FIWARE Global Summit

Scale Up for a Real Smart Future

QuantumLeap

Storing and querying spatial-temporal IoT data

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Open APIs for Open Minds

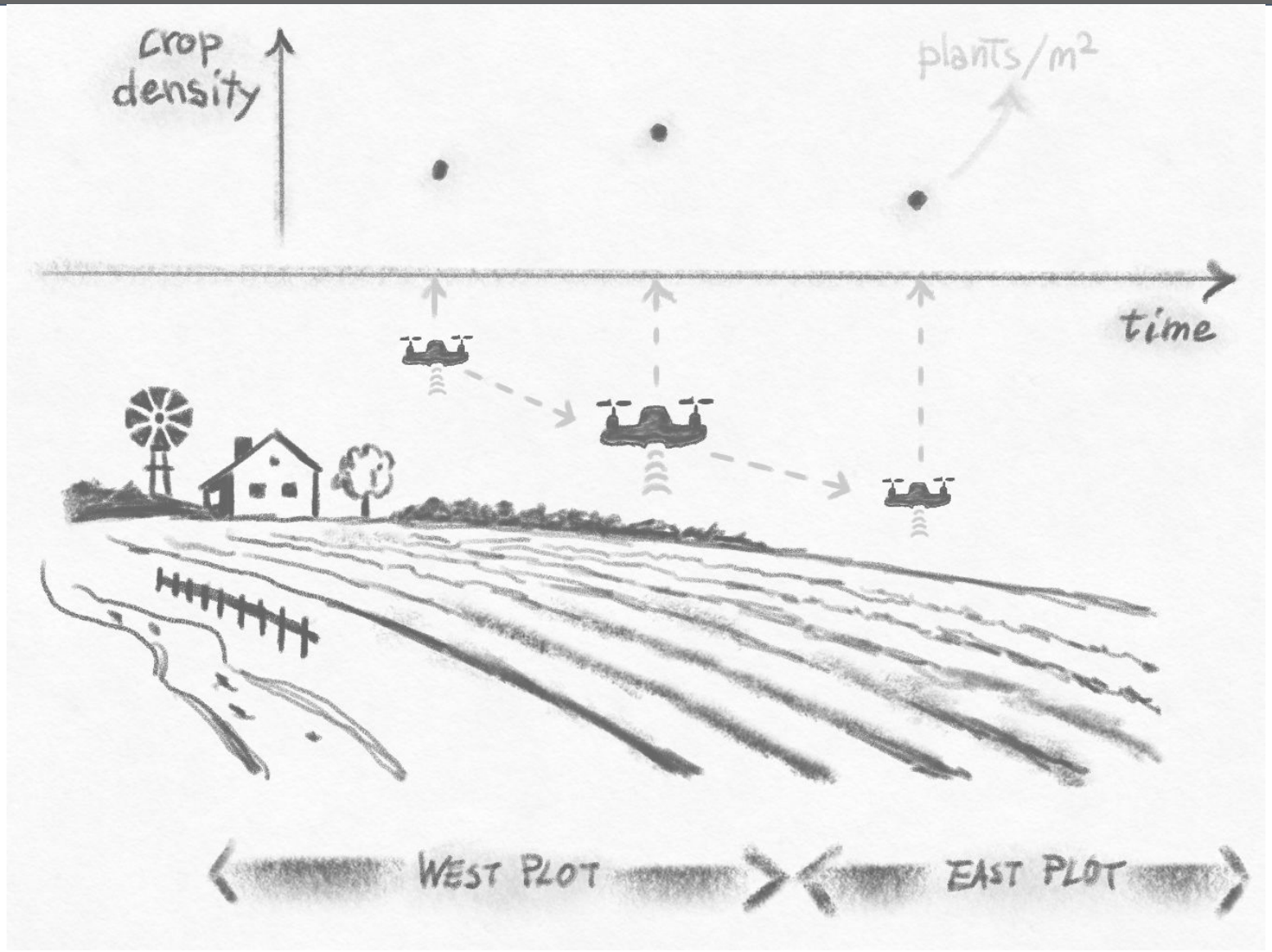
Spatial-temporal features of IoT data

- A reading is taken on Earth at a specific time
- Often to analyse readings in a meaningful way you need:

