Having fun with Raspberry(s) and Apache Projects

Presented by:
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AGENDA

• Who I am
• How does it started
• OK now I have my demo for HTTP/2 what next.
• Get Astro Hat and have fun.
• Get another Hat and have another fun.
• More serious people using Industrino
• Questions
Jean-Frederic Clere
Red Hat
Years writing JAVA code and server software
Tomcat committer since 2001
Doing OpenSource since 1999
Cyclist/Runner etc
Lived 15 years in Spain (Barcelona)
Now in Neuchâtel (CH)
Trying to make a demo :D

- first localhost (failed)
- remote server (failed)
- try local + configurable:
  - Need a very small hardware:
  - Need real OS (no Arduino)
  - Fast
  - With WIFI
• Hardware: sd card / wifi access point
• Most distributions requires for installation:
  - Screen
  - Keyboard
  - Solution:
    • mount root
    • remove autostart (tricky SystemD)
    • add ssh keys
• Next yum install java/openssl/gcc etc...
• Done in a few hours...
Fedora 24 (with RPI kernel and modules)

Drivers from https://github.com/raspberryi/firmware

wifi access point from (free since September 2016)
https://raw.githubusercontent.com/RPi-Distro/firmware-nonfree/master/

dhcp (server)

bind (name server to make captive portal)

Oracle JDK 8 for ARM (Java Openjdk version "1.8.0" too slow)

Tomcat apache-tomcat-8.5.6

Apache httpd (the fedora one)

http://10.0.0.201/
• HTTP/2
• Tomcat-8.5.6 (bin tar)
• Tomcat-native-1.2.10 (sources compiled on the Raspberry)
• OpenSSL 1.0.2j (from Fedora 24)
• http://10.0.0.203:8080/ (normal tomcat)
• http://10.0.0.203:8080/http2.html
• https://10.0.0.203:8443/http2.html https normal
• https://10.0.0.203:8002/http2.html https HTTP/2
• So play with latency:
  - tc qdisc add dev eth0 delay 85ms 20ms (to get something that isn't localhost).
  - tc qdisc del dev eth0 root (remove it).
  - tc qdisc add dev eth0 root netem delay 185ms 120ms
• https://10.0.0.202:8443/http2.html https normal
• https://10.0.0.202:8002/http2.html https HTTP/2
Let’s start the fun!

- Hats...
- Lot experimentation boxes
- Use Astro Hat
- Sensors:
  - Magnetometer
  - Humidity sensor
  - Temperature
  - Accelerometer
  - Joystick
  - And a DISPLAY!!!
First Tomcat fun

- Servlet
- Frame Buffer
- HTLM5 scripts
- Read the display / write / reset etc
- Note the following:
  - Openjdk no JIT compiler (slow, so I use Oracle VM).
  - Openjdk (arm version: memory map file ~ broken)
  - Or frame buffer problem.

Use RandomAccessFile
• http://10.0.0.203:8080/demo-1.0-SNAPSHOT/FrameBuffer
● Broker easy to collect information
● The Raspberry library are in Python
● Easy to make STOMP (on the PI)
  – Topic to send temperature in the example.
  – Queue on the PI to display a message
● Websocket STOMP on the client
  – html page with java script
  – jquery
  – stomp
First Fun demo

- http://10.0.0.201/client.html

MyPi:n queue

HAT

STOMP python

WIFI

PI

Topic

WIFI

MyPi:p queue

HAT

STOMP python

ActiveMQ + web server

STOMP java script
ActiveMQ demo

• First the client (java script): http://10.0.0.201/client.html

• bin/activemq console

• http://10.0.0.201:8161/admin/ (the activeMQ console admin/admin)

• The object Raspberry have STOMP python application running. (autostarted):

root@localhost ROOT]# ps -ef | grep python
root 371 1 0 17:28 ? 00:00:07 /usr/bin/python3 -Es /usr/sbin/firewalld --nofork --nopid
root 2007 1 1 18:09 ? 00:00:01 /usr/bin/python /root/tomcatPI/python/sendtemprecvmess.py
root 2047 745 0 18:11 pts/0 00:00:00 grep --color=auto python
Based on Arduino but for electricians.
- Powered with 24 volts
- No OS and programmed via USB
- Industrial format
- To control pumps, heaters etc
- Measures 2 temperatures
- Connected to ActiveMQ via RPI3 using Modbus
- Mostly OpenSource and OpenHardware
• http://10.0.0.201/client.html
Internet of Things (IoT).

http://mynewt.apache.org/ Arduino

https://edgent.apache.org/RPI

Problems with hardware:
- Partially OpenSource /OpenHardware :-(
- Hard to explain to the players the Apache Way
• PI 3 + memory + power = 2 lunches
• http://mynewt.apache.org/
• https://edgent.apache.org/
• Blog: http://jfclere.blogspot.com.es/
• Github: https://github.com/jfclere/tomcatPI
• Fedora: https://fedoraproject.org/wiki/Raspberry_Pi
• Industruino code (you need Industruino libs too): https://github.com/jfclere/Industruino_HVAC_Functions
• Hardware controller: http://econtrols.org
• Mail: jfclere@gmail.com
Question ?
Thanks !