

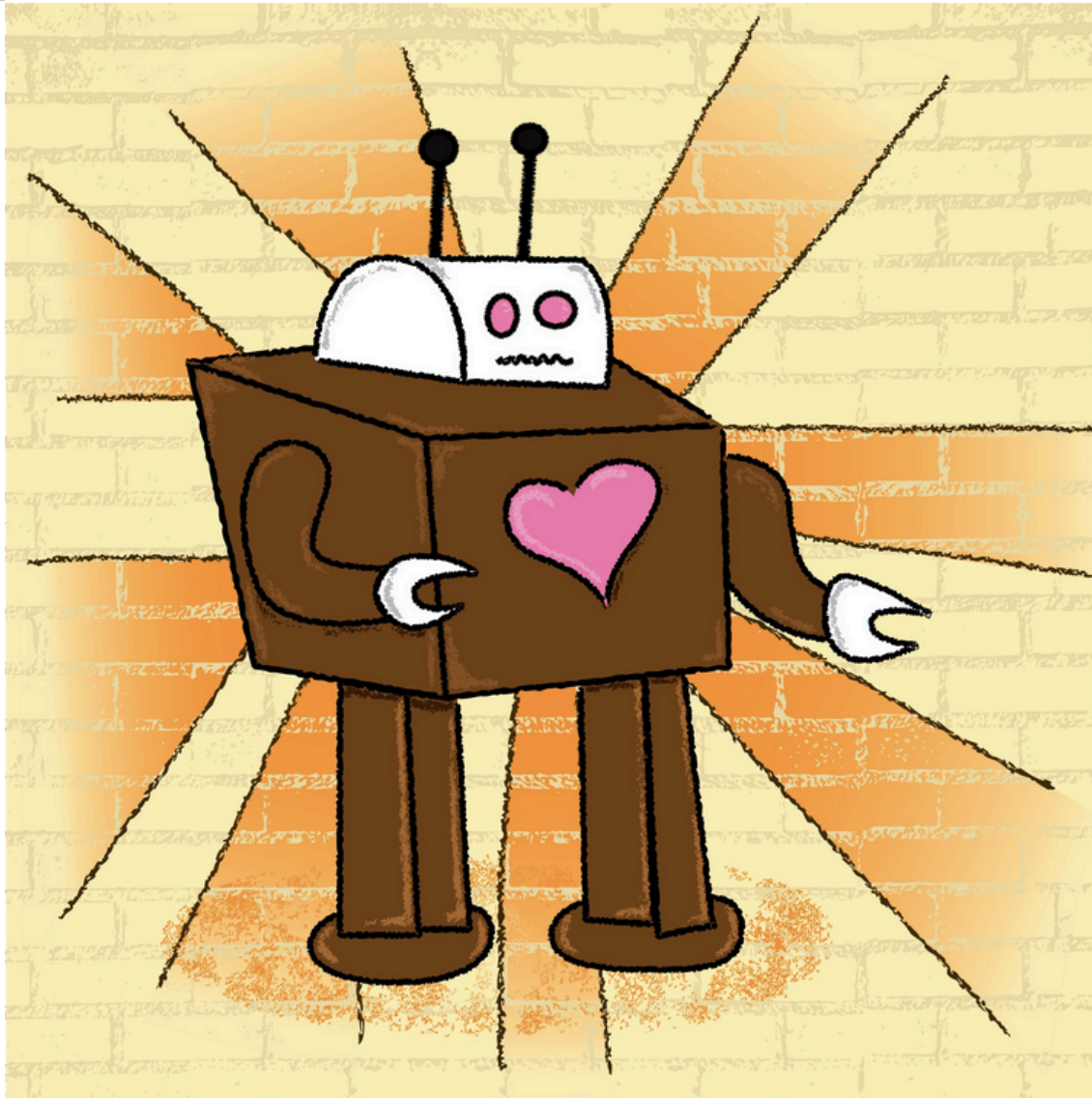


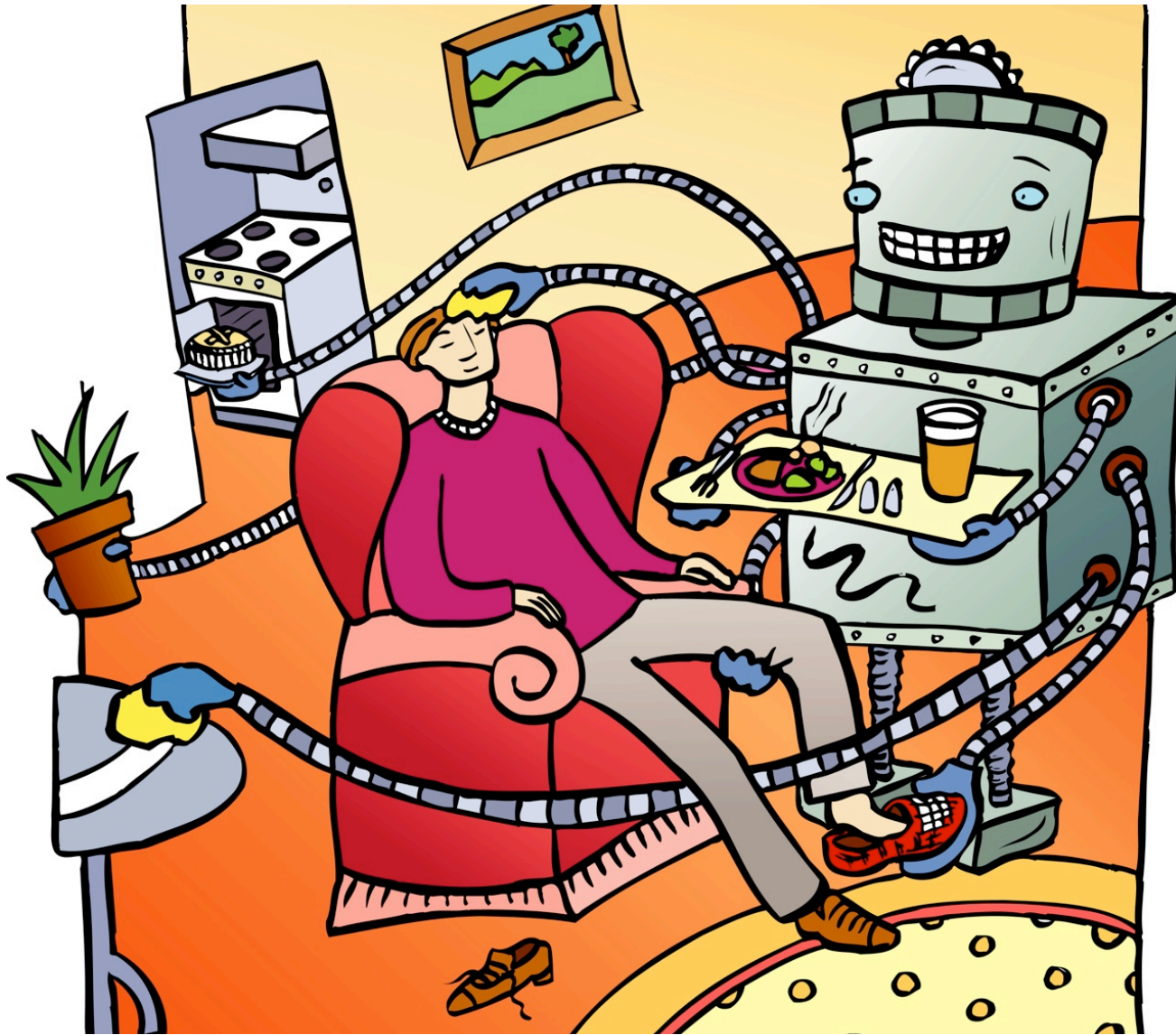
Behind the Data Sensing Lab

Gathering, Processing, and Analyzing Data at Scale using the Google Cloud Platform