  R = { (reading, when, where) }

- QuantumLeap builds persistent and queryable Rs out of NGSI entities

Example: Monitoring crop growth

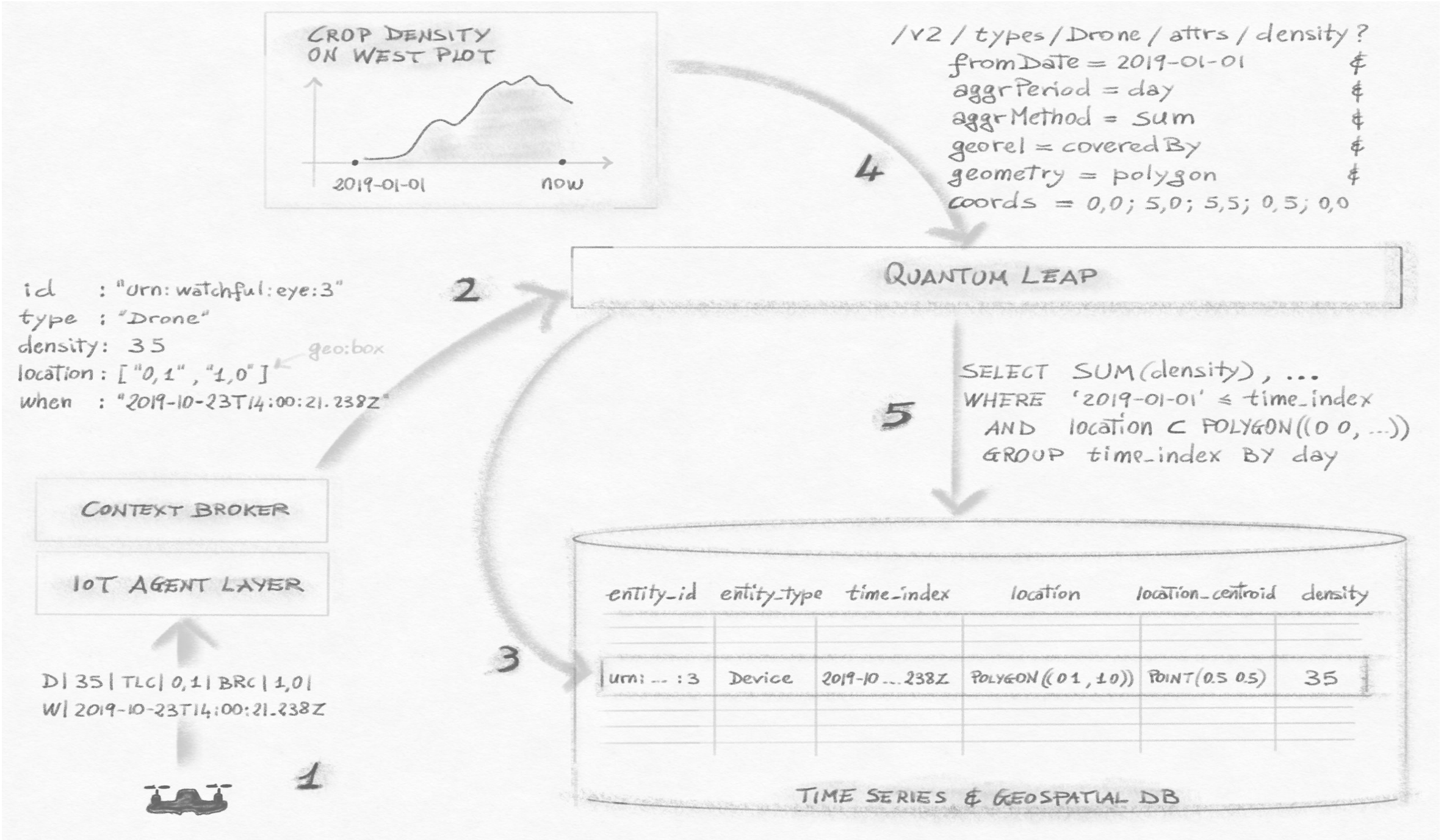


Example: Monitoring crop growth

- What's the **current** plant count **on** the east plot?
- How has it varied **in** the west plot **since** the beginning of the year?
- Need both **space** and **time** to ask meaningful questions about the data

