KURA M2M/IoT Gateway

reducing the distance between embedded and enterprise technologies

Tiziano Modotti, October 28th, 2014
IoT Architecture

M2M/IoT Integration Platform on Cloud

Business Applications

Application Framework + Gateway

Sensors, Actuators, Displays, …
Why do we have to reduce the distance between the Embedded software and the Enterprise software?
1-Gartner’s Hype Cycle
It tells that time is coming …
2-M2M & IoT: an industrial revolution

Gartner and other market analysts forecast IoT/M2M to reach dozens of billions of connected devices by 2020.
3-Field Data are very good food for Business Applications
4-OBSTACLES?

Complexity can still be a strong barrier to close the gap

• Embedded software programmers ignore the complexity of enterprise applications and architectures
• Enterprise software programmers ignore the complexity of embedded applications and M2M communications.
Is there any standard that we can leverage?
Java

The most used programming language for ENTERPRISE APPLICATIONS

9+ MILLION JAVA DEVELOPERS

3+ MILLION JAVA DEVICES
Java tomorrow

The most used programming language either for ENTERPRISE & EMBEDDED & M2M/IoT applications

More than 9+ MILLIONS JAVA DEVELOPERS
KURA is the open source Java and OSGi-based Application Framework for M2M Service Gateways.

Purpose
Simplify the design, deployment and remote management of embedded applications.
IoT Gateway Stack
Increase productivity and lower time to market
Kura’s Benefits

- **Reduced development time** → Shorter time to market
- **Focus on the application** → Differentiate your offering and products
- **Portable, robust code** → Higher quality software
- **Less required resources** → Reduced development costs
- **Hardware virtualization** → Better investment protection
- **More deterministic project execution** → In time market introduction
- **Standard based** → Future-proofed, Investments protection
- **Remote app management** → Extended product lifecycle
## Kura Developers’ Experience

Designed from ground-up for developers

<table>
<thead>
<tr>
<th>Emulate on PC</th>
<th>Deploy on Target</th>
<th>Cloud Managed</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Computer" /></td>
<td><img src="image2" alt="Gateway" /></td>
<td><img src="image3" alt="Cloud" /></td>
</tr>
</tbody>
</table>
| Start developing your M2M application in the comfort of your PC.  
- Full Eclipse Integration  
- Target Platform Definition  
- Emulated Services  
- Run/Debug from Eclipse  
- Support Mac/Linux Hosts | When you are ready, deploy your application on the gateway.  
- One-click Deployment  
- Eclipse Plugin  
- Remote Debugging | Provision your application to field devices from the Cloud.  
Manage your application configuration and lifecycle from a Cloud infrastructure.  
No more field visits!  
- Web-based Console  
- REST API Integration  
- Smart Alerts |
Are we closing the gap at least a bit?
IoT spontaneously closing the GAP between EMBEDDED & ENTERPRISE SW platforms

### Same language
- JAVA

### Same IDE
- ECLIPSE

### Same Reference Architecture
- DECOUPLING LAYERS

### Same Standards & Protocols
- OSGi, JSON, API REST

### Same Tools
- Application Builder

### Same Middleware
- Brokers, Containers,…
Thank You!
So, three things…

1. Download it
2. Design
3. Contribute
Business Issue
... and with more than one Consumer of the Device Data
Device Cloud Solutions
Where M2M Projects most often fail...

1. Selecting and integrating sensors, devices, sensors, human machine interfaces (HMI), Meters, legacy field busses & actuators
   - Ensuring long life support
   - Meeting certification requirements

2. Selecting and integrating operating system, device support / drivers
   - Implementing the business logic

3. Optimum M2M protocols
   - WAN cost reduction
   - Security

4. Decoupling of producers and consumers of data
   - Write speeds
   - Real-time data streams
   - Data storage

5. Device data management
   - Device life cycle management
   - Security

6. Standard APIs
   - Ready to use adapters for standard applications
   - CEP / Complex Event Processing capabilities

7. Application development & life cycle management
   - Dashboards, user interaction & interfacing
   - Integration (Big Data, social networks, enterprise IT)
Make it SIMPLE!

... but not stupid

Normalize the communication

Encapsulate the complexity

Decouple the architectural layers
Normalising the communication …
The ESB architecture for M2M integration platforms on Cloud
Connecting the field at the Enterprise

De-coupling Architectural Components
Encapsulating the complexity
An entire end-2-end M2M/IoT communication in a simple API REST

GET

Returns the list of all the Alerts published under the account of the currently connected user.

Example of query in CURL:
```
curl --user 'clientId:client password' -k https://api-sandbox.everyware-cloud.com/v2/alerts.xml?severity=CRITICAL' | xmllint --format -
```

Parameters

<table>
<thead>
<tr>
<th>name</th>
<th>description</th>
<th>type</th>
<th>default</th>
</tr>
</thead>
<tbody>
<tr>
<td>limit</td>
<td>Maximum number of entries to be returned.</td>
<td>query</td>
<td>50</td>
</tr>
<tr>
<td>offset</td>
<td>Starting offset for the entries to be returned.</td>
<td>query</td>
<td>0</td>
</tr>
<tr>
<td>startDate</td>
<td>Start date of the date range requested. The parameter is expressed as a long counting the number of milliseconds since January 1, 1970, 00:00:00 GMT. The default value of 0 means no start date. Alternatively, the date can be expressed as a string following the ISO 8601 format.</td>
<td>query</td>
<td>0</td>
</tr>
<tr>
<td>endDate</td>
<td>End date of the date range requested. The parameter is expressed as a long counting the number of milliseconds since January 1, 1970, 00:00:00 GMT. The default value of 0 means no end date. Alternatively, the date can be expressed as a string following the ISO 8601 format.</td>
<td>query</td>
<td>0</td>
</tr>
<tr>
<td>severity</td>
<td>: can be one of the following CRITICAL, WARNING, INFO</td>
<td>query</td>
<td></td>
</tr>
<tr>
<td>source</td>
<td>: can be an asset name or System</td>
<td>query</td>
<td></td>
</tr>
<tr>
<td>category</td>
<td>: eg Performance, Security, Other etc ...</td>
<td>query</td>
<td></td>
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Business Issue
Sometimes M2M Solutions look simple …

A single application to communicate with

No connectivity options required

Single or no special application on gateway

Only one type of Gateway HW & SW

Only one type of device / sensor

Business Application

Internet / TCP/IP

Service Gateway

Sensors, Actuators, Displays, …
Business Issue

... Geographically Dispersed ...

Business Applications

Multi-Service Gateway

Sensors, Actuators, Displays, ...