Amy Unruh and **Kim Cameron** - Developer Relations

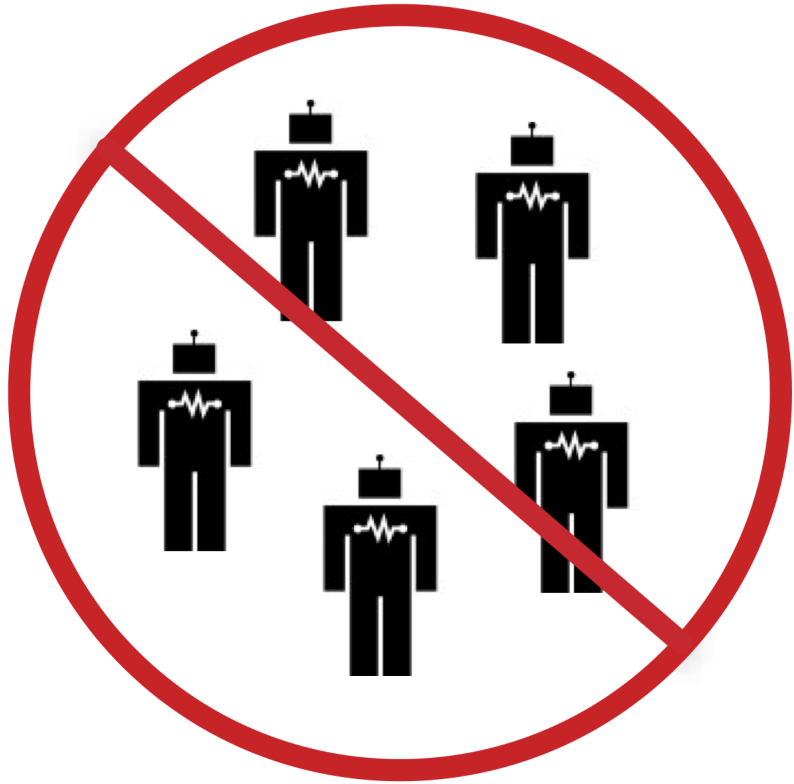


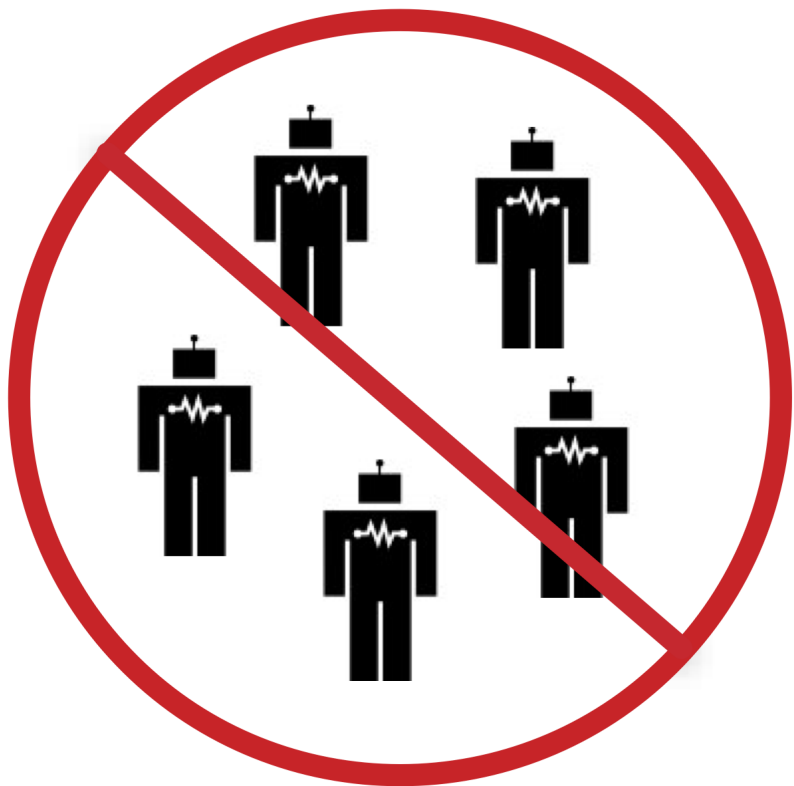




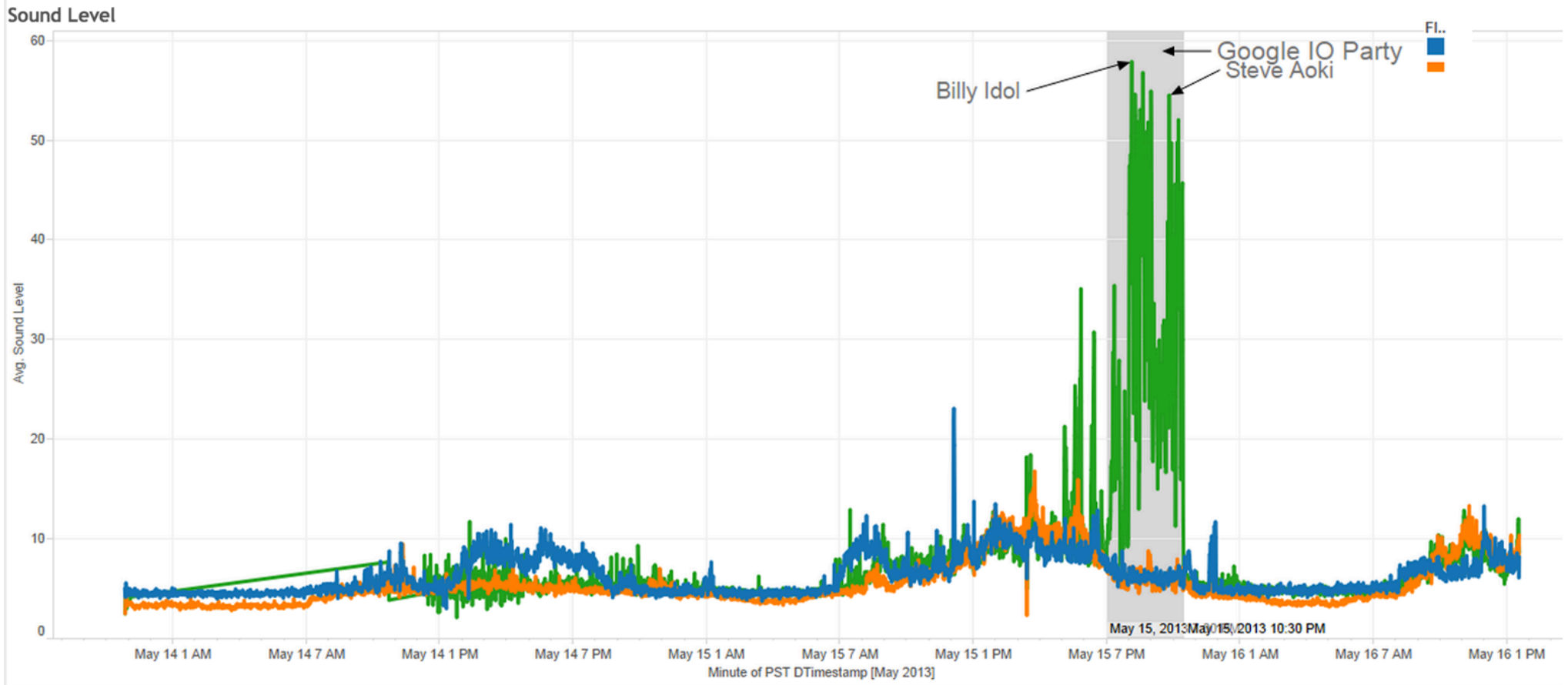


MACHINE TAKEOVER!!!