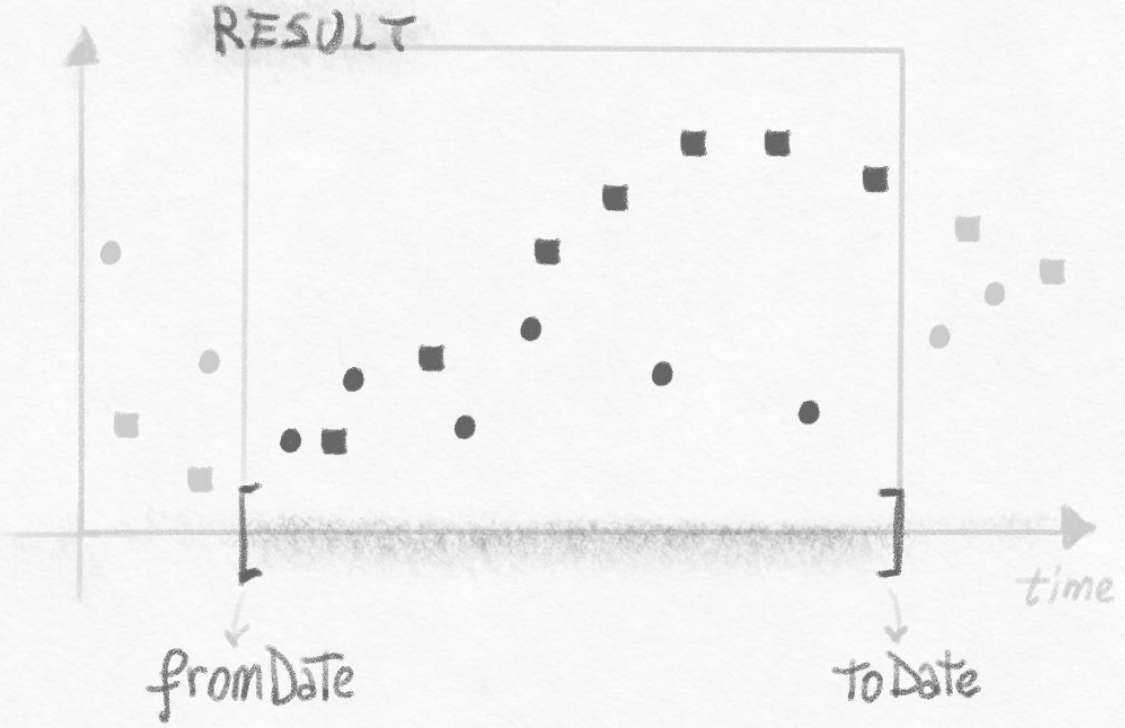
QuantumLeap's approach

- Get notified of entity changes by Context Broker
- Convert NGSI entities to tabular format
- Store in time series & geo-spatial DB
- Support multiple DBs
- REST API to query entities over space & time


CROP DENSITY
ON WEST PLOT
2019-01-01
now
/v2/types/Drone/attrs/density?
fromDate = 2019-01-01 &
aggrPeriod = day &
aggrMethod = sum &
georel = coveredBy &
geometry = polygon &
coords = 0,0; 5,0; 5,5; 0,5; 0,0
4
QUANTUM LEAP
id : "urn:watchful:eye:3"
type : "Drone"
density: 35
location : ["0,1", "1,0"]
geo:box
when : "2019-10-23T14:00:21.238Z"
2
SELECT SUM(density), ...
WHERE '2019-01-01' ≤ time_index
AND location ⊂ POLYGON((0 0, ...))
GROUP time_index BY day
5
CONTEXT BROKER
IoT AGENT LAYER
D|35|TLC|0,1|BRC|1,0|
W|2019-10-23T14:00:21.238Z
1
3
entity_id
entity_type
time_index
location
location_centroid
density
urn: ... :3
Device
2019-10 ... 238Z
POLYGON((0 1, 1 0))
POINT(0.5 0.5)
35
TIME SERIES & GEOSPATIAL DB

RESTful queries: time intervals

/v2/types/Drone/attrs/density ?
fromDate = 2019-02-16 &
toDate = 2019-10-23



● density from drone 1

■ density from drone 2

density for single entity:

/v2/entities/urn:drone:1/attrs/density ? ...

