How to Cook an Egg ...
Goal

The goal is to:

Control an IoT device (Raspberry Pi)
Just Using OSGi Services
And the ECF Remote Service Implementation
Required Knowledge

You know what an OSGi Service is.
Menu

- Hardware
- Software
- ECF – Remote Services
- Nebula Widgets
Hardware
The Mainframe

Raspberry Pi: $39.50
Breadboard

Half-Sized Breadboard: $6.50
We are going to map and OSGi Service to pin0 and pin1.
GPIO to Breadboard

Cobbler: $6.50
GPIO to Breadboard
Cables for Breadboard

Cables: $1.00
LM35/TMP36 Temperature Sensor

LM35: $1.50
LM35 Temperature Sensor

2.7-5.5V in

Ground

Analog voltage out
LM35 Temperature Sensor

ANALOG?
MCP3008 ADC

MCP3008: $3.50
2 Channel Relais Board

Relais Board: $5.00
Software
Software Stack

• Linux – Debian Wheezy
• Java 8
• WiringPi

• PiPolos – Server
• Egg UI - Client
Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Minimal OSGi Server

It contains:

– Equinox
– Gogo console
– Start Script: pipolos.sh (-debug)
PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

In addition (but can be removed):

- Jetty
  - admin/admin
- Felix File Install
- ECF Remote Services
- ECF Raspberry Pi Example Implementation
- PI4J
Software Stack

PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Build:

git clone https://github.com/wimjongman/pipolos.git
cd pipolos
mvn verify
PIPOLOS – Plain Old OSGi Server for the Raspberry Pi

Run:

`unzip pipolos-linux.gtk.x86.zip` file into a directory of your choice then `chmod a+x pipolos.sh` to make it executable and run it through `sudo ./pipolos.sh`
Software Stack

Egg Client

Build:

git clone https://github.com/wimjongman/eggclient.git
cd eggclient
mvn verify
<exhale>
Demo
Hacking Competition

Host: ???

• Get the RCP client for your platform (smb);
• Change correct settings in the ini file (your ip);
• Clients for mac and linux need to set execution bits;
• Your firewall will probably block our ports.

Control the light:
First one to achieve this gets E 5,- plus a public honoring.
ECF

- Best kept secret of Eclipse.
- 9 Years on the Release Train
- Used by many projects (P2, Mylyn, Oomph, etc..)
- OSGi Remote Service Admin Implementation
- Other kinds of Communication

- Project Lead: Scott Lewis
ECF – Remote Services

- Remoting property:

```
service.exported.interfaces=*;
```

```java
pinProps.put("service.exported.interfaces", "*");
ServiceRegistration<IGPIOPinOutput> pinReg = Pi4jGPIOPinOutput
    .registerGPIOPinOutput(getPinNumber(), pinProps, getContext());
```
package org.eclipse.ecf.raspberrypi.gpio;

/**
 * LM35 is a temperature measurement device.
 *
 * @author Wim Jongman
 */

public interface ILM35 {

    /**
     * Temperature changed on the specified host.
     *
     * @param pHost
     * @param pTemperature
     */
    public void setTemperature(String pHost, double pTemperature);
}
package org.eclipse.ecf.raspberrypi/gpio;

import java.util.concurrent.CompletableFuture;

/**
 * LM35 is a temperature measurement device.
 * @author Wim Jongman
 * @see ILM35
 */

public interface ILM35Async {

    /**
     * Temperature changed on the specified host.
     * @param pHost
     * @param pTemperature
     */
    public CompletableFuture<Void> setTemperatureAsync(String pHost, double pTemperature);
}
ECF - Discovery
ECF - Discovery

ETCD
DNSSD
Zoo keeper
Zero Conf
SLP
EDEF
Custom
ECF - Distribution

- Cust
- MQTT
- ECF
- JSON
- XMPP
- R-OSGi
What could possibly go wrong?
The Eight Fallacies of Distributed Computing

Peter Deutsch

Essentially everyone, when they first build a distributed application, makes the following eight assumptions. All prove to be false in the long run and all cause big trouble and painful learning experiences.

1. The network is reliable
2. Latency is zero
3. Bandwidth is infinite
4. The network is secure
5. Topology doesn't change
6. There is one administrator
7. Transport cost is zero
8. The network is homogeneous

For more details, read the article by Arnon Rotem-Gal-Oz
What could possibly go wrong?

• Firewall
  – ECF Generic Server Ports (dft = 3288)
• Network Settings (egg.ini)
  -Decf.generic.server.hostname=(ip/host) must be reachable from other hosts
• JmDNS Discovery
  -Dnet.mdns.interface=(ip/host) can do only one network
Proof ..
Thank You!

Wim Jongman

CTO @ Remain Software / Industrial-TSI
Nebula Lead
ECF and E4 Committer
Eclipse RCP and Tycho Trainer

Don’t forget to rate this talk.

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