Getting to the Next Level with Eclipse Concierge

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Eclipse Concierge

Goals:

- Full OSGi core R5 compatibility
  - Goal achieved

- Keep a small footprint to work well on embedded devices
  - 250kiB without debug symbols
  - 330kiB with debug symbols

- Remain “readable”
  - Currently 9 classes

- Remain backwards-compatible
  - Java 5
Getting to the Next Level

- Eclipse SmartHome on Concierge
- Concierge and enRoute
- Performance Benchmarks 2016
Adoption of Concierge for Eclipse SmartHome
Adoption of Concierge for Eclipse SmartHome

self-contained

tailored to Embedded

Template for other solutions

small package

See packaging sample: https://github.com/eclipse/smarthome-packaging-sample
How to achieve?

- Pre-configured runtime environment
- Get rid of modeling / DSL features (EMF, xText, DSLs)
- Do not use Karaf feature management
- Reduce footprint of OSGi framework / services (Concierge)
- Reduce footprint of JavaVM (JavaSE Embedded compact 2/3)
- Remove developer tooling (Swagger, WebConsole)
Adoption of Concierge for Eclipse SmartHome
<table>
<thead>
<tr>
<th></th>
<th>openHAB2</th>
<th>smarthome-concierge</th>
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</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>160 MB</td>
<td>19 MB</td>
</tr>
<tr>
<td>OSGi (no Karaf)</td>
<td>3.1 MB</td>
<td>1.6 MB</td>
</tr>
<tr>
<td>EMF/xText</td>
<td>7 MB</td>
<td>0 MB</td>
</tr>
<tr>
<td>Java Runtime</td>
<td>32 MB</td>
<td>16 MB (compact3)</td>
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<tr>
<td></td>
<td></td>
<td>12 MB (compact2)</td>
</tr>
<tr>
<td>Memory footprint</td>
<td>~32 MB</td>
<td>~15 MB</td>
</tr>
<tr>
<td>Startup time</td>
<td>~40 sec</td>
<td>~30 sec</td>
</tr>
</tbody>
</table>

Note: Compact 2/3 profile: logback needs cp3, quartz, jersey-min needs Full-JRE
Concierge & bnd(tools) / enRoute

OSGi enRoute uses OSGi R6 and bndtools

→ R6 implementation of Concierge available as snapshot
→ OSGi repository hosted at the Concierge website
OSGi Frameworks

Eclipse Equinox
• version 3.11.1.v20160708-1632
• 1.3 MiB
• (R6 framework)

Apache Felix
• version 5.6.0
• 678 kiB

Knopflerfish
• version 5.2.1
• 321kiB compact

Concierge
• version 5.0.0
• 245kiB

<concierge.git>/tests/org.eclipse.concierge.stresstest
Platforms

**Beaglebone Rev A5**
- AM335x 720MHz ARM Cortex-A8
- 256 MiB DDR2 RAM
- 4 GiB microSD card
- Angstrom Linux
- Java SE Embedded 1.7.0_21-b11 and
- Java SE Embedded build 1.8.0_06-b23 compact1

**Raspberry Pi B**
- ARM1176JZF-S 700 MHz ARM 11
- 512 MiB SDRAM (shared with GPU)
- 8 GiB SDHD card
- Raspbian Linux
- Java SE build 1.8.0-b132
Startup Time

VM = startup time of the JVM

Concierge is consistently the fastest framework in terms of startup time
Service Registry

Stress test

Register 10000 services
  • Each one has a random value for the same key
    • Range: byte => collisions

Perform 1000 lookups (getServiceReferences) for a random value
  • Range: byte

Unregister the 10000 services
Service Registry – Service Lookup

![Graphs showing service lookup times for different devices and platforms.](image-url)
Resolver

Generate 1000 “random bundles”

• Can either import or export up to 5 packages
• Choice of 50 packages in total
  • For exports: generate a random package version from [1.0.0-21.0.0)
  • For import: generate a random import range from the interval.

Install all 1000 bundles

Resolve the bundles

Benchmark turned out to be rather volatile…
Resolver

Installation

<table>
<thead>
<tr>
<th>Device</th>
<th>Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaglebone ejre7</td>
<td>70000</td>
</tr>
<tr>
<td>Beaglebone ejre8</td>
<td>30000</td>
</tr>
<tr>
<td>Raspberry Pi</td>
<td>10000</td>
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</table>

Resolving

<table>
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<tr>
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<th>Time (ms)</th>
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<tr>
<td>Beaglebone ejre8</td>
<td>5000</td>
</tr>
<tr>
<td>Raspberry Pi</td>
<td>15000</td>
</tr>
</tbody>
</table>
What’s next?

• More auxiliary bundles
  • Remote services?

• Help other projects with transitioning to Concierge

• Short term:
  • Move to Github
  • Concierge R5.1 Release
    • EventAdmin
    • RFC 182: Remote management based on REST interface

• Medium term:
  • RFC 183: Cluster Information Specification
  • R6 compatibility
Eclipse Concierge

Concierge is an OSGi framework optimized for embedded devices and the Internet of Things.

It’s simplicity and usability can help with developing complex IoT applications with ease.

It’s fast, it’s pleasant, you should try it, too.

Project Homepage

http://eclipse.org/concierge

Clone it from here

http://git.eclipse.org/c/concierge/org.eclipse.concierge.git
Evaluate the Sessions
Sign in and vote at eclipsecon.org

-1 0 +1
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