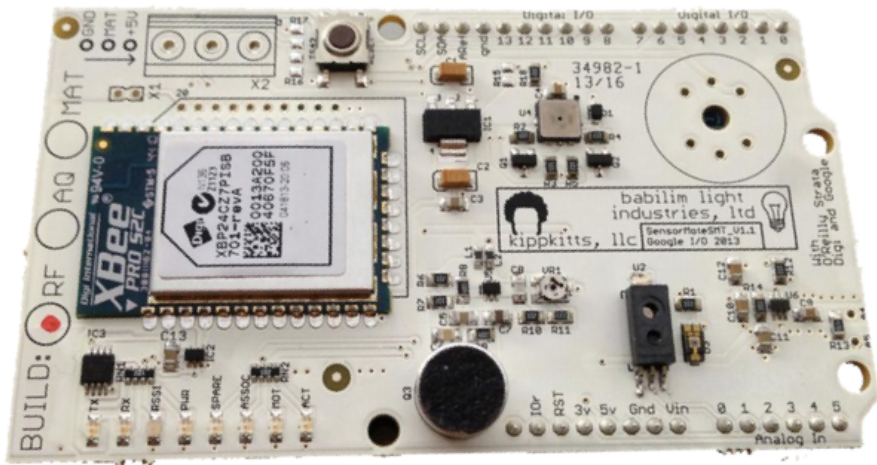




**DATA
SENSING
LAB**

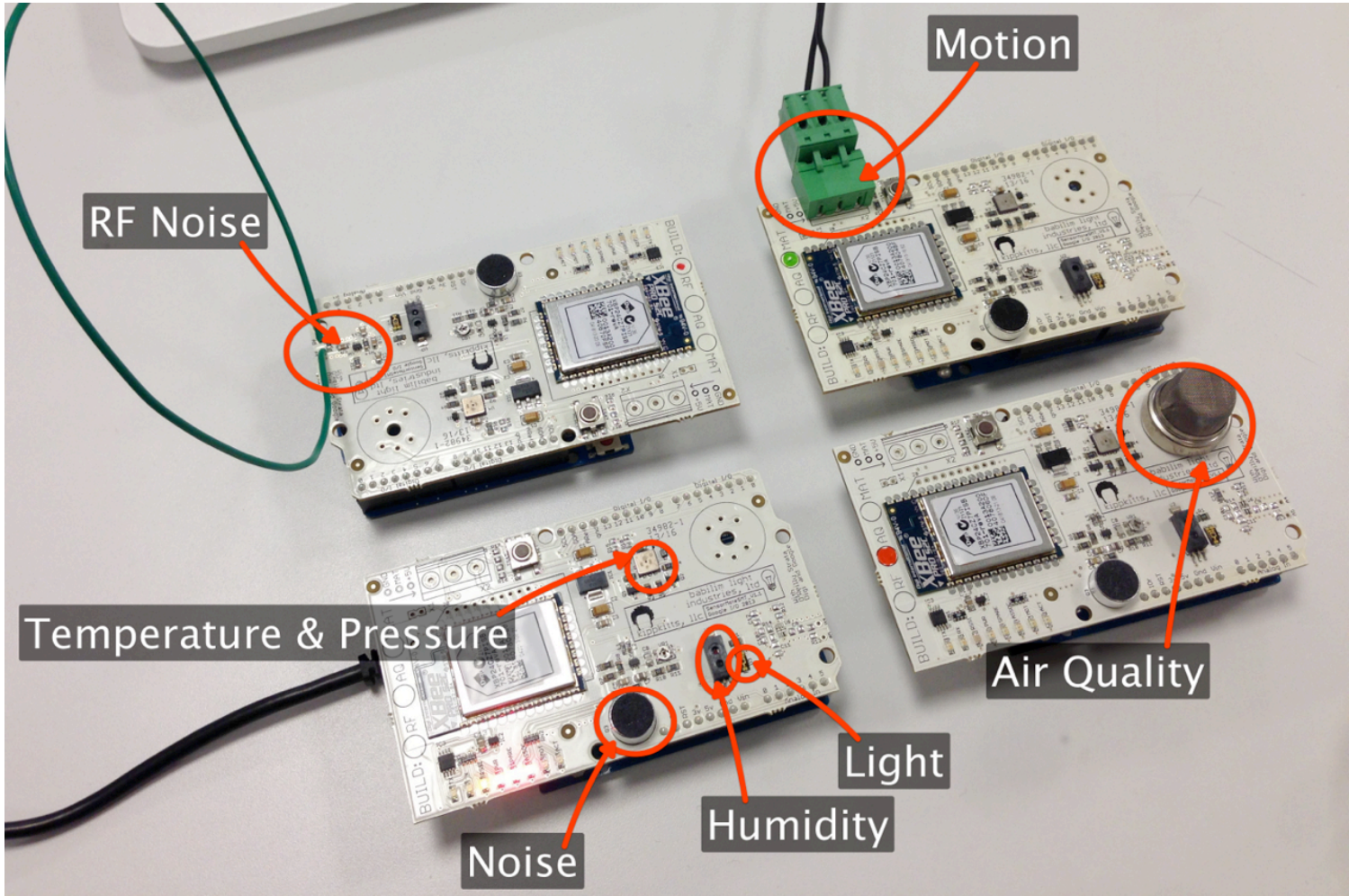
Hardware hacking
for data scientists





 **kippkits**



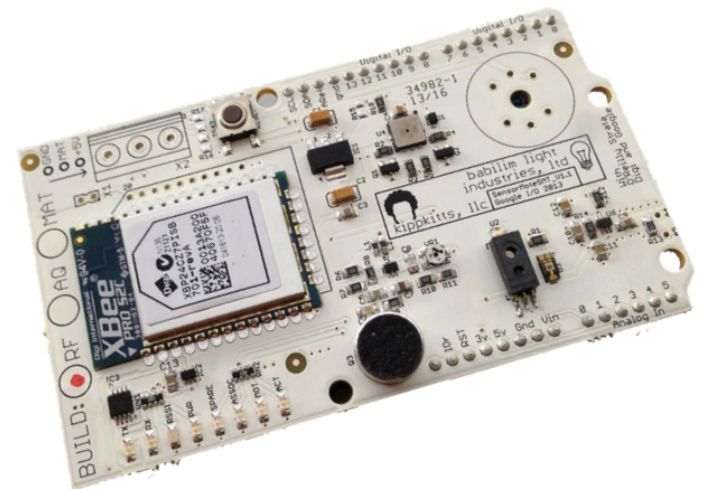


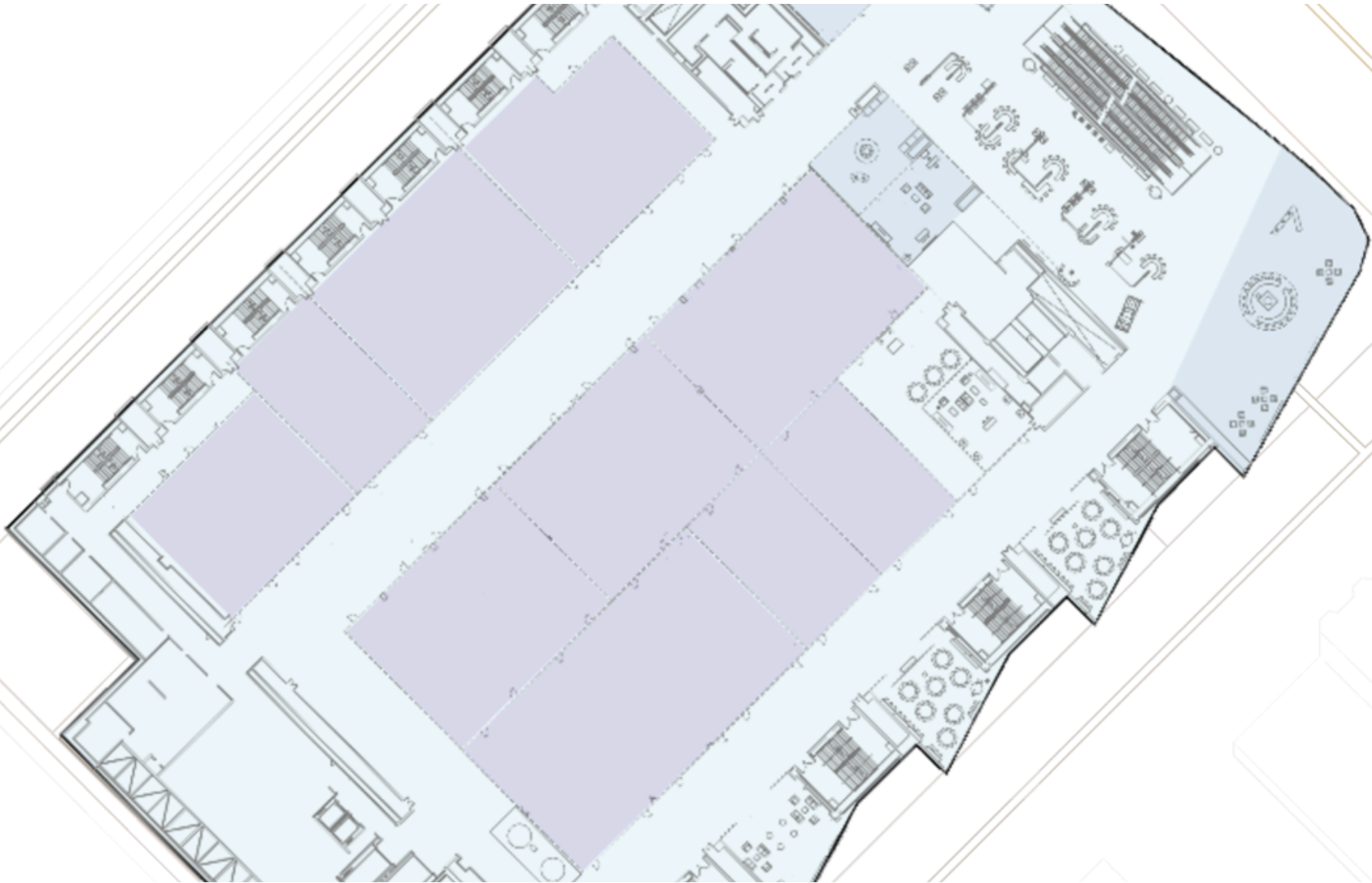
mote