RESTful queries: time binning

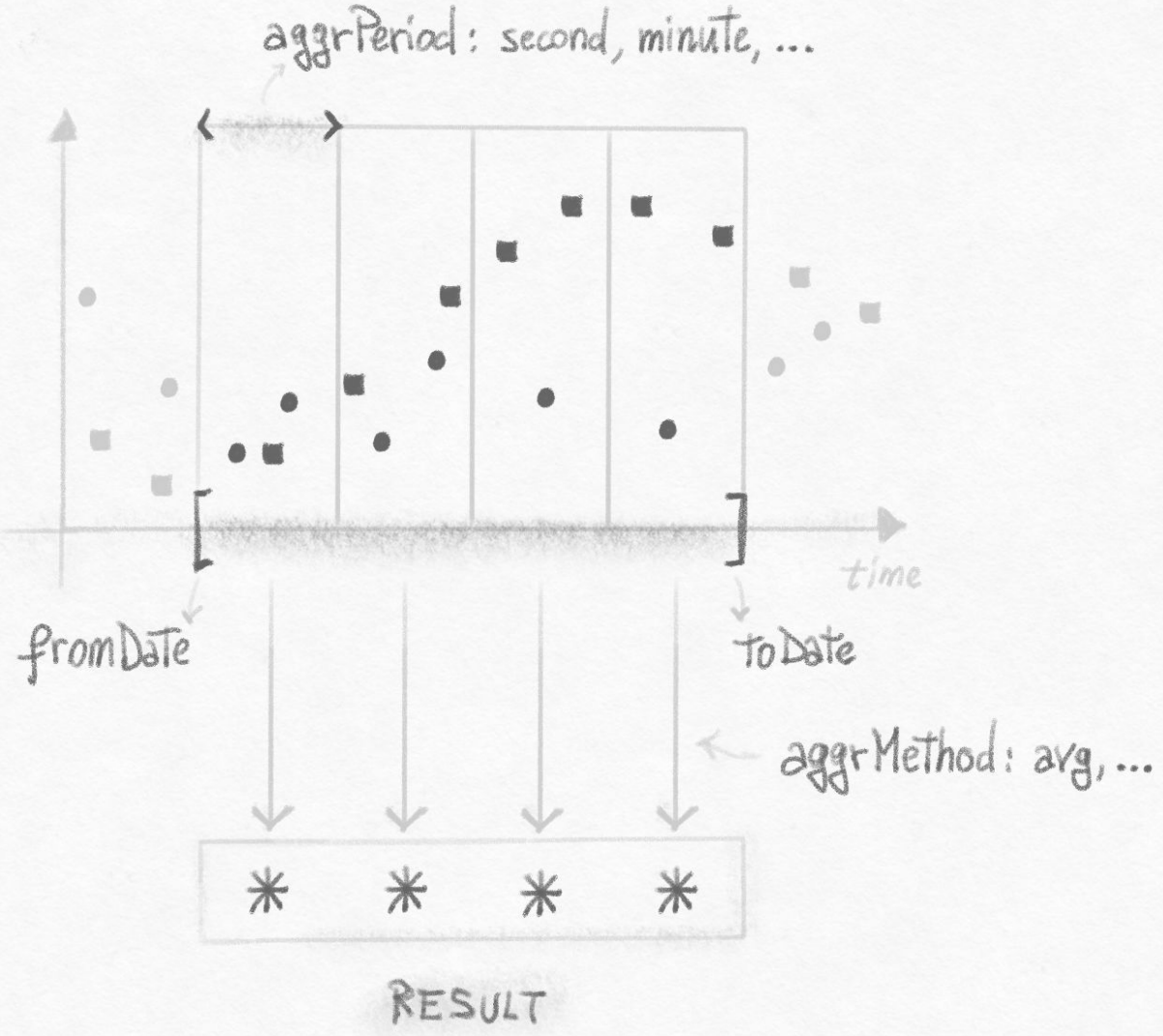
/v2/types/Drone/attrs/density ?
fromDate = 2019-02-16 &
toDate = 2019-10-23 &
aggrPeriod = month &
aggrMethod = count

● density from drone 1

■ density from drone 2

density for single entity:

/v2/entities/urn:drone:1/attrs/density ? ...

