IoT?
In reality...
In reality...

... Internet of Silos
Open Source IoT?

Technology

Industry adoption

Community
Open Standards and Open Source to Connect and Manage
Founded in late 2011 by IBM, Eurotech, Sierra Wireless.
- 20 open-source projects*
- Lots of **Java** but also C, C++, Python, Go, .Net, ...

→ **IoT Standards**
→ **Services & Frameworks**

* and counting!
Eclipse IoT Technology
CONNECT

MANAGE
Connecting things to the IoT

- **CoAP**
  - « HTTP over UDP »
  - Expose your device as a resource on the Internet of Things

- **MQTT**
  - Publish/Subscribe model
  - TCP-based
CoAP - RFC 7252

- RESTful protocol designed from scratch
  - URIs, Internet Media Types
  - GET, POST, PUT, DELETE
- Transparent mapping to HTTP
- Additional features for M2M scenarios
  - e.g Observe
CoAP: The web-of-things

/walk
/hand/left/raise
/eye/picture

/on
/red
/green
/blue
/mtbf

/bat-level
/bat-level
/bat-level
/bat-level

/engine/status
/position
/fuel

/bat-level
/bat-level
/bat-level
/bat-level

/C02
/noise
/lights/on

/on
/on
/on
/on
Eclipse Californium

- Focus on scalability and usability
- To be used in IoT cloud servers or M2M/IoT devices running Java
- Includes DTLS implementation (Scandium), HTTP/CoAP bridge, Plugtests, ...

http://eclipse.org/californium
MQTT: Publish & Subscribe

Publish: KETTLE232/temp
Payload: 21°C

Subscribe: KETTLE232/*
Eclipse Paho

- Open-source MQTT clients
- Pick your language!
  - Java
  - JavaScript
  - C/C++, Objective C
  - Go, Lua, Python, .NET, WinRT, …

http://eclipse.org/paho
Eclipse Mosquitto

- Open source MQTT broker
  - C implementation
  - MQTT 3.1.1 compliant
  - Scalable (1000 clients = 3MB RAM)
  - Extensible (e.g. authentication plug-ins)
Sandboxes

Eclipse IoT operates open sandboxes for IoT developers

- MQTT
- CoAP
- LWM2M

http://iot.eclipse.org/getting-started#sandboxes
Yup, lots of aspects to manage

- **Network**
  - PPP cellular connection, WiFi hotspot, Zigbee coordination, VPN, firewall …
  - offline/online mode

- **Applications**
  - Remote install, start, stop, configure, …
  - Sandboxing

- **Hardware**
Gateways to the rescue!
Gateway
Gateway
Eclipse Kura

Applications
App 1  App 2  ....  App n

Operation & Management
Connectivity and Delivery
Network Management
Gateway Basic Services

Field Protocols
Device Abstraction
OSGi Application Container
Java VM

Linux
Hardware

Administration GUI

Eclipse Kura
Kura features

● Network management
  ○ Cellular Modem, WiFi
  ○ Firewall
  ○ NAT

● OSGi and system administration

● IoT server communication settings
Kura features: Remote management UI
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Kura features: Remote management UI
Device Management with LWM2M

- LWM2M is an Open Mobile Alliance Standard
- Device Management on top of CoAP
- Eclipse **Leshan** (Java) and **Wakaama** (C) are two implementations
Device Management with LWM2M
Eclipse IoT is also...

Server Platform

- Software provisioning
  - [https://projects.eclipse.org/projects/iot.hawkbit](https://projects.eclipse.org/projects/iot.hawkbit)
- Uniform service interface for Telemetry and Command & Control
  - [https://projects.eclipse.org/projects/iot.hono](https://projects.eclipse.org/projects/iot.hono)
Eclipse IoT is also...

Information Models

- **Eclipse Vorto** allows to create and manage device descriptions + associated toolchains (code generators)
Eclipse IoT is also...

**Industrial IoT**

- Open source implementations of IEC standards
  - Eclipse neoSCADA: Siemens S7 PLC, IEC 60870-4-105, ...
  - 4DIAC: 61499
  - Rise V2G: IEC 15118
Eclipse IoT is also...

- Flexible Framework
- Based on **Java** and **OSGi**
- Huge number of “bindings”: KNX, Nest, Philips HUE, …
and much more...

http://iot.eclipse.org/projects
Industry Adoption
“MQTT” on Google Trends

Can you guess what happened then?
What do Microsoft Azure IoT suite, AWS IoT, or IBM Watson IoT platform have in common?
What do Microsoft Azure IoT suite, AWS IoT, or IBM Watson IoT platform have in common?
We went with Eclipse SCADA because it gave us a ready made control system as an open source product
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</tr>
</tbody>
</table>
Eclipse IoT Community
Eclipse IoT today

2 MLOC
21 projects
150+ developers
100K monthly visitors
OPEN IOT CHALLENGE 2.0

80 teams
$20K+ in prizes

http://iot.eclipse.org/open-iot-challenge
Virtual IoT Meetup

- Bi-weekly webinars with IoT experts
- 800 members

http://www.meetup.com/Virtual-IoT
application development

IoT software development is often slowed or delayed because the target hardware is unfinished, unstable, or just a few units are available. Existing hardware

Bring Your IoT Ideas to Life with the WunderBar

You're full of fantastic IoT ideas, but bringing them to fruition is never an easy task. Especially when it comes time to work with your sensors and electronics. Hardware can present a significant challenge, but not when you use the WunderBar.

Visualize IoT data with BIRT

IoT refers to the connection and intercommunication of different devices, systems, and services in a single platform. This plays right into BIRT's ability to connect to and relate many different sources in a single design or dashboard. By the end of this talk you should have a strong understanding of the different

Connecting Sensor Networks

Slides: http://www.slideshare.net/mkovatsc/virtual-lot-meetup-connecting-sensor-networks

Building the Internet of Things with the Eclipse IoT stack: a practical example

It may seem hard to get started with the Internet of Things (IoT) with so many technologies, protocols, hardware platforms... involved. In this session, Benjamin Cabé from the Eclipse Foundation will cover all you need to know to start building IoT solutions

OM2M: Standardized service platform for M2M interoperability

Machine-to-Machine (M2M) promises to interconnect billions of devices in near future covering various domains. However, M2M is suffering from a high vertical fragmentation of current M2M markets and lack of standards. To bridge this gap we propose the

Building home gateways with Eclipse SmartHome

Slides are available on Slideshare: http://slideshare.net/xthyriyne/eclipse-smart-home

Introducing an open platform for your SCADA project

Eclipse SCADA provides a platform independent, comprehensive SCADA solution from the connection to the field devices, through the data enrichment in the SCADA server, and the visualization for the user interface. What is SCADA? The answer is simple:

IoT Gateway: Reducing the distance between embedded and enterprise technologies

Slides of the presentation: http://slideshare.net/Eurotechchannel/kuram2mtgatwe
Get Involved!

- Open (or fix!) bugs
- Request new features
- Write articles, tutorials
- Participate on the mailing lists
- Share your success stories
- Propose your project!
Thank you! Questions?

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http://iot.eclipse.org