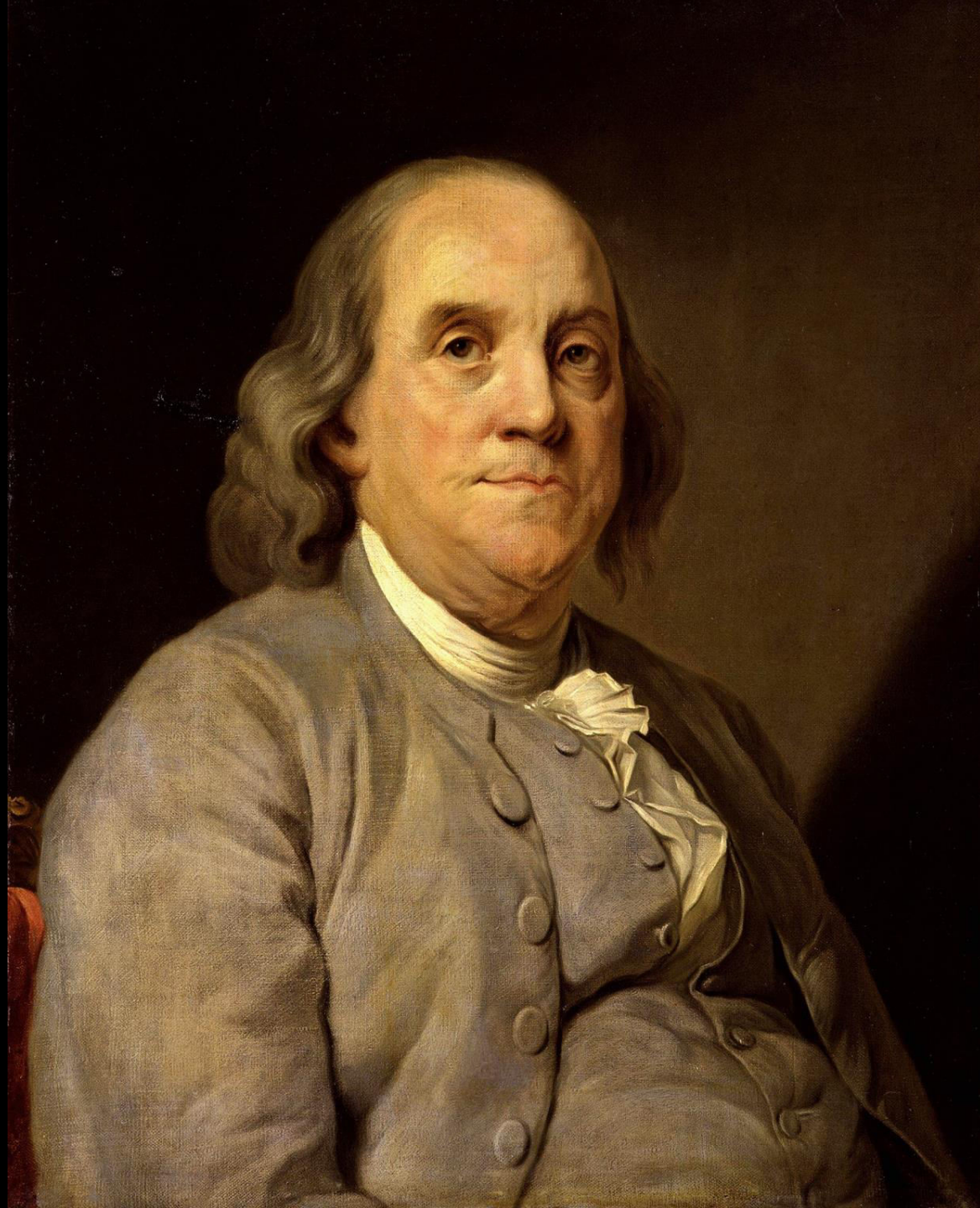
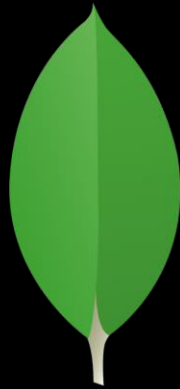


