

Wearables at Scale

Deploying OSGi on an army of Cubie Trucks

Frank Lyaruu



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About me

Frank Lyaruu



CTO at

Senior Technology Architect at SEN)RATO

@lyaruu



About Dexels



- Est. 2001 based in Amsterdam
- Enterprise software for large companies
- Heavily invested in OSGi
- Focused on sports and entertainment



About Dexels

SEN)RATO

- Est. 2013
- Joint venture with Dexels
- Custom hardware for large events



- Case study
- Hardware stack
- Software stack
- Development chain
- DEMO!

The image features a dark purple gradient background. In the center, the word "Tomorrowland" is written in a white, sans-serif font. Behind the text is a black silhouette of a castle with a large central dome and several spires of varying heights. The castle's base is a wide, low wall with a slightly peaked roofline.

Tomorrowland





Tomorrowland 2014

Electronic music festival near Antwerp, Belgium

- 2 weekends
- 8 stages
- ~100 hectares
- ~100k visitors a weekend
- ~ € 250 per ticket



Requirements



Requirements

Design a wristband to do:

- Access control
- Location
- Profiling / feedback
- Crowd monitoring
- Integrate with 3rd party applications
- Something that adds to the UX



Access control

- Should *always* work
 - Should be secure
- ...simplicity is essential: Passive RFID



Location

- Ability to locate individuals
- Ability to locate security personnel



Profiling / feedback

- How do the visitors behave?
- What acts are popular?



Crowd monitoring

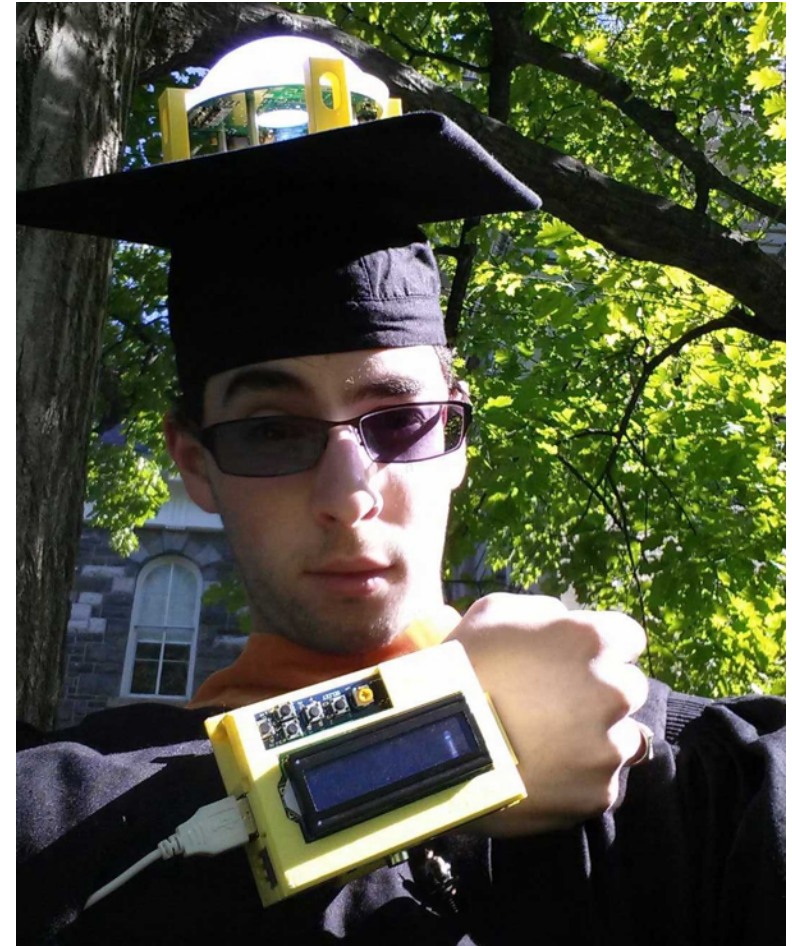
- Find hotspots in the flow of people
- Dashboard for security personnel





