

# Positioning and Hockey Sticks

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Startups & Algorithms

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# Agenda

- Me & Trueflow
  - Techstack
  - Positioning
  - Routing
  - Going live
- Making a startup
- Getting experience
- Discussion

**Spoiler:**  
**20 pages**

# Who am I?

- Boards @ Chalmers
- Graduated 2013 from CSE
- Work in San Francisco
- Co-founder & CTO Trueflow



Who are you?



Indoor search - Google maps for indoors

### Business model

- All exhibitions in one app
- Revenue share from ads
- Subscription model

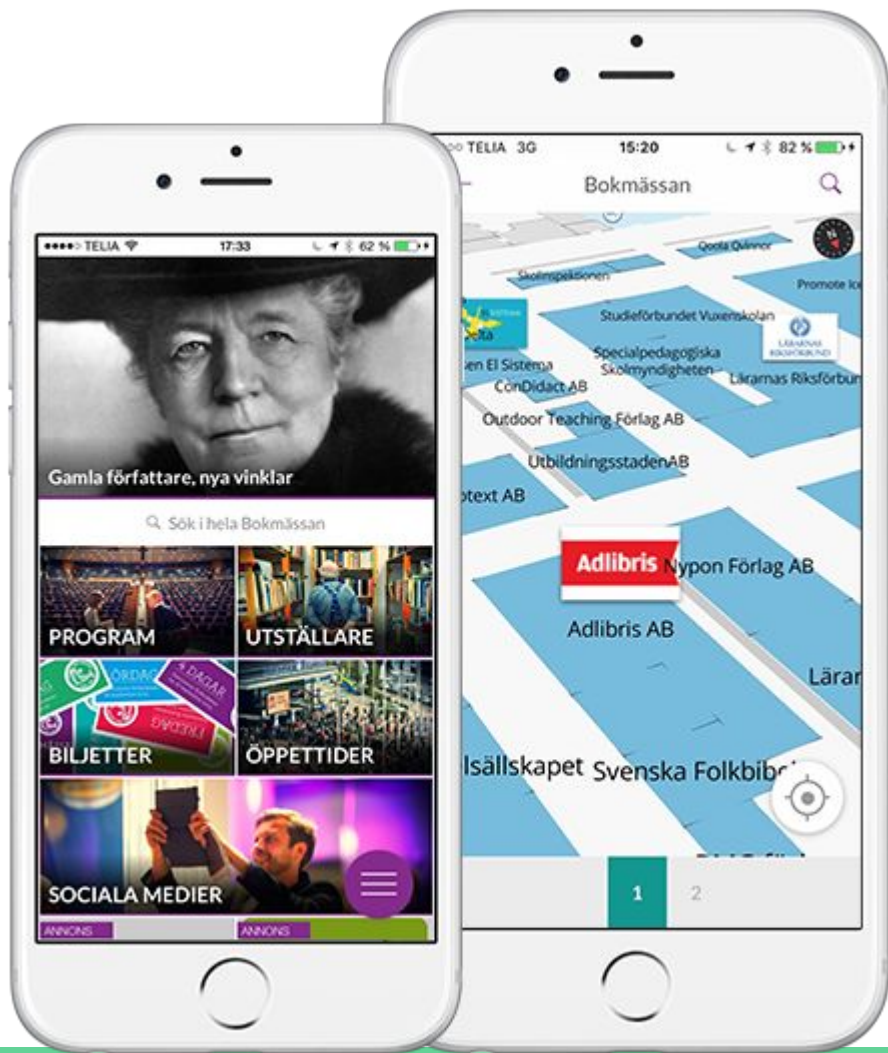
### Financing

- \$1m from investment angels
- Revenue (soon profitable! yay!)