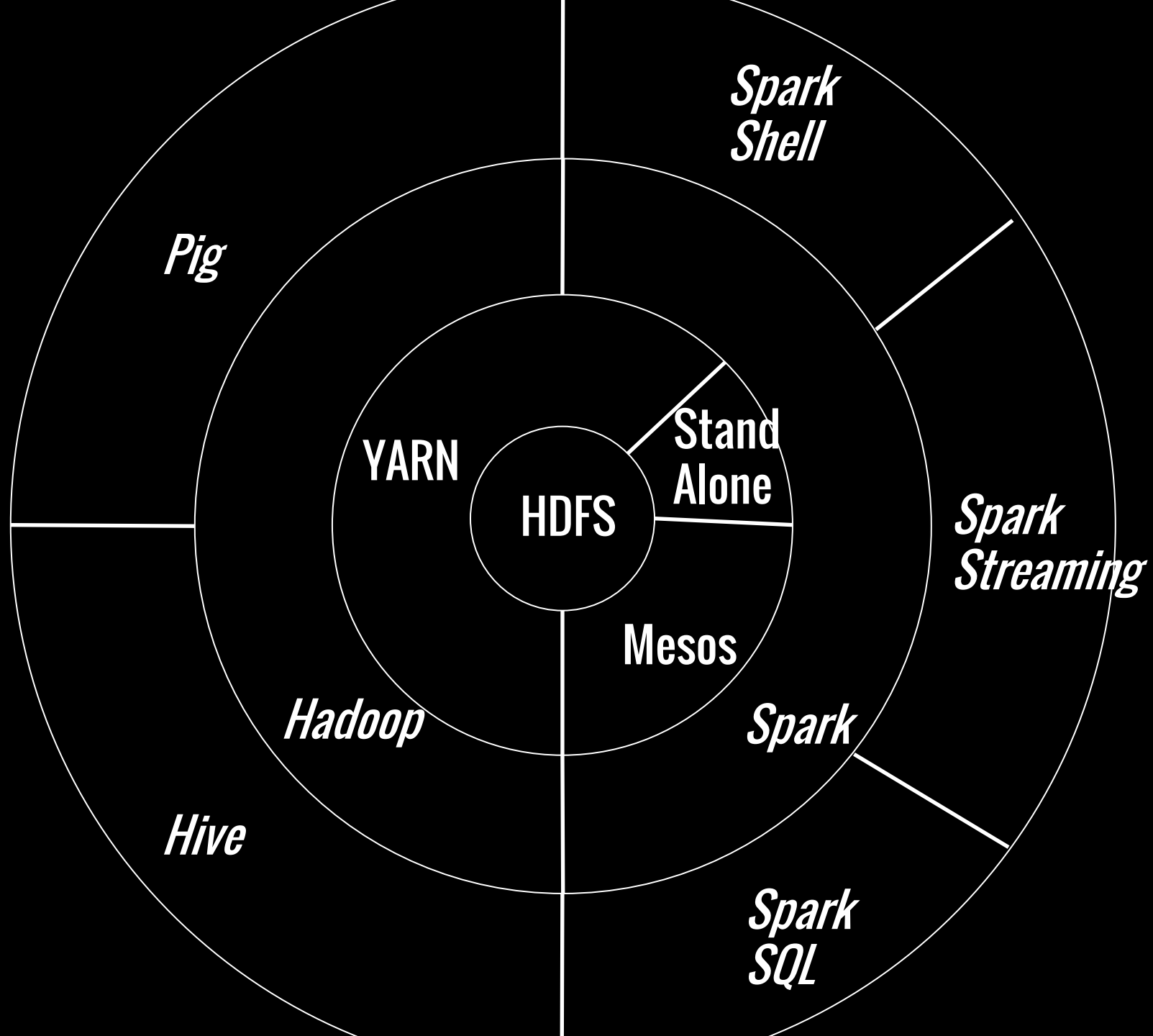
FIG. 173. — FRANKLIN'S CHART OF THE GULF STREAM.