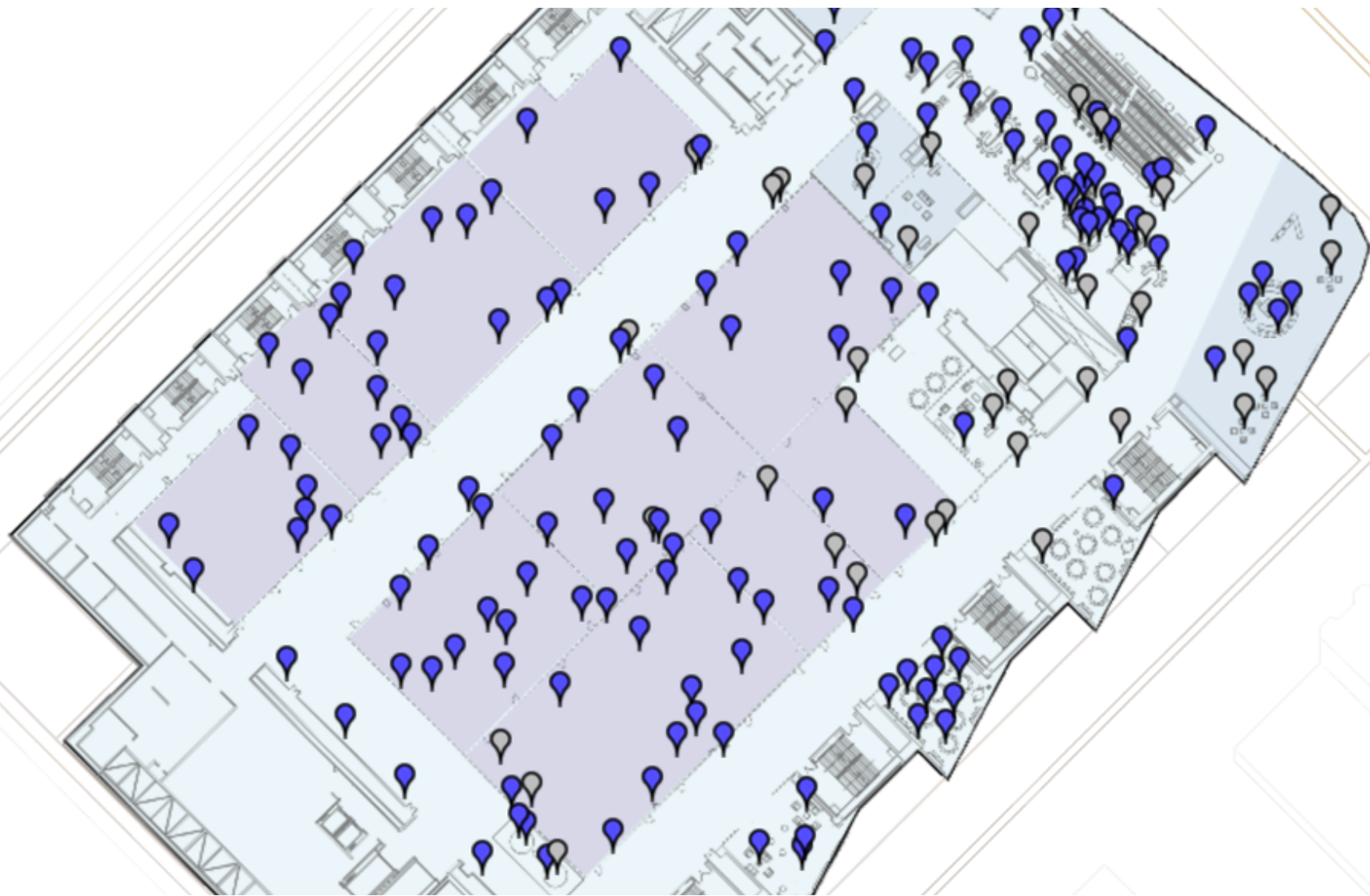
noun /mōt/

motes plural

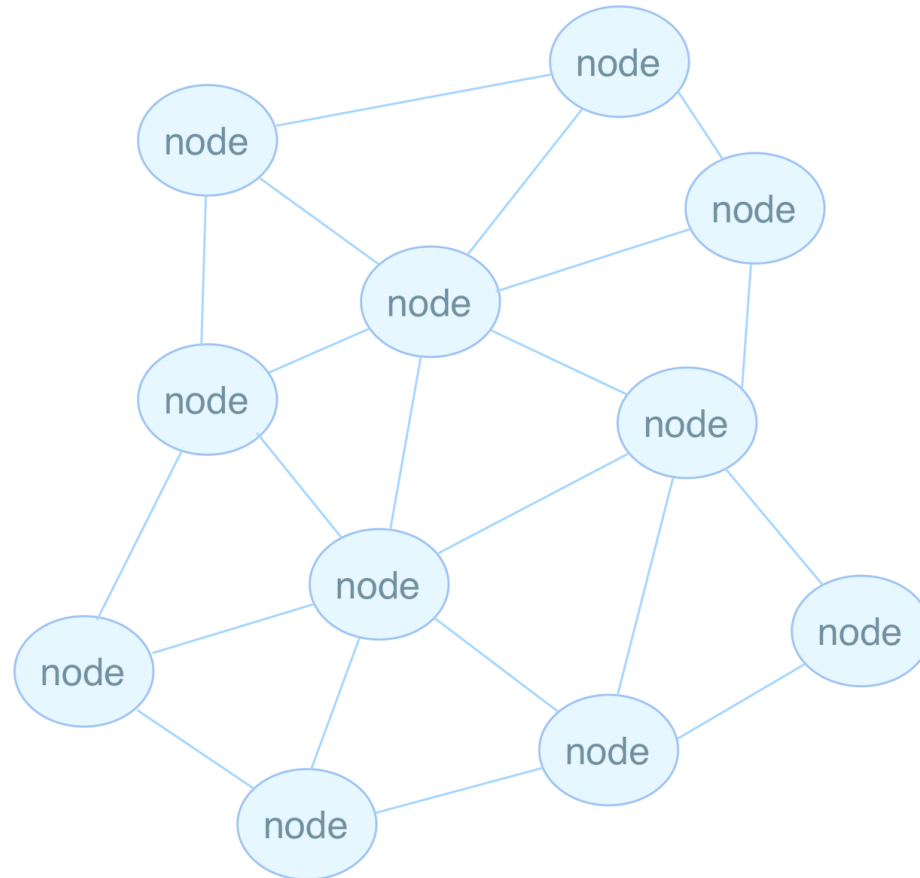
1. A tiny piece of a substance. Synonyms: particle - atom - speck
2. A single sensor node in a wireless sensory network
3. Those things with the blinky lights that you see everywhere