UX

- UX is key
- Comfortable
- Match the festival
- Suitable for non-nerds





The plan



The setup

- Set up base stations around the terrain
- Wristbands will report status
- The base stations triangulate and consolidate the data
- Visualize and push the data to other applications
- Use regular passive RFID for access control



Something cool

- LED lights on the wristbands, integrated with the light show
- A button to send Facebook friend requests



The protocol

- Time slotted protocol
- All base stations synchronise with each other
- Visitor bracelets send every few minutes
- Staff bracelets send every few seconds

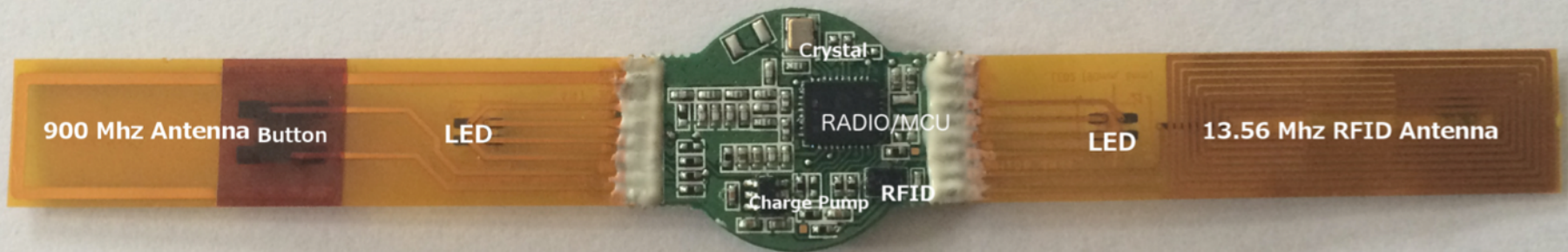
The image features a dark purple gradient background. In the center, there is a white silhouette of a domed building with several minarets. The word "Hardware" is written in white, sans-serif font across the middle of the silhouette.

Hardware



Hardware

- One 3V battery for 3 days
- Leather
- Branded for the festival
- < \$10 per bracelet