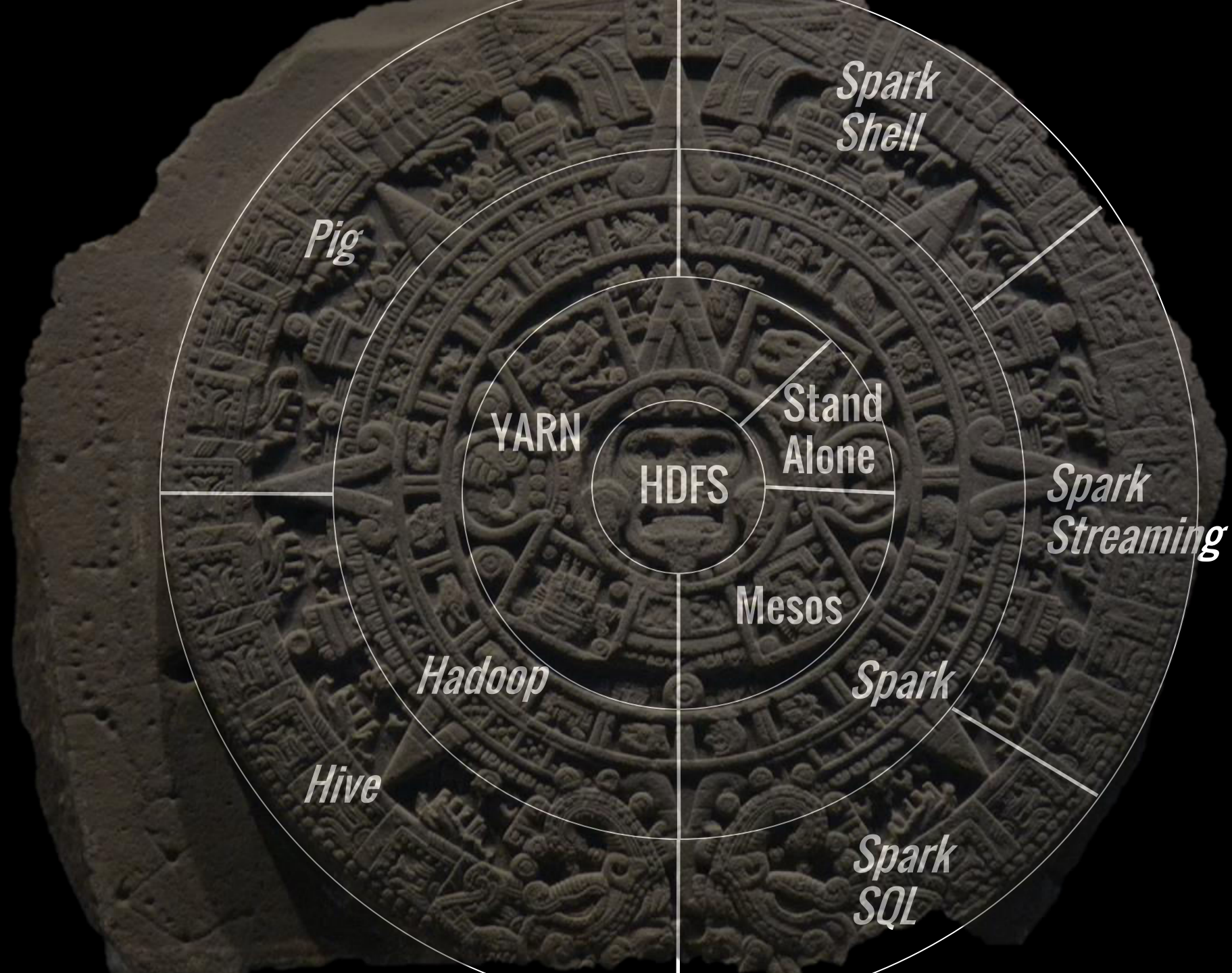


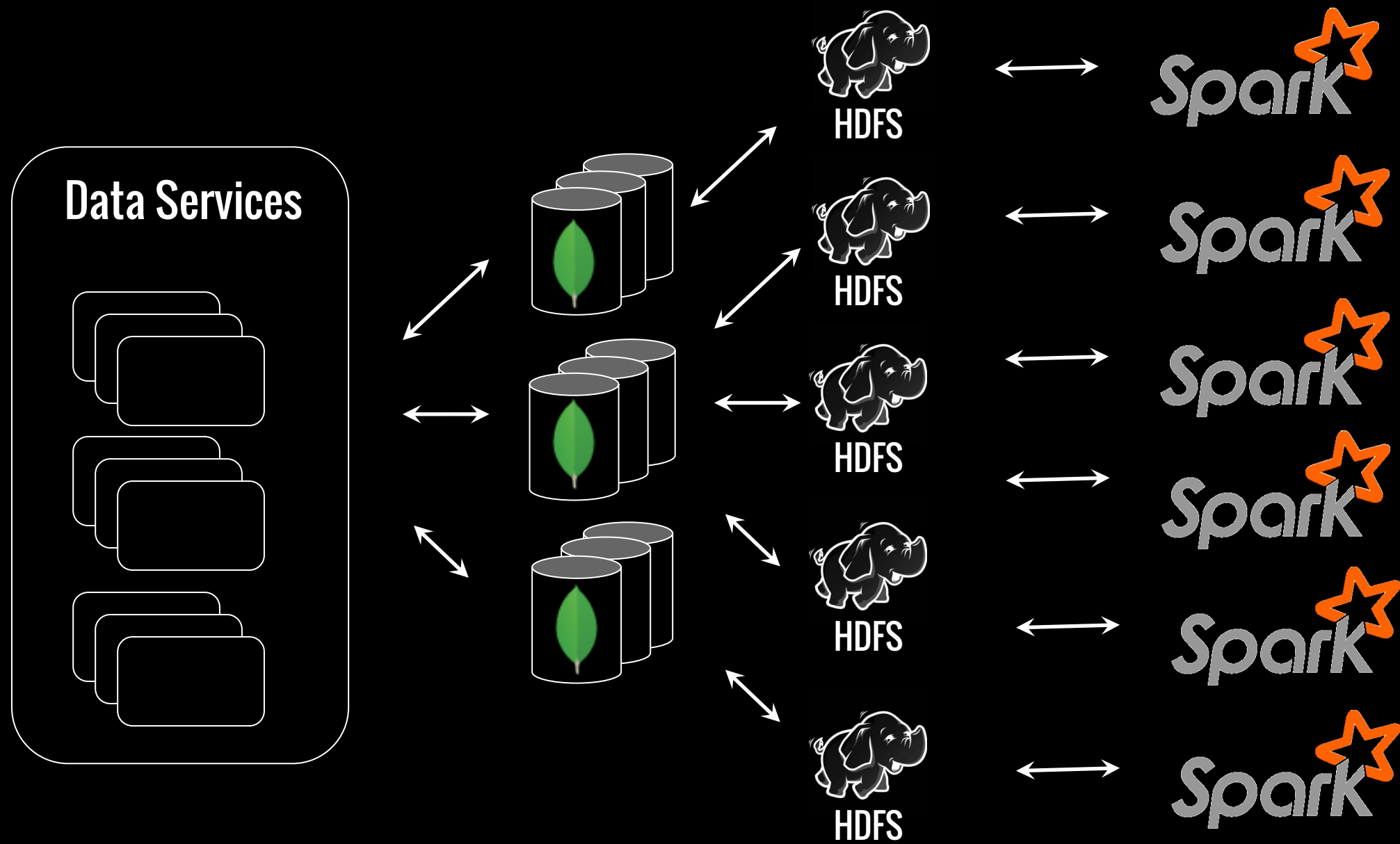


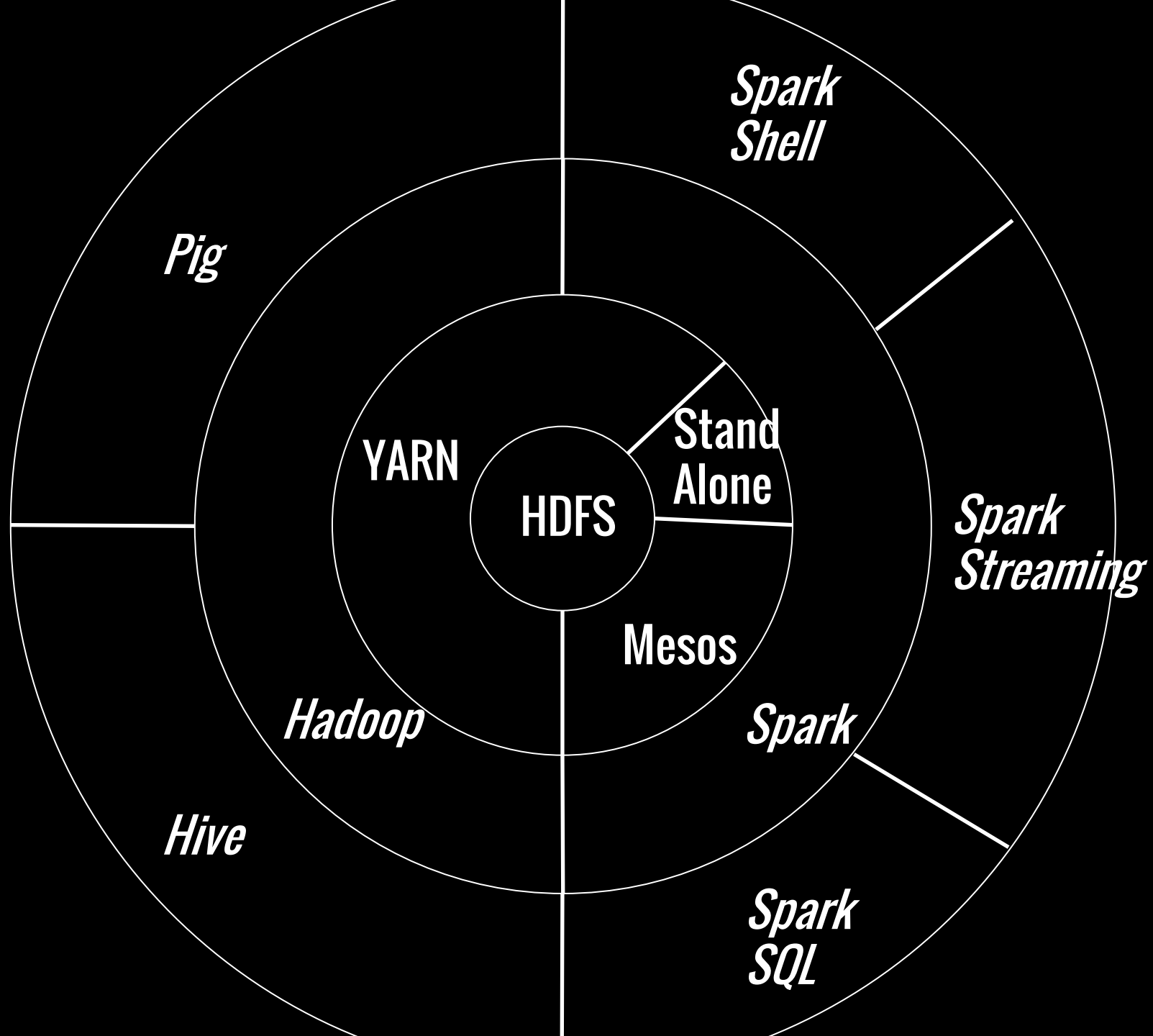
Data Processing

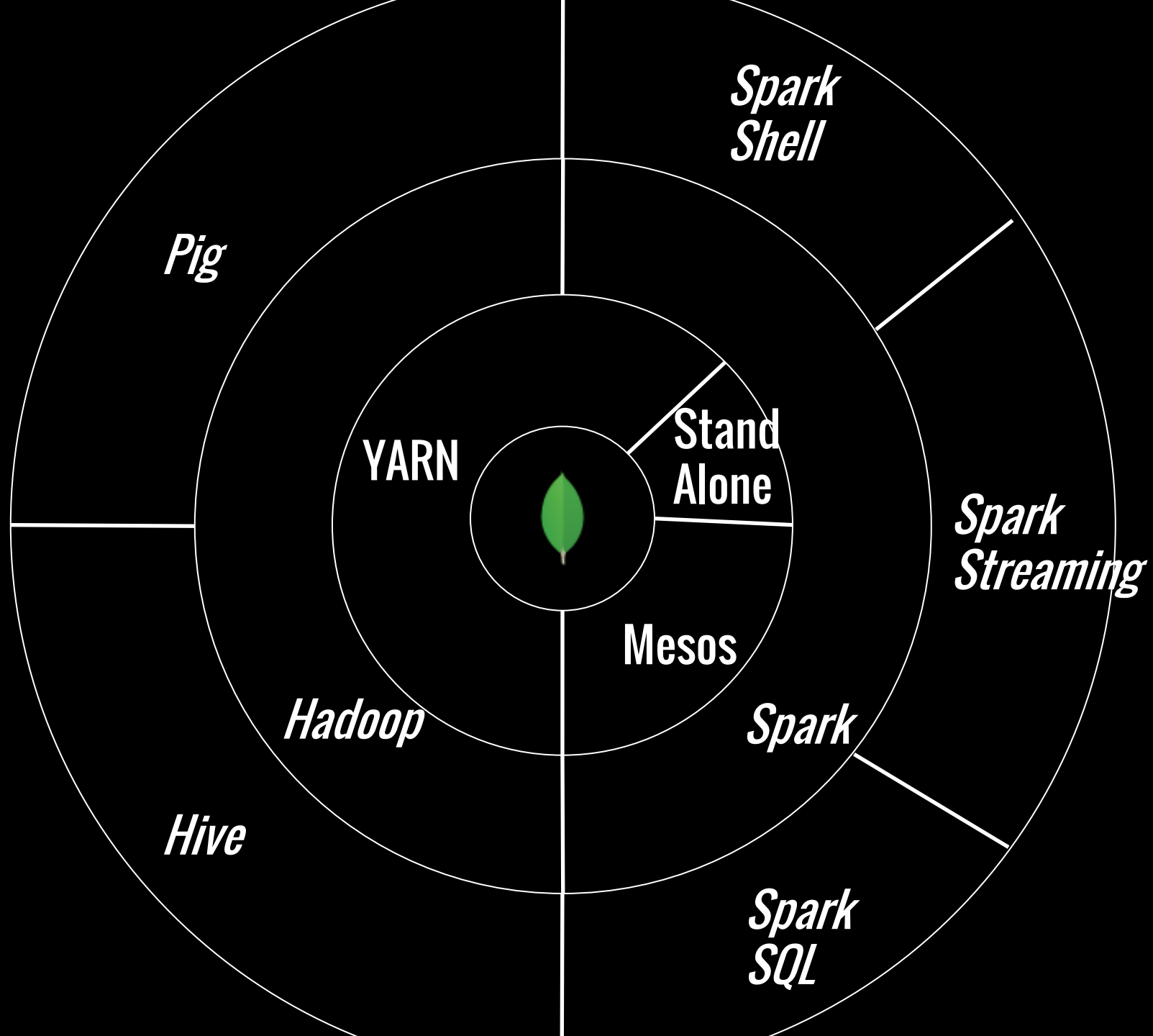


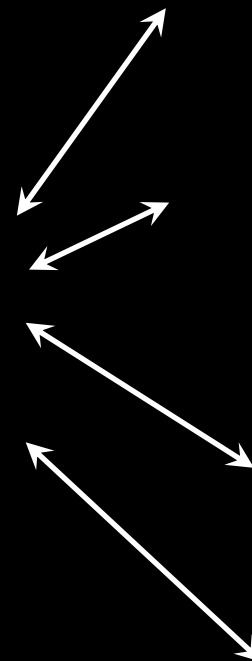
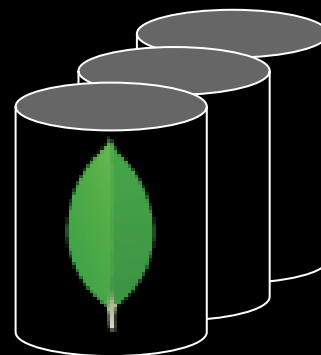












Spark



MapReduce





This repository Search

Pull requests Issues Gist



mongodb / mongo-hadoop