### Team

- 3 Chalmerists
- 2 Part time CSE
- 1 Martin

Founded Okt 2014



<https://map.trueflow.io/#/2/15300/sv-se/>  
<http://trueflow.io>

# Trueflow Customers

- Some of the largest building complexes in the Nordics
  - Svenska mässan - 30 000m<sup>2</sup>
  - Uppsala uni - 400 000m<sup>2</sup>
- Upcoming 2016
  - Elmia - 30 000m<sup>2</sup>
  - Älvsjömessan - 100 000m<sup>2</sup>
  - Hamburg - 150 000m<sup>2</sup>
  - Nürnberg - 300 000m<sup>2</sup>



# Trueflow product

## Techstack

- Swift - iOS
- Java - Android
- C++ - maps
- Angular - Admin web
- Golang - Micro service backend
- GIT
- Databases
  - Postgres
  - Redis
  - Titan (Graph)
  - SQS (Queue)
  - Elastic
- Bluetooth - Positioning
- Docker - deployment



TITAN

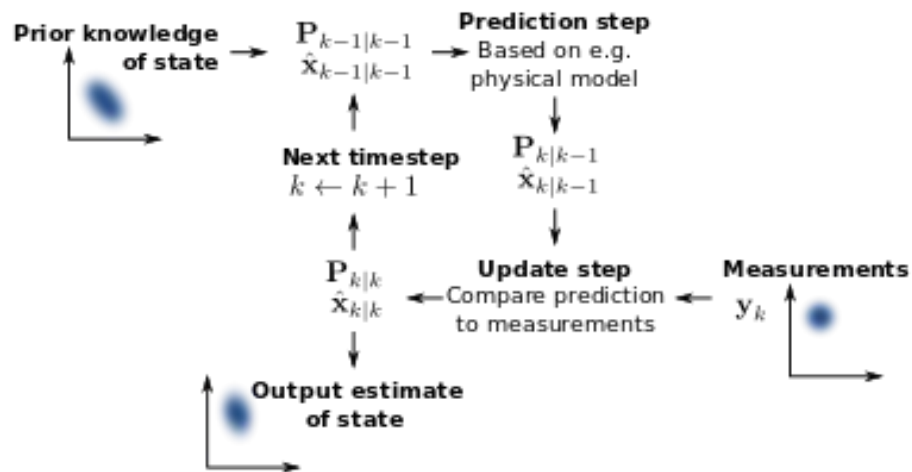


elastic

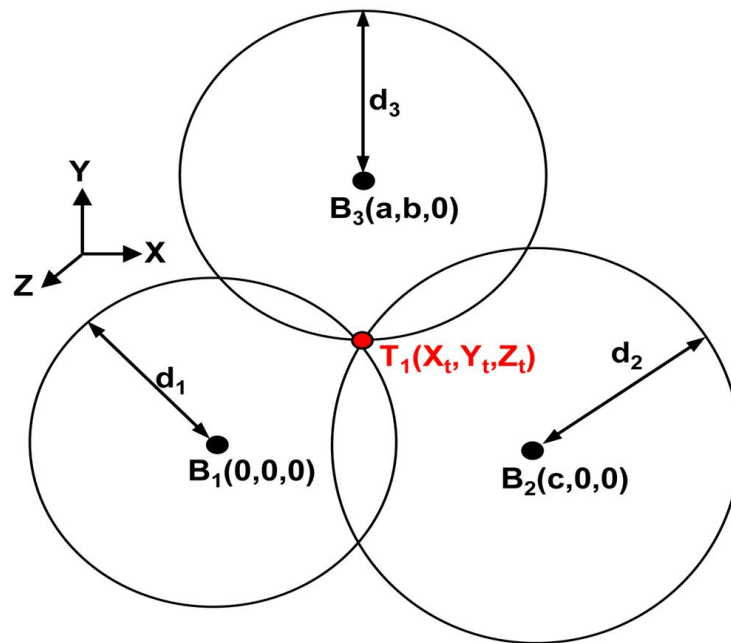
NO PHP (or python or ruby) :D



# Kalman filter

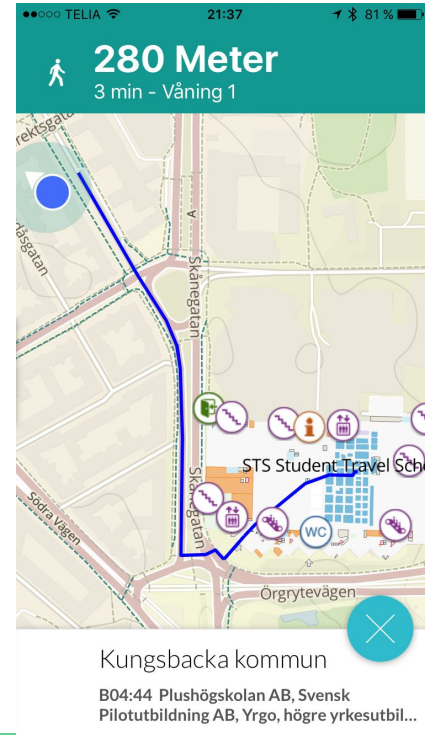