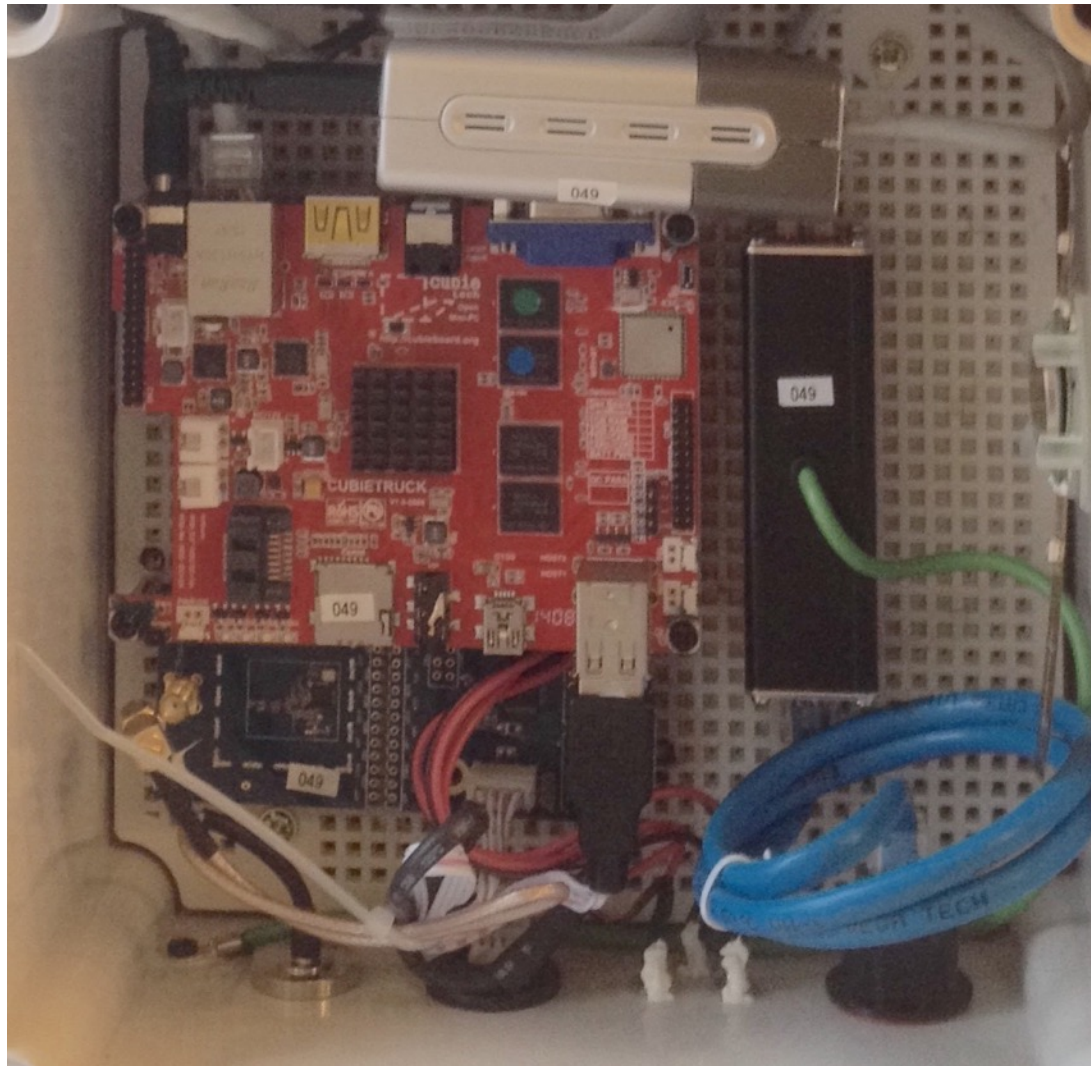


Base station hardware





Base station





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Hardware challenges





Base stations

- Heat
- Rain
- Unreliable power
- Unreliable network
- Unstable mount points
- Electromagnetic interference