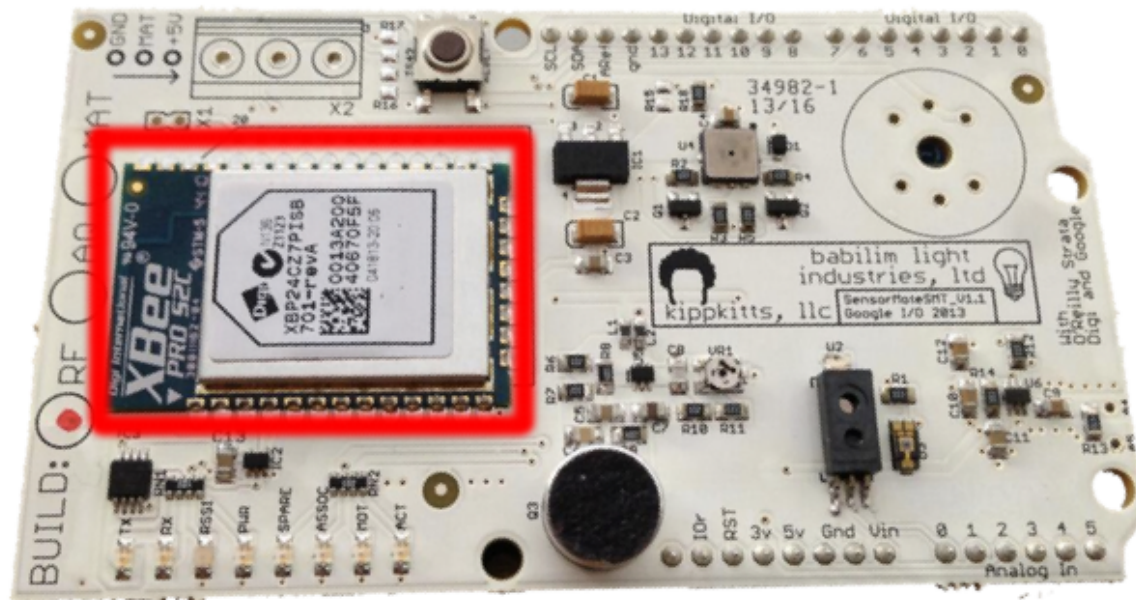






Mesh network



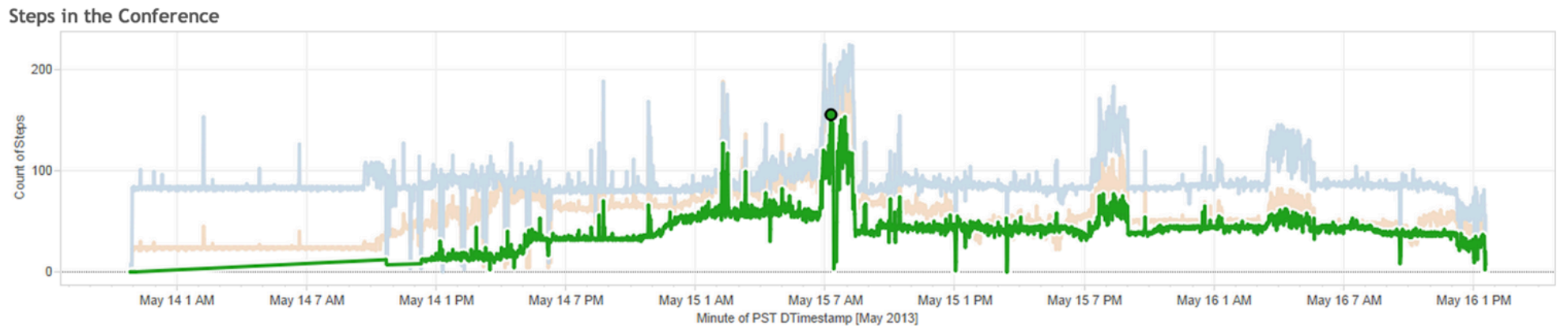
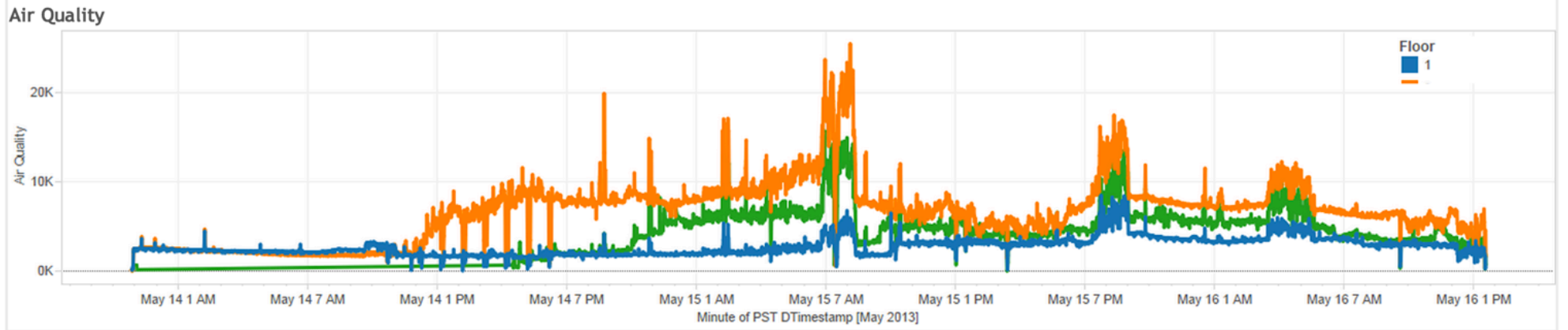




Google Cloud Platform



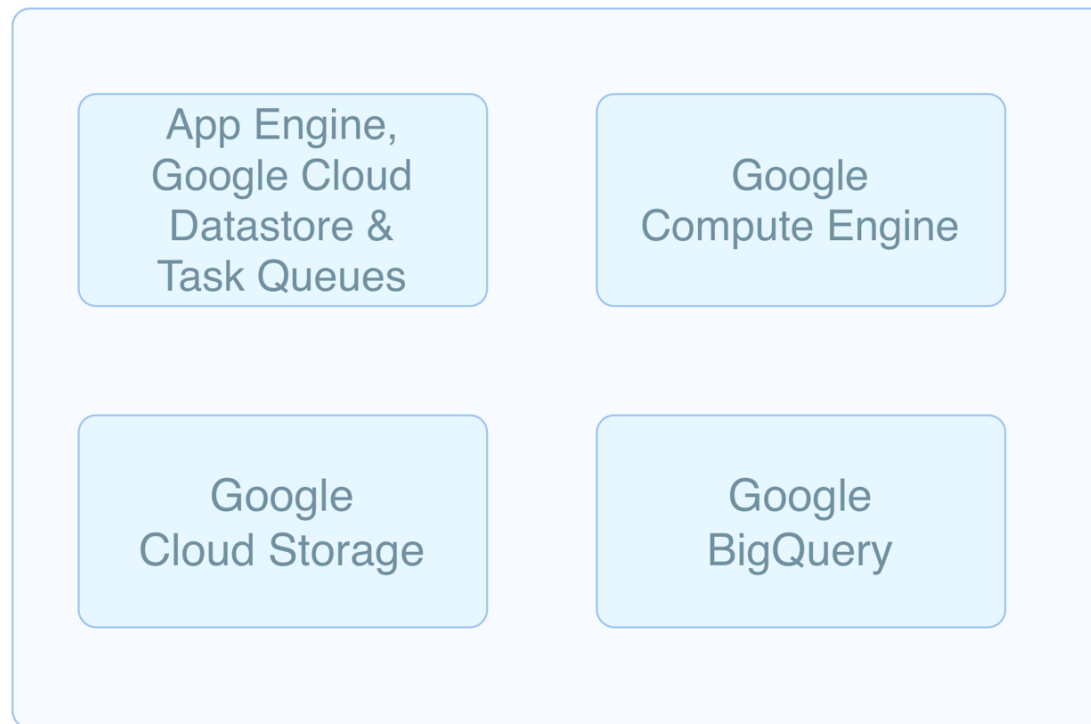
Temperature Map



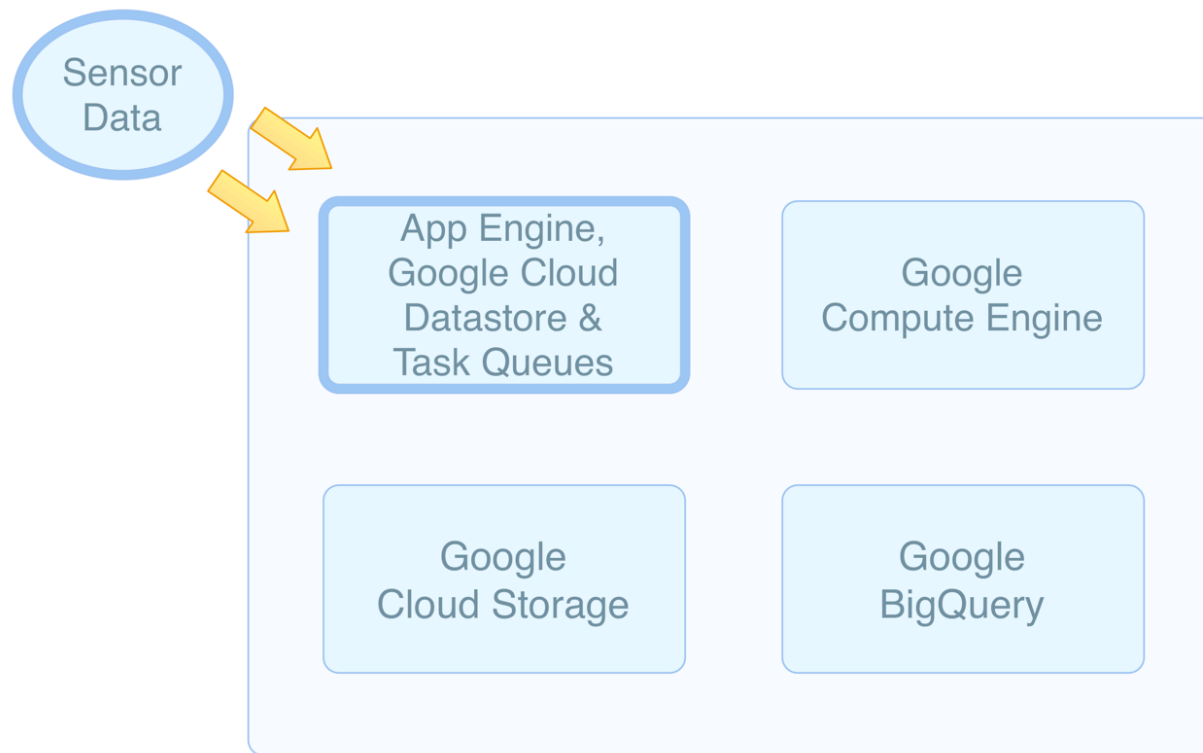


The "PIPELINE"