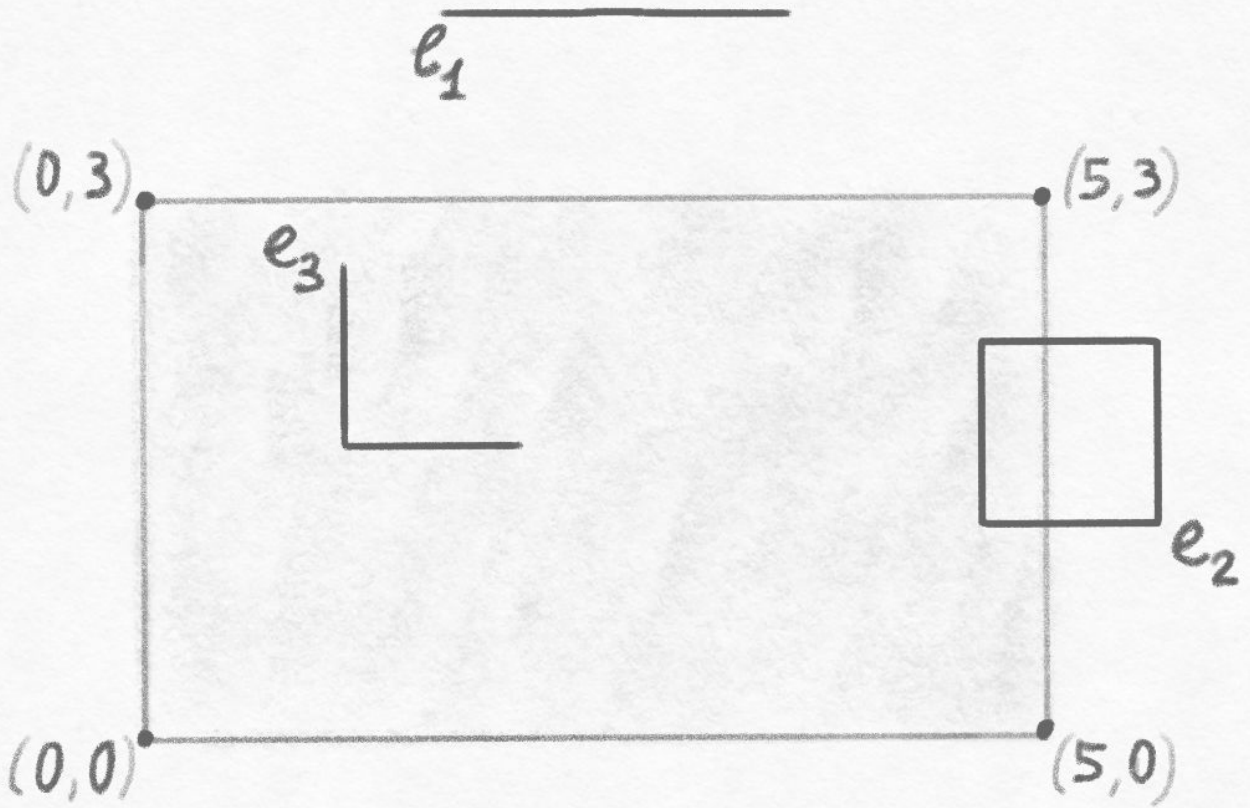


RESTful queries: incidence

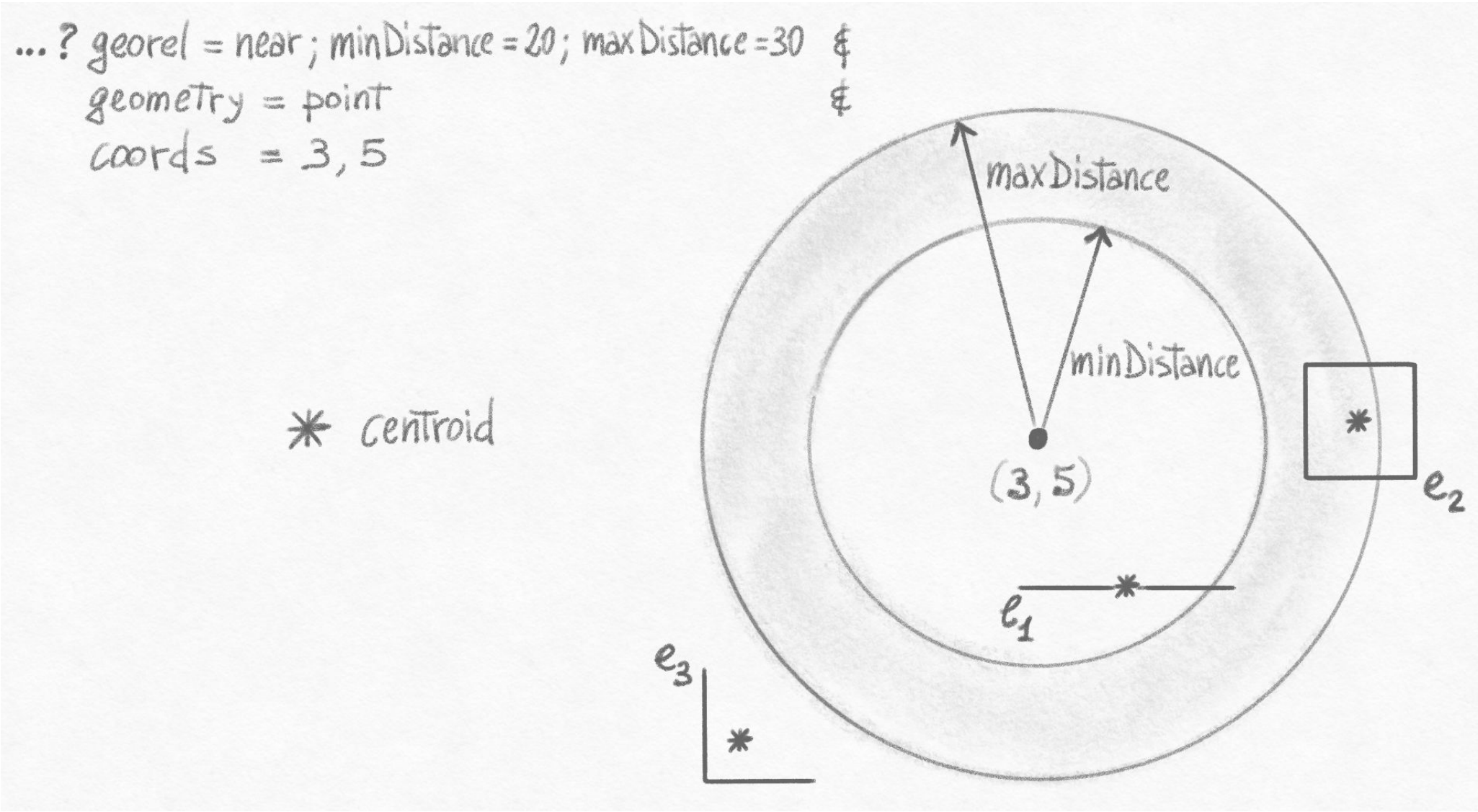
```
...? georel    = coveredBy        &
     geometry= polygon          &
     coords  = 0,0; 5,0; 5,3; 0,3; 0,0
```

other georel :