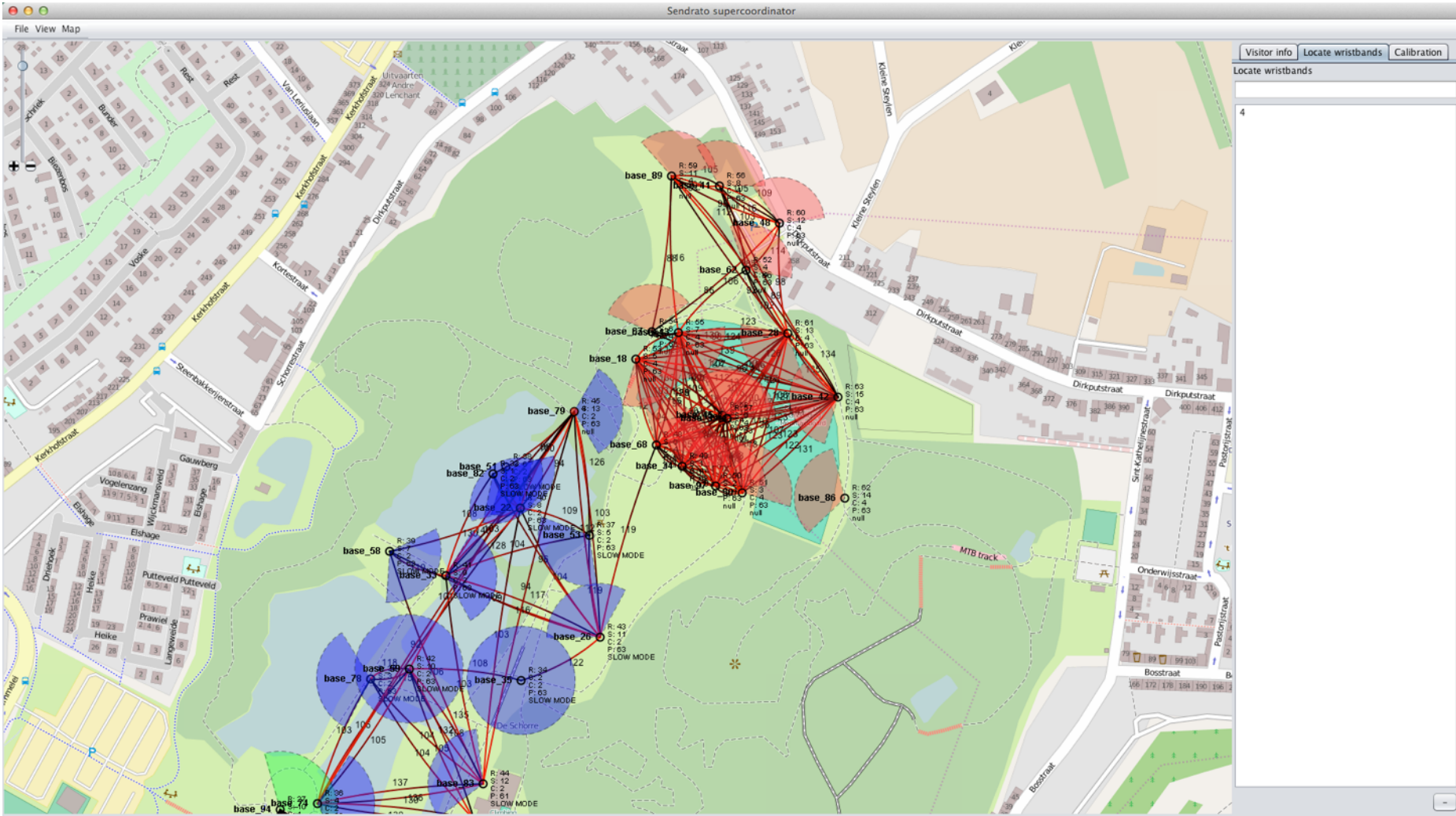


Base station deployment



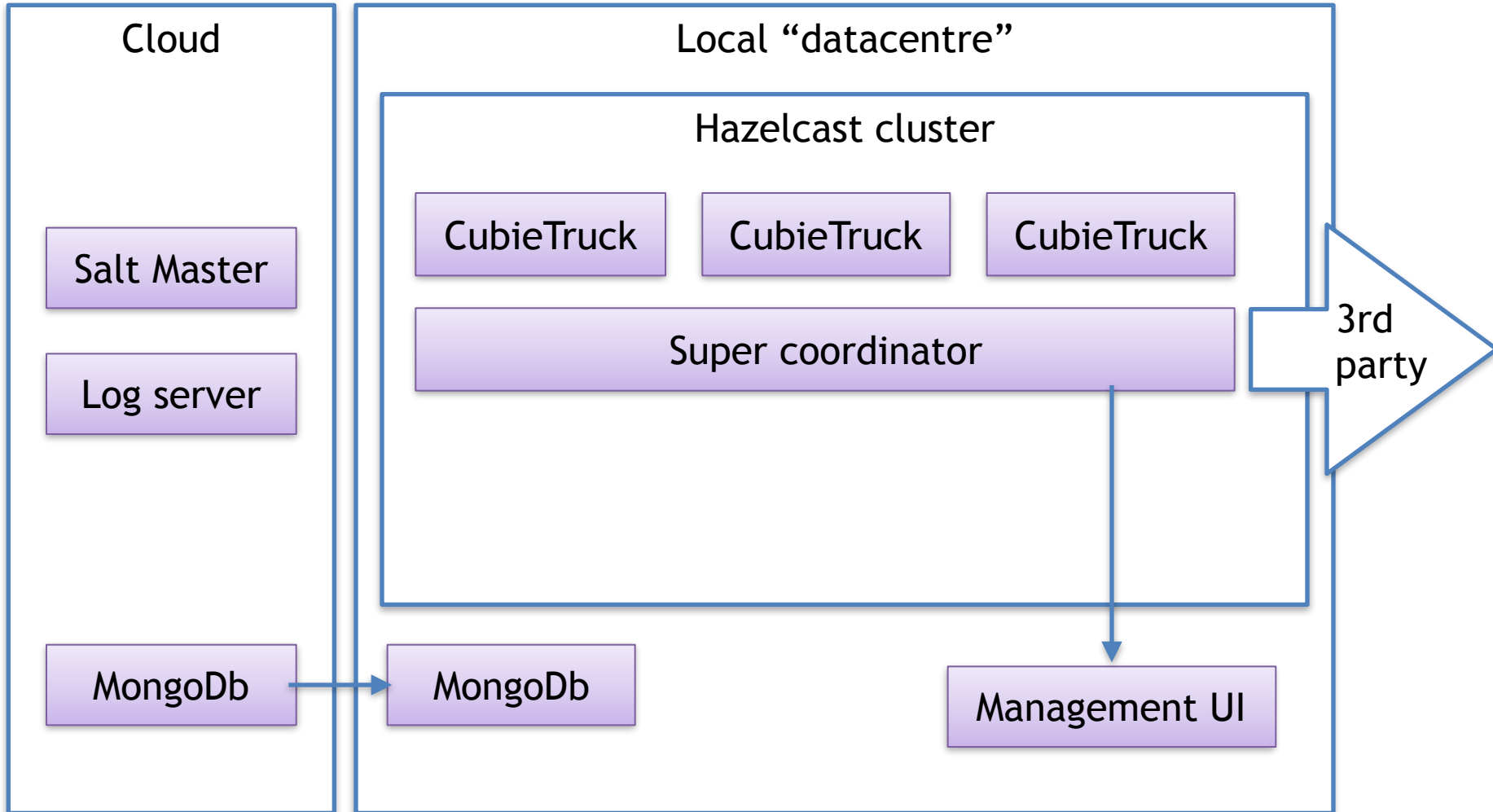


Base stations



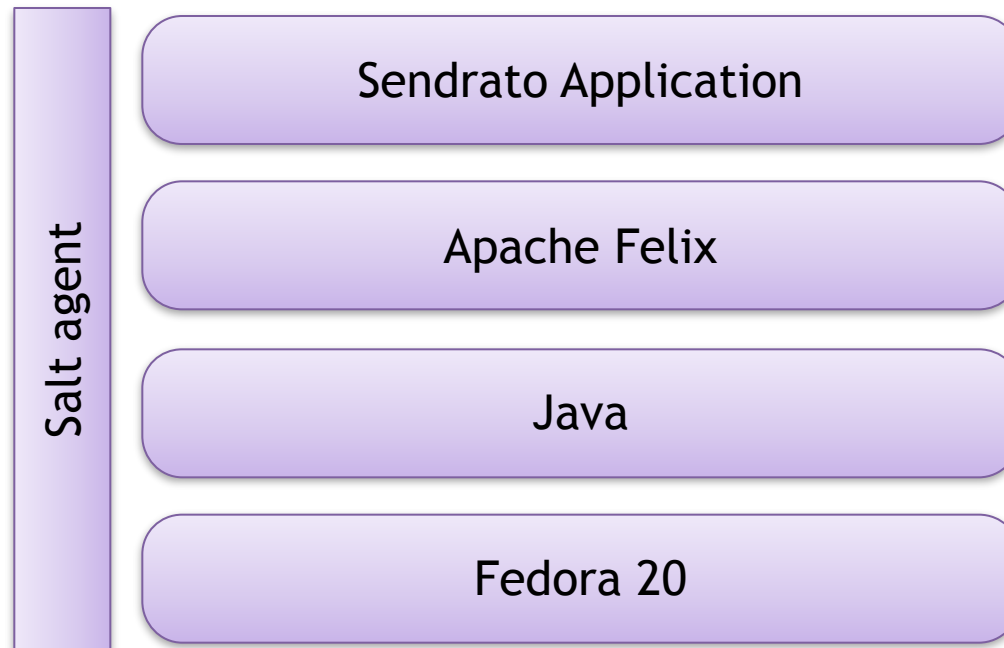


Sendrato Infrastructure





Base station software stack

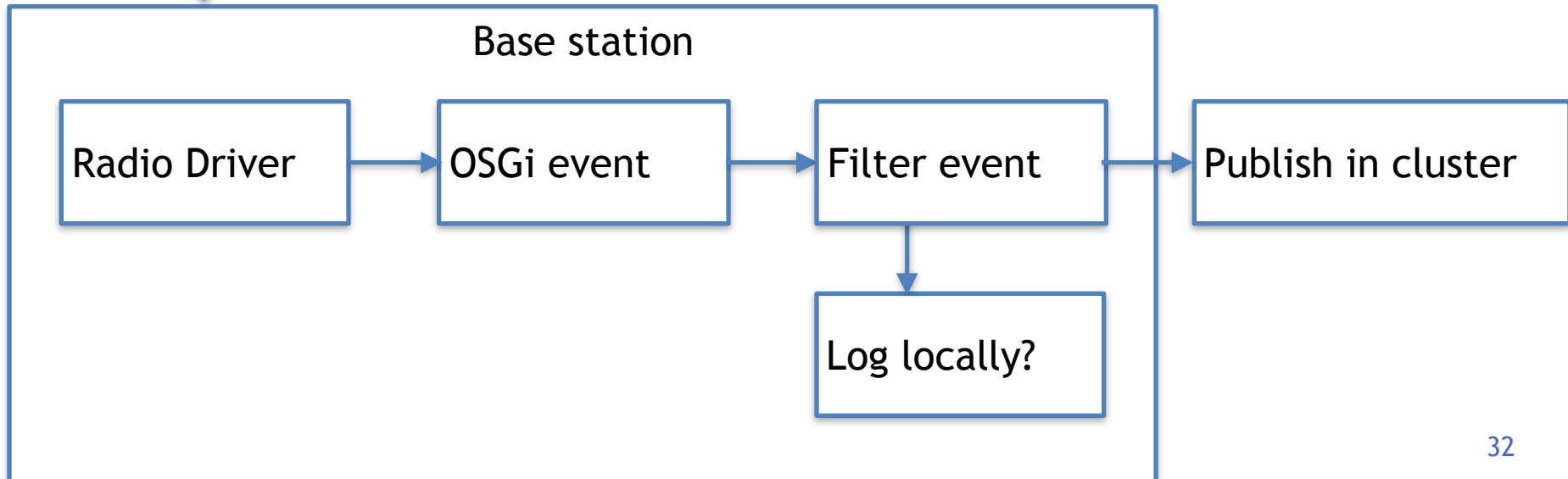




Basestation software

Wristbands

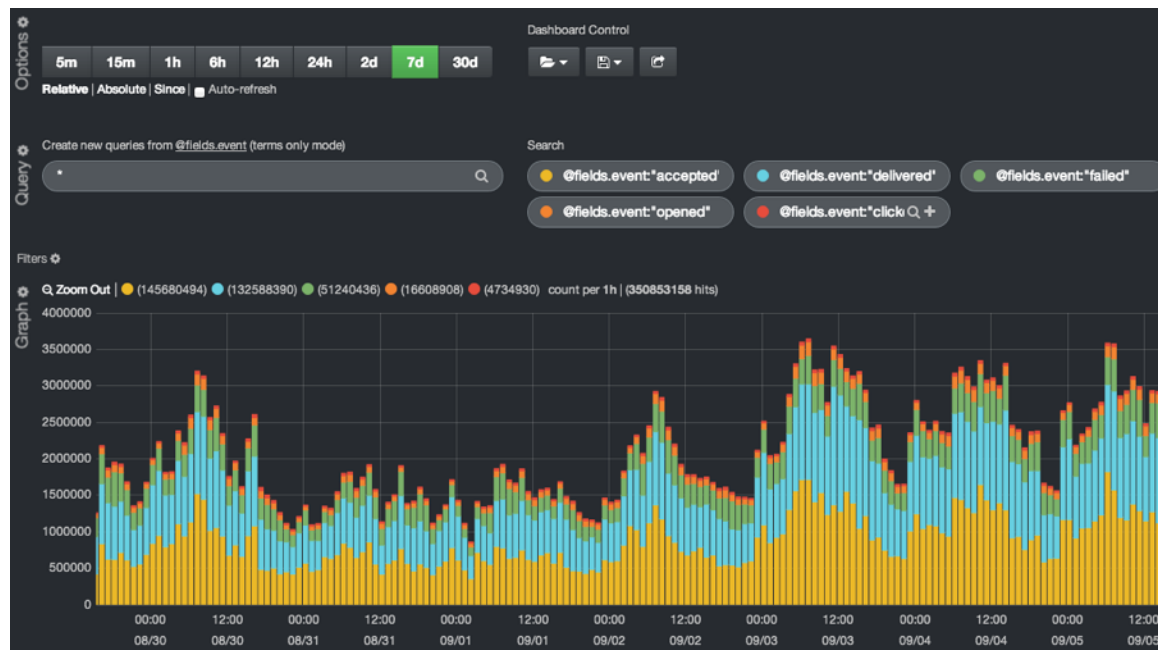
Radio





Logging

- Custom Logback appender to Redis queue