Watch 139

Star 992

Fork 413

MongoDB Connector for Hadoop

1,095 commits

27 branches

14 releases

48 contributors



Branch: master

mongo-hadoop / +

https://github.com/mongodb/mongo-hadoop

BUMP 1.5.0-SNAPSHOT		
clusterConfigs	Upgrade version of Hive.	5 months ago
config	use constants	a year ago
core/src	BUMP 1.5.0-SNAPSHOT	15 hours ago
examples	Don't make assertions about opcounters in TestSharded (HADOOP-82, HA...	4 months ago
flume/src/main/java/com/mon...	Do not log the full MongoDB connection string, so that credentials ca...	2 months ago
gradle	Fix typo "Extracing" -> "Extracting".	2 months ago
hive/src	Fix test that parses Strings into Timestamps (HADOOP-226).	17 hours ago

Code

Pull requests 12

Graphs

SSH clone URL

git@github.com:mongi

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop

Download ZIP



Thank You
@blimpyacht
bryan@mongodb.com

Michal Piorkowski, Natasa Sarafijanovic-Djukic, Matthias Grossglauser,
CRAWDAD dataset epfl/mobility (v. 2009-02-24), traceset: cab,
downloaded from <http://crawdad.org/epfl/mobility/20090224/cab>, doi:10.15783/C7J010, Feb 2009.