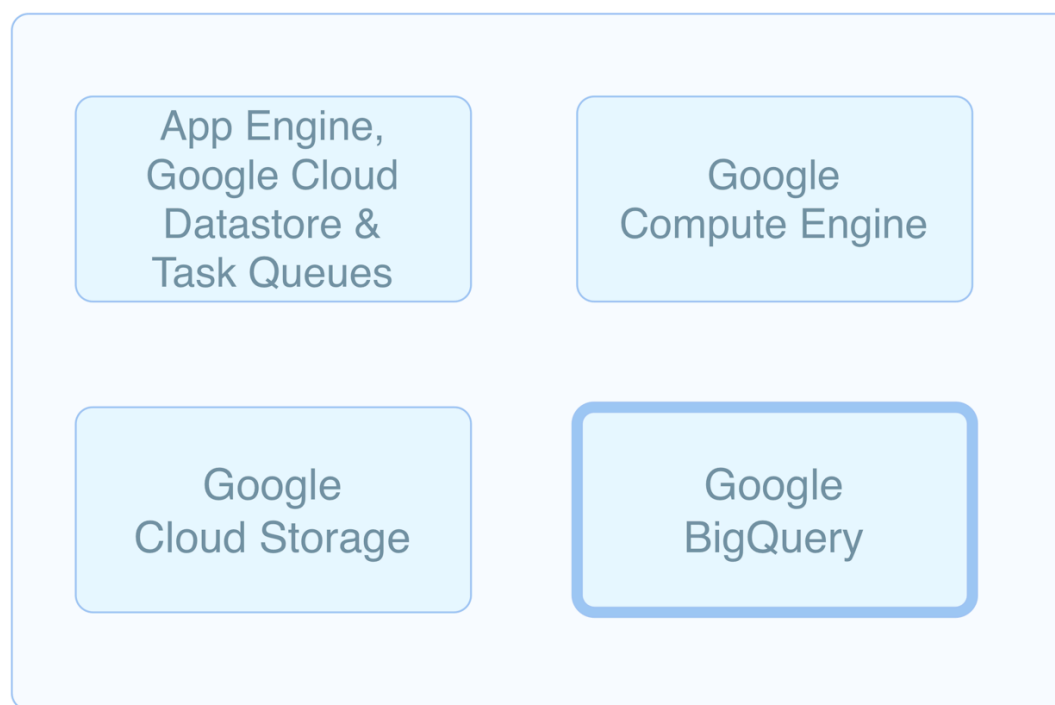
The Google Cloud Platform Data Sensing Lab Pipeline