- ElasticSearch analytics
- Kibana web interface





Salt Stack

- Configuration manager
- Remote execution
- Agent based
- Versatile & *Fast*
- Master running in the cloud

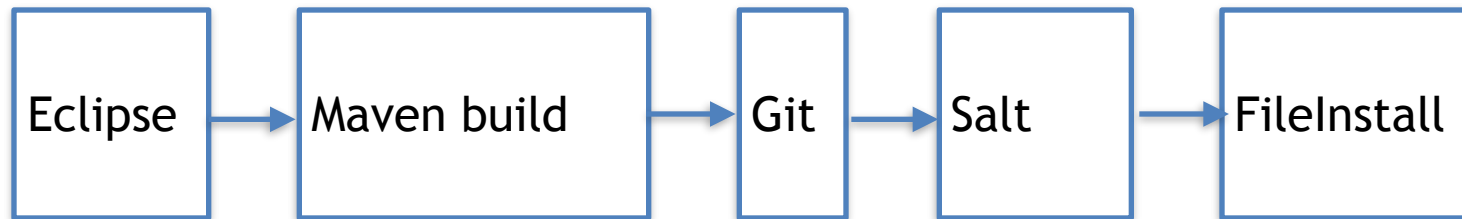
The background features a dark purple gradient with a silhouette of a large domed building, possibly a mosque or cathedral, with several minarets. The central dome is the largest and most prominent feature. The minarets are smaller and positioned around the base of the dome. The overall aesthetic is dark and architectural.

“Testing in production”



Development cycle

- Pretty crude but effective:





Future work

- Distributed OSGi
- More mature deployment model
- Apache Karaf + Cellar
- Pluggable network / clustering
- Proper 3rd party API

The image features a dark purple gradient background. In the center, there is a white silhouette of a mosque. The mosque has a large central dome topped with a spire, and several smaller minarets with pointed tops. The word "Demo" is written in a white, sans-serif font across the middle of the dome.

Demo



- <http://youtu.be/eDZaea7OCd0>

Thank you!

@Sendrato

sendrato.com

info@sendrato.com