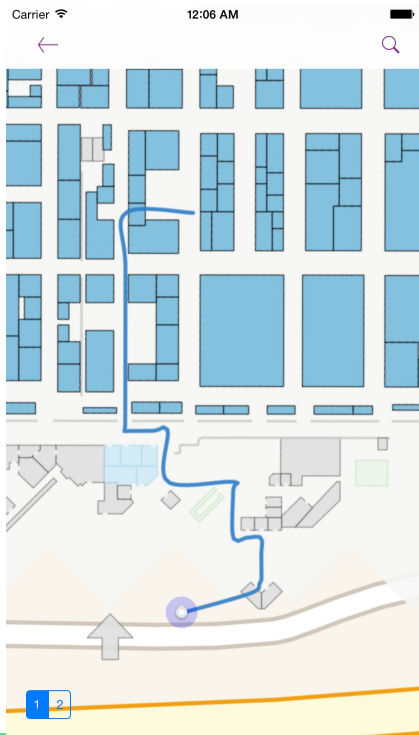


# Trilateration



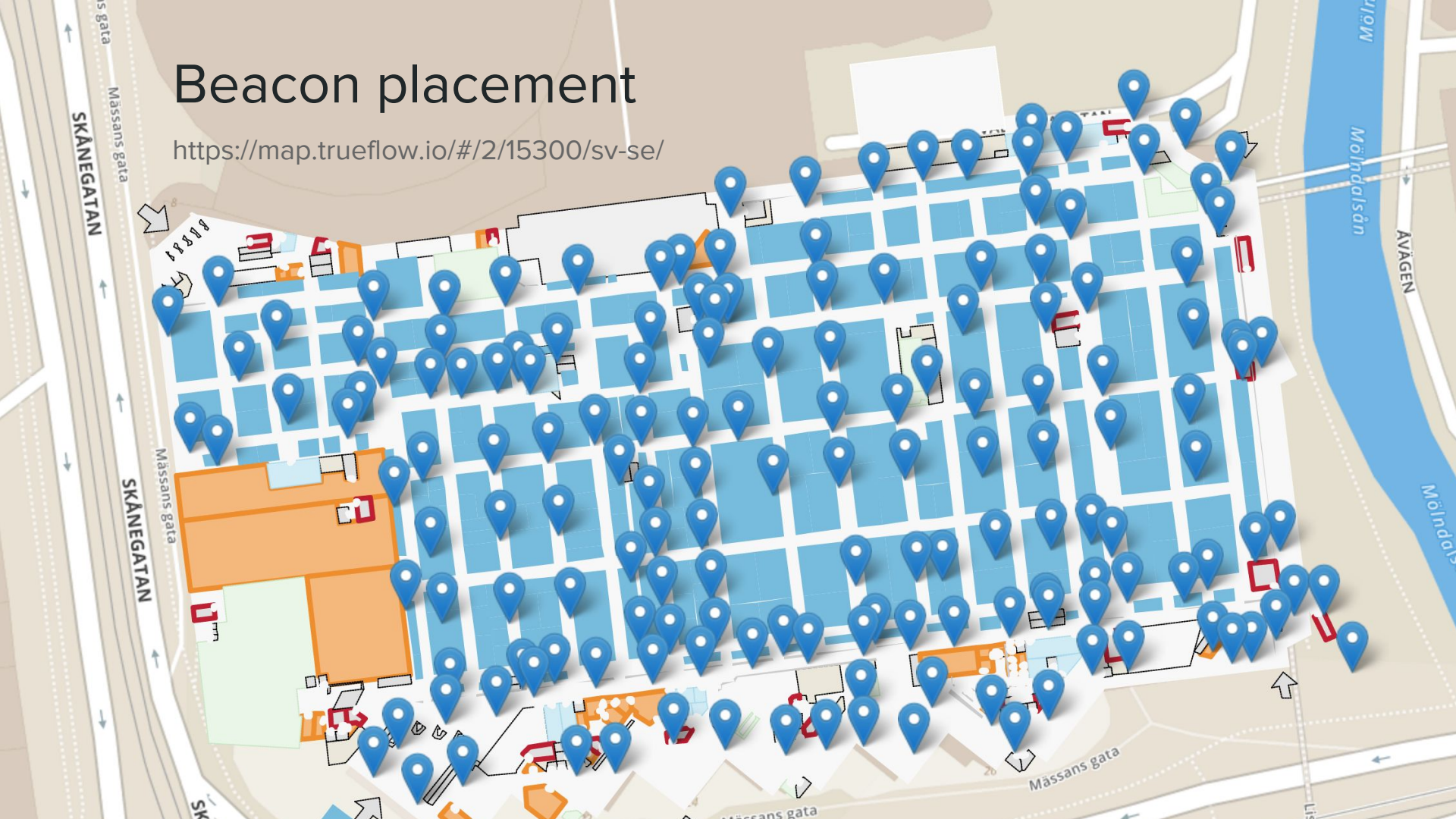
# Positioning

```
let normalizeCoefficient: Double = beacons.reduce(0.0) {$0 + 1/abs($1.distance)}  
let lat: Double = beacons.reduce(0.0) {$0 + 1/abs($1.distance * normalizeCoefficient) * $1.position.coordinate.latitude}  
let lng: Double = beacons.reduce(0.0) {$0 + 1/abs($1.distance * normalizeCoefficient) * $1.position.coordinate.longitude}
```