* intersects
* equals
* disjoint



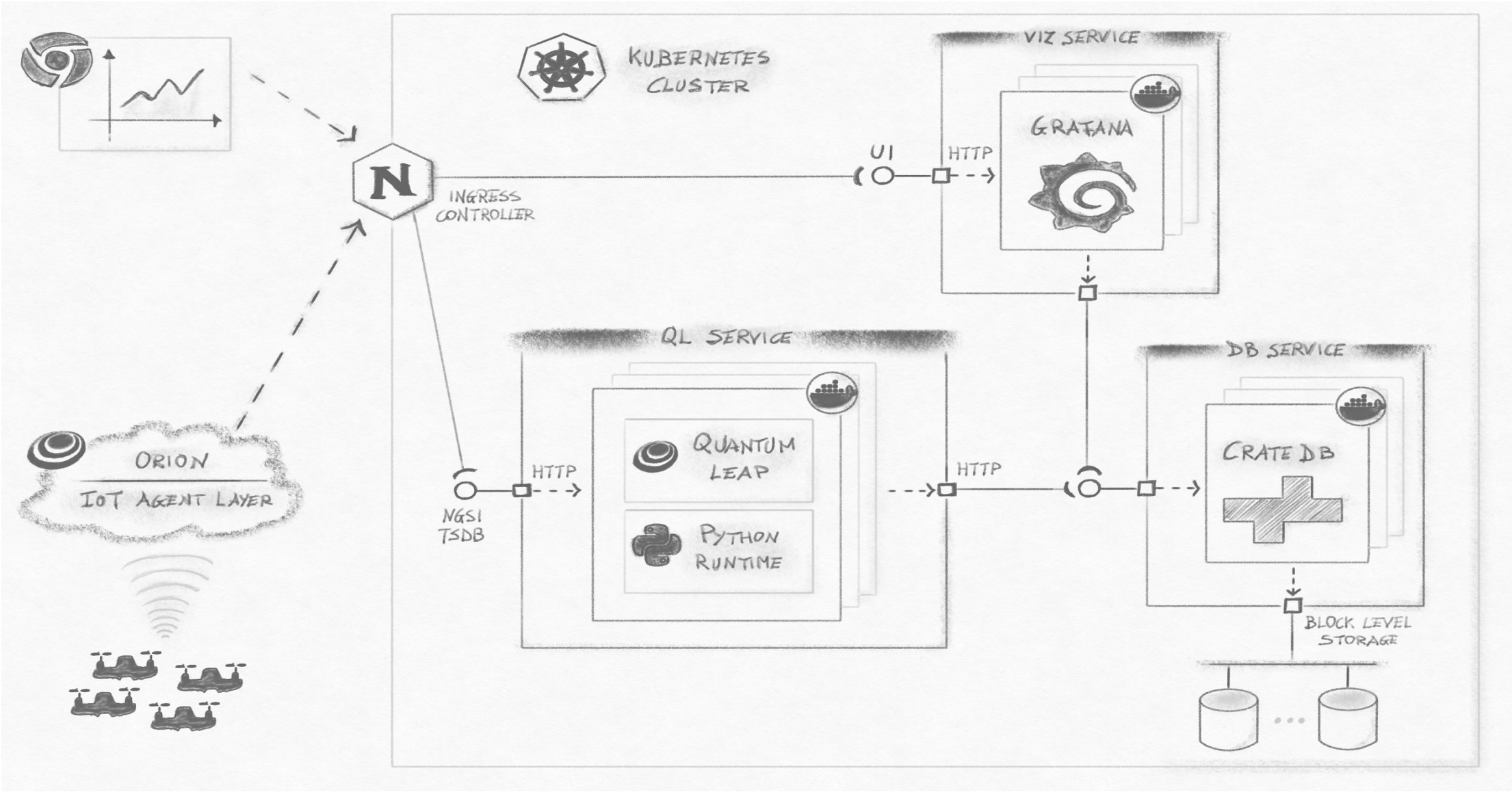
RESTful queries: radius search



Ready, steady... deploy!

1. Set up DB: Timescale, CrateDB
2. Deploy Docker image: Compose, Swarm, K8s
3. Create Orion sub for entities to track
4. Set up Grafana: PG data source, map plugin

Example: K8s cluster deployment



A few reasons to use QuantumLeap

- Build & query NGSI v2 time series
- Leverage efficient spatial-temporal DB
- Scale horizontally (stateless)
- Container images, cloud-friendly

From zero to QuantumLeap hero

1. Take a sip: **FiWare Time-series Data tute**
2. Dive in: **quantumleap.readthedocs.io**
3. Get your fill: **ngsi-timeseries-api** on GitHub
4. Ask questions, we'd love to hear from you :-)
5. Tinker, tweak, develop, open a PR!

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