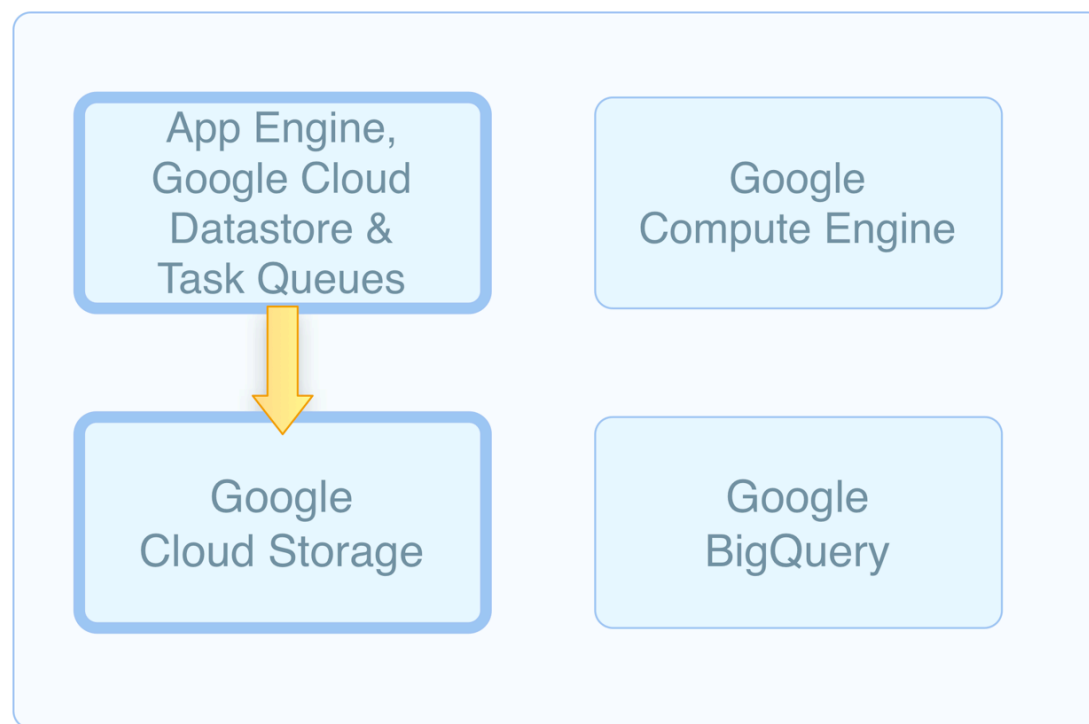
Data Sensing Lab Pipeline: Ingestion



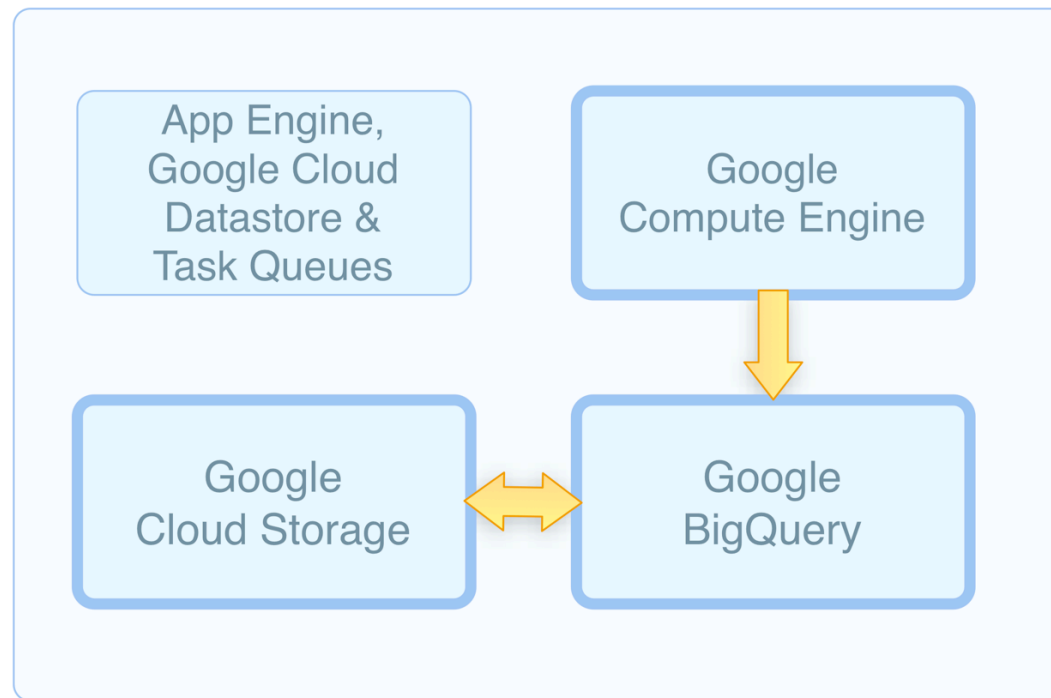
Data Sensing Lab Pipeline: BigQuery



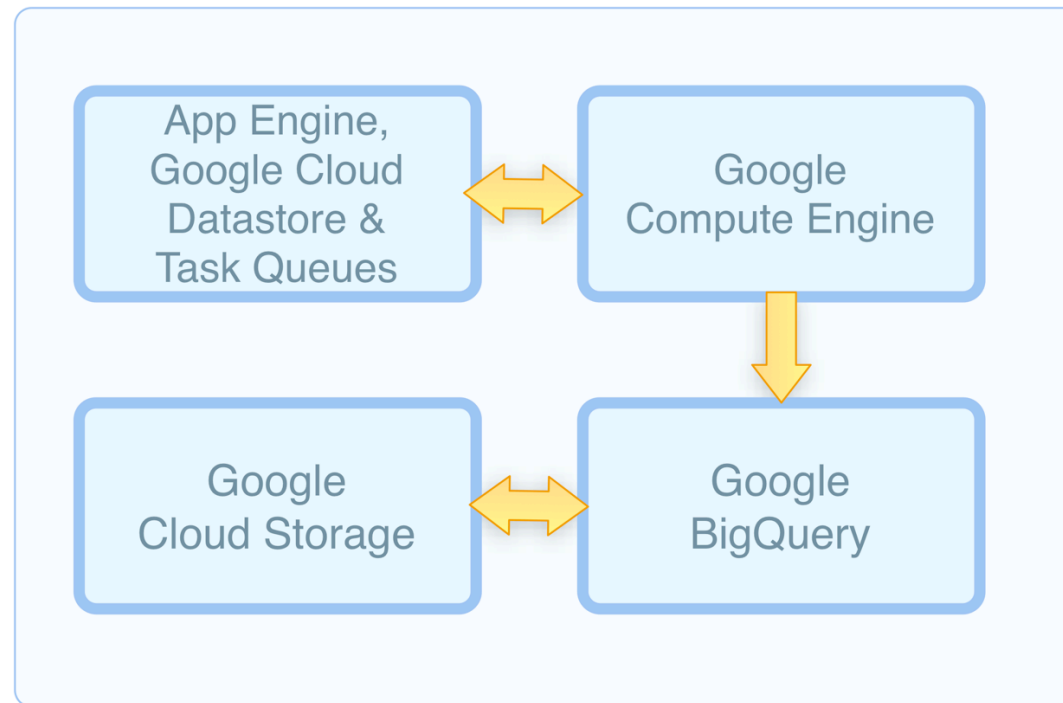
Data Sensing Lab Pipeline: Move Data to GCS



Data Sensing Lab Pipeline: Initiate Loading



Data Sensing Lab Pipeline: Load Data into BigQuery







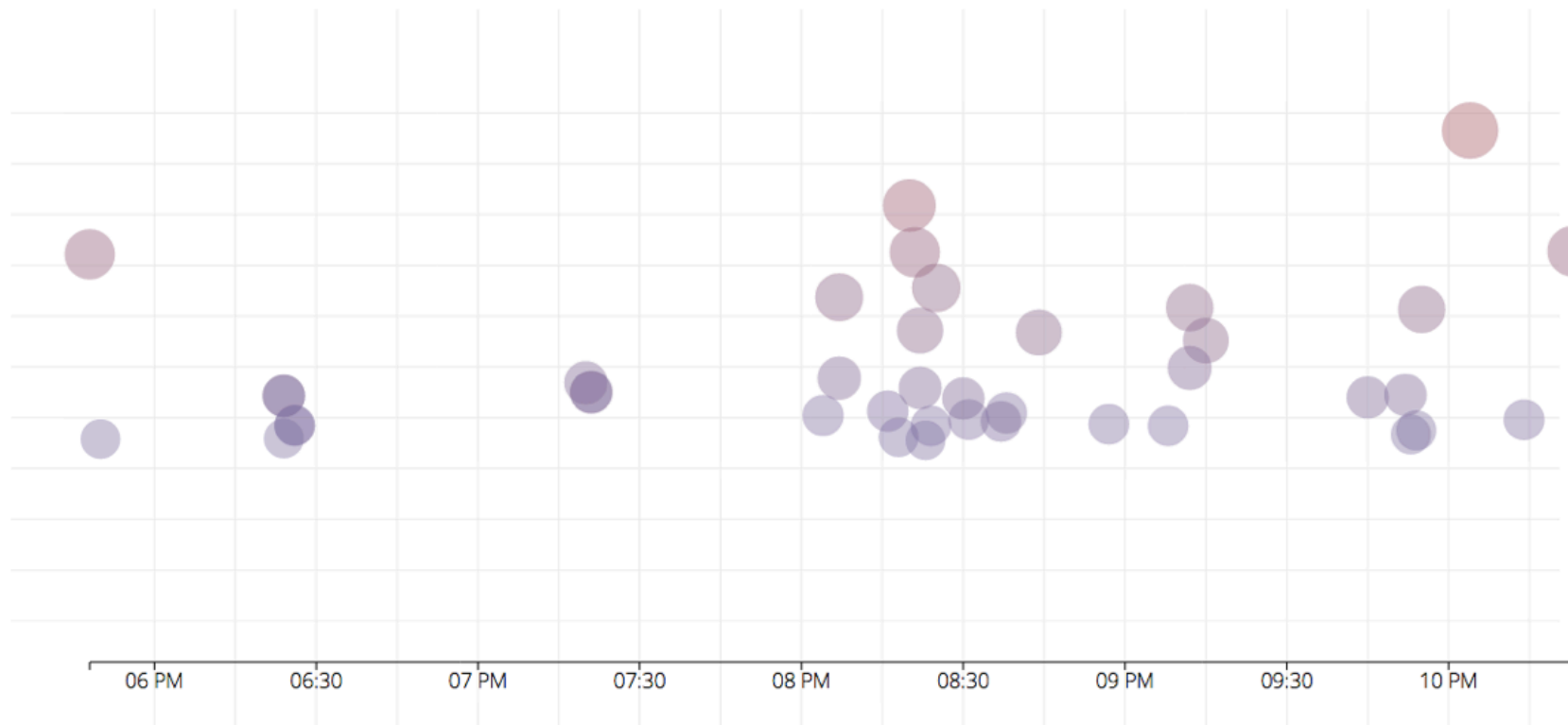
Visualize

Pressure Mats



Google I/O: Top 40

THE 40 NOISIEST MINUTES AT GOOGLE I/O THUS FAR



Top 40 Noisiest Moments - BigQuery Query

```
SELECT
  STRING(SEC_TO_TIMESTAMP(ROUND(TIMESTAMP_TO_SEC(DTimestamp)/60) * 60))
  AS loudest_minutes,
  Room,
  MoteId,
  MoteLat,
  MoteLng,
  AVG(Data) AS loudness FROM [io_sensor_data.moscone_io13]
WHERE
  SensorType = 'mic'
  AND MoteId != 'None' AND MoteId IS NOT NULL
  AND DTimestamp > TIMESTAMP('2013-05-08 17:00:00')
GROUP BY
  Room, MoteId, MoteLat, MoteLng, loudest_minutes
ORDER BY
  loudness DESC LIMIT 40;
```



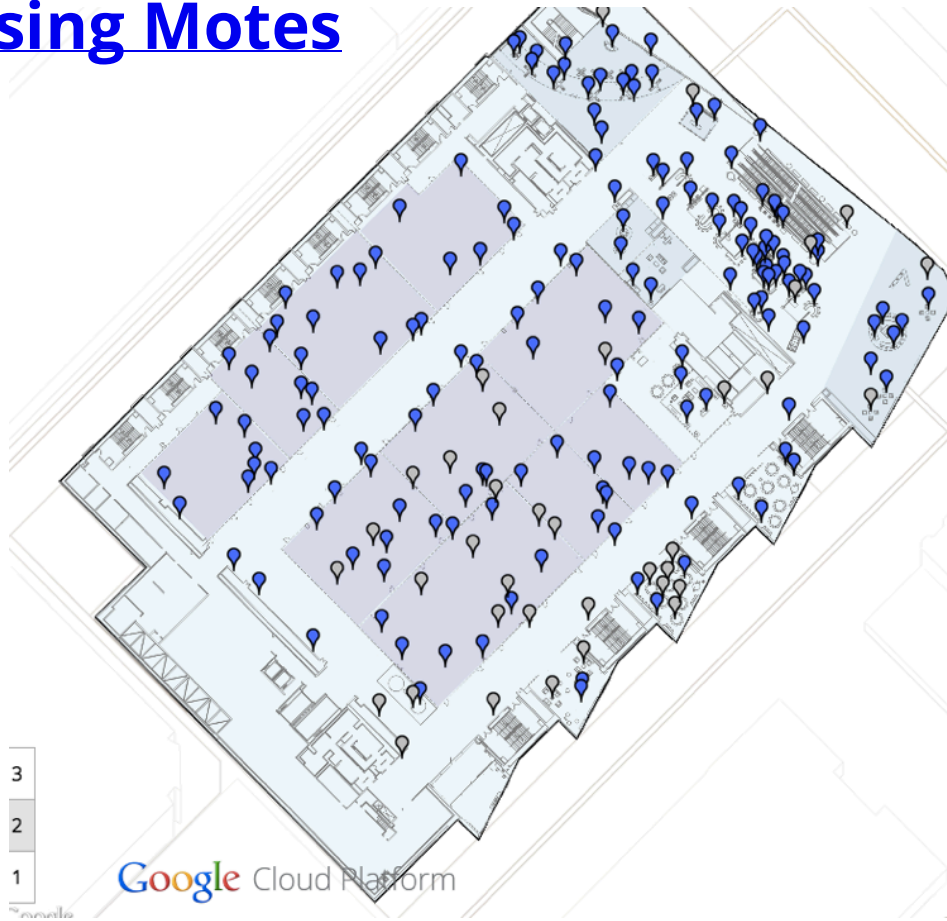
<https://bigquery.cloud.google.com/project/data-sensing-lab>