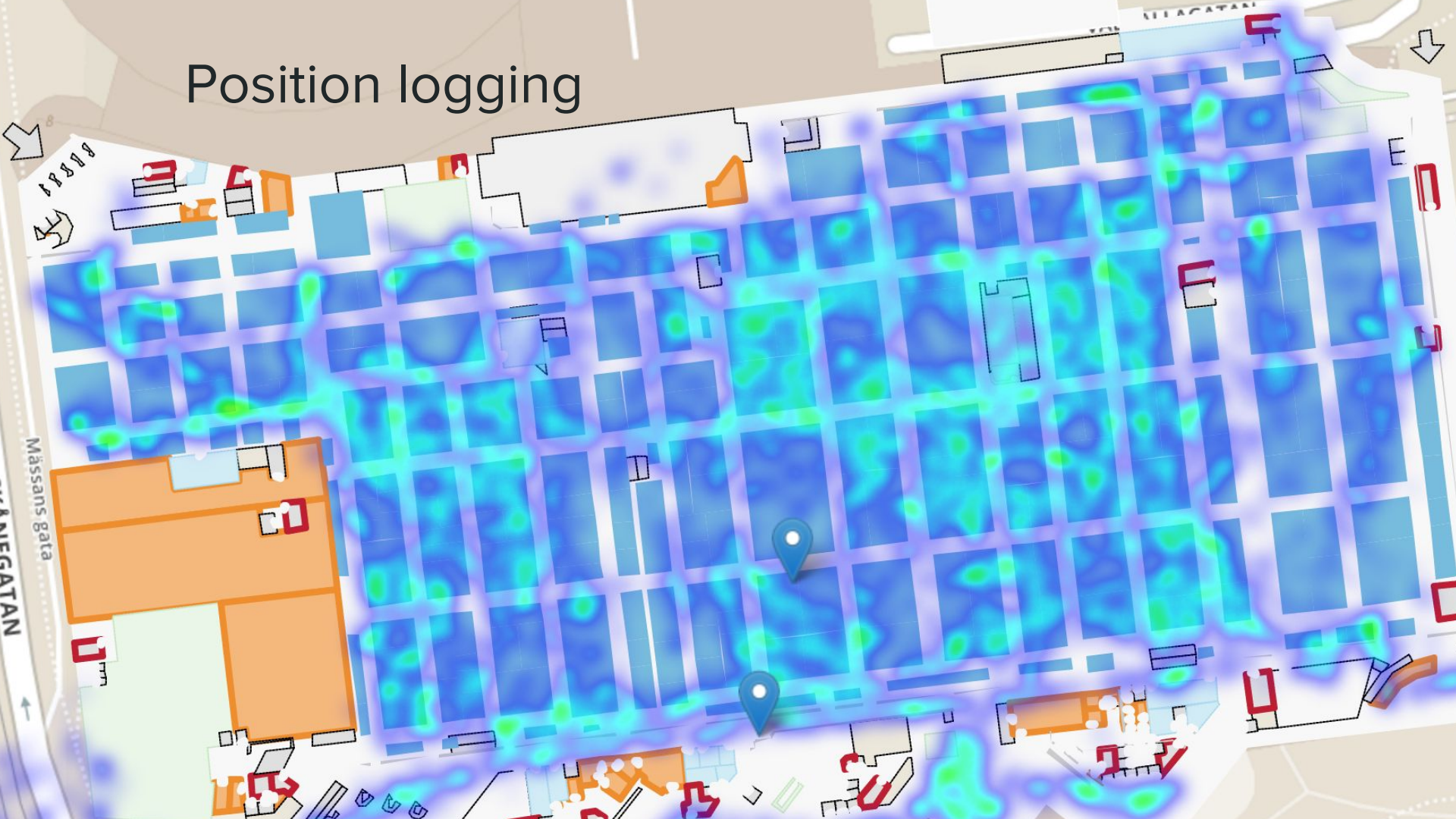
# Beacon placement

<https://map.trueflow.io/#/2/15300/sv-se/>





# Position logging



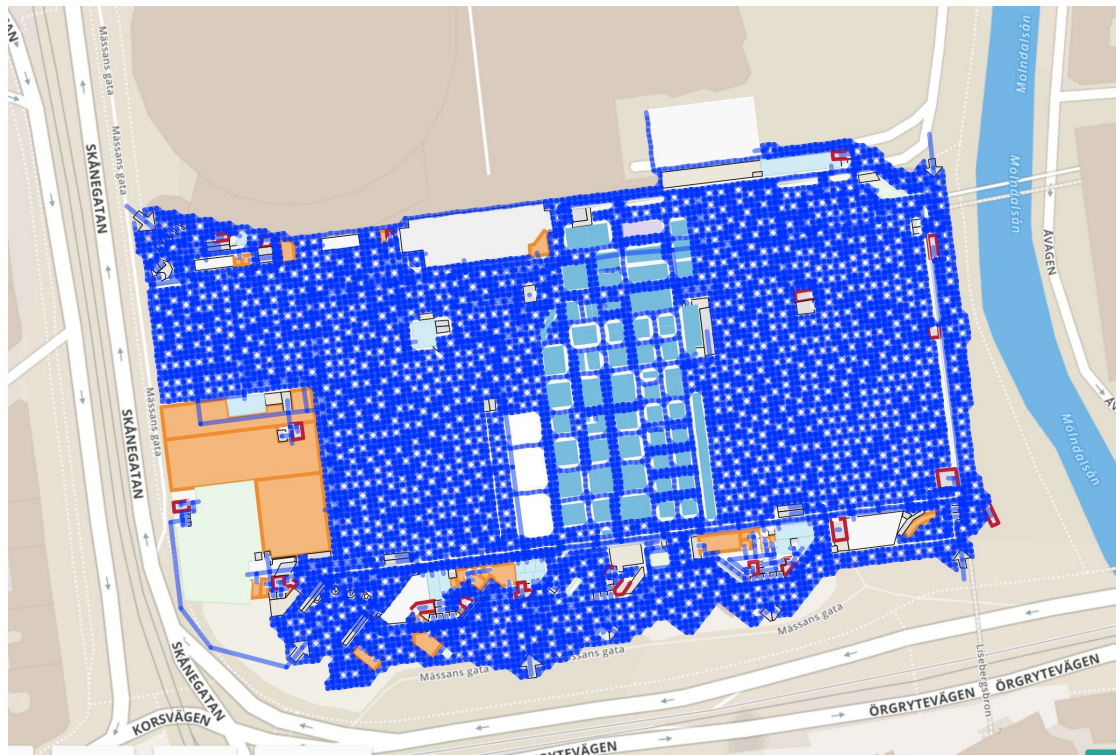
# Privacy

- Concerns
- Where and how is it OK to store it?
- PUL & EU rules

```
type Log struct {  
    Type            string    `json:"type"`  
    BeaconsNearby  []string  `json:"beaconsNearby"`  
    PositionAccuracy float64   `json:"positionAccuracy"`  
    PositionMethod string    `json:"positionMethod"`  
    UserId          string    `json:"userId"`  
    VenueId        int       `json:"venueId"`  
    DeviceId       string    `json:"deviceId"`  
    SensorType     string    `json:"sensorType"`  
    AppState       string    `json:"appState"`  
    AppVersion     string    `json:"appVersion"`  
    Position       BuildingPosition `json:"position"`  
    PosUnfiltered  BuildingPosition `json:"positionUnfiltered"`  
    TimeStamp     time.Time `json:"timeStamp"`  
    Bearing       float64   `json:"bearing"`  
    OsVersion     string    `json:"osVersion"`  
    DeviceModel   string    `json:"deviceModel"`  
    Manufacturer  string    `json:"manufacturer"`  
    Locale        string    `json:"locale"`  
    MotionState   string    `json:"motionState"`  
}
```

# Routing

- Just routing is hard
- Accessibility routing
- Making a good routing graph
- Doing the actual routing

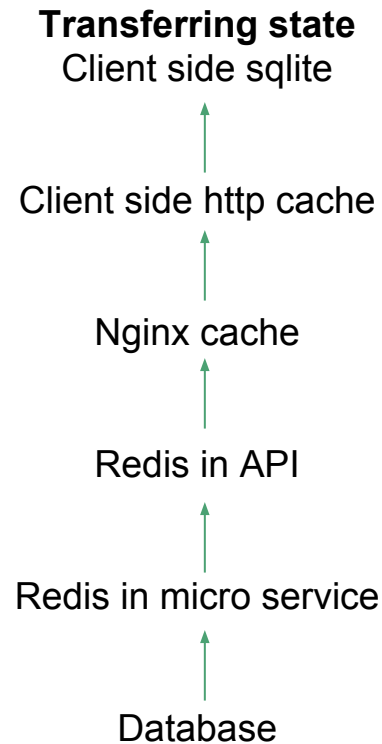


# Upcoming

- Machine learning for fun :D
- Core OS - Container orchestration
- Client side continues deployment
- Graph for users - object relations relations

# Going Live

- Early optimization is the root of all evil
- Testing
- Spikes and crashes
- Users complain, numbers gives the verdict





# Making a startup

- Common sense
- Always discuss the idea
- What's the worst that can happen
- Keep it simple & Move fast
- Nail it!



*“Success is 10% strategy and  
90% execution”*

# Get experience

- Software is changing the world, so code!
- Internships
- Side projects
- Don't worry about working for free
- Many different kinds of careers

# For ideas @ Chalmers

- Chalmers innovation - Startup camp
- Support - Chalmers school of entrepreneurship
- ETA, XP, Robotics association
- Making contacts through Student union
- Startup hack
- Close relationship to alumnis
- Open minded professors



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY

# To take with you

- Don't think too long before starting, the second thought is probably wrong so the first is good enough as a start.
- Making a startup is not always a good idea, but it might be
- Never be afraid of stuff you don't understand
- Software is changing the world, you're leading it

*“The harder I work the more luck I seem to have”  
--Thomas Jefferson*

Questions?