Monitoring

Missing Motes



Current Status, Sensor Mote Network, Floor 2. Blue is online and grey is offline.

#io13 #datasensinglab





Analysis

Google Cloud Datastore and Compute Engine



```

def fetch_data_for_mote(mote_name, limit, buckets):
    for stype in SENSOR_TYPES:
        req = datastore.RunQueryRequest()
        q = req.query
        q.limit = limit
        set_kind(q, kind='SensorData')
        add_property_orders(q, '-timestamp')
        set_composite_filter(q.filter, datastore.CompositeFilter.AND,
            set_property_filter(datastore.Filter(),
                               'mote_name', datastore.PropertyFilter.EQUAL, mote_name),
            set_property_filter(datastore.Filter(),
                               'sensor_type', datastore.PropertyFilter.EQUAL, stype))
    resp = datastore.run_query(req)
    res = [r.entity for r in resp.batch.entity_result]
    for entity in res:
        # ... process entity...
        entity_dict = {}
        for p in entity.property:
            v = p.value[0]
            if v.HasField('string_value'):
                val = v.string_value
            elif v.HasField('integer_value'):
                val = v.integer_value
            ...
        entity_dict[p.name] = val

```



.....

2013-05-15

02:17:00,temperature,32.0,light,212.0,mic,6.0,gas,147.0,humidity,25.04,pressu

2013-05-15

02:18:00,temperature,32.0,light,211.0,mic,7.0,gas,147.0,humidity,25.04,pressu

2013-05-15

02:19:00,temperature,32.0,light,209.0,mic,7.0,gas,147.0,humidity,25.37,pressu

2013-05-15

02:20:00,temperature,32.0,light,206.0,mic,3.0,gas,146.0,humidity,25.2,pressur

2013-05-15

02:21:00,temperature,32.0,light,204.0,mic,7.0,gas,145.0,humidity,24.56,pressu

2013-05-15

02:22:00,temperature,32.0,light,202.0,mic,3.0,gas,146.0,humidity,24.56,pressu

2013-05-15

02:23:00,temperature,32.0,light,198.0,mic,2.0,gas,145.0,humidity,25.2,pressur

.....



% R

```
> library(Hmisc)
> mote <- read.csv("XBee_406714E5.csv")
> alt <- mote[15]
> hu <- mote[11]
> temp <- mote[3]

> cor(hu, temp)
-0.9438309
```

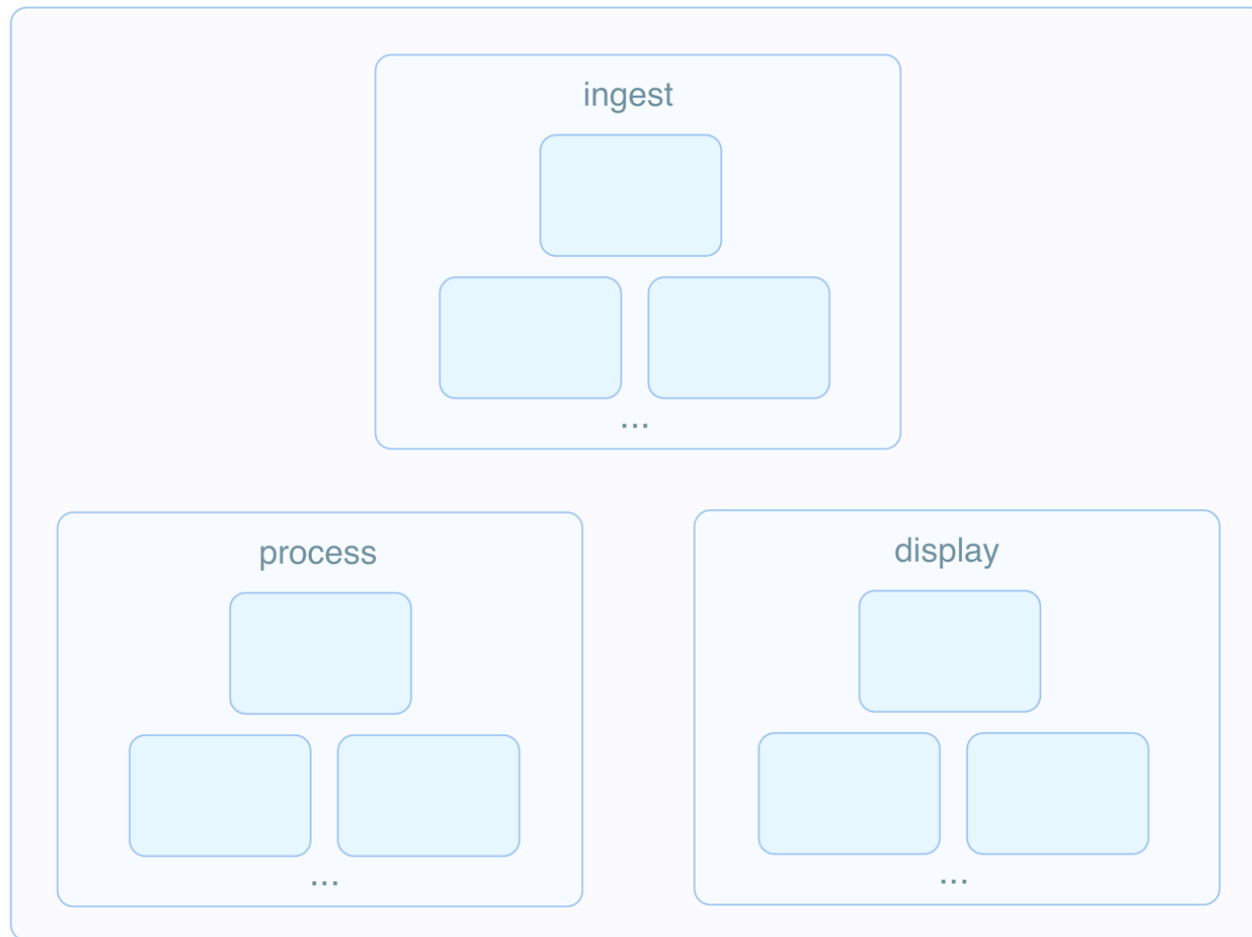




Performance



App Engine Servers *(limited preview)*



Challenges



Google Cloud Platform



Thank you!



- Michael Manoochehri
- Felipe Hoffa
- Alasdair Allan
- Kipp Bradford
- Julie Steele
- Francois Ajenstat
- Euzel Villanueva
- Christine Chambers

- Rob Faludi
- Elizabeth Presson
- Brad Cole
- Josh Livni
- Paul Saxman

- Brian Goldfarb
- Ryan Boyd
- Chris Tillman
- Merci Niebres
- Ron Crook
- Dusty Reid
- Priscila Albro



Resources & Sessions

- [Google Data Sensing Lab Project](#)
- [Google Cloud Platform](#)
- [O'Reilly Data Sensing Lab](#)
- [Digi](#)
- [Tableau](#)

- **App Engine Servers** Limited Preview sign-up: <http://goo.gl/xvZbc>
-
- **Code Lab:** [Using the App Engine Datastore to build unified solutions that span App Engine and Compute Engine](#) - **Day 3 - 11:15 AM, Room 8**

We'd love your
feedback!

