OSGi Remote Management

Date 20-11-2006

Miguel García Longarón - mgl@tid.es
Present situation

- OSGi is being applied in several domains
- Each domain has its own solution for remote management
  - Home Gateways: DSL-Forum TR-069
  - Mobile Devices: OMA Device Management
  - Server: JMX (Java Management Extensions)
  - Desktop/RCP (Rich client platform): JMX
  - Vehicle: no standards (perhaps will adopt mobile devices solutions…)
- The approach of the Mobile Expert Group has been to design OSGi management aligned with technologies already available in the mobile domain.
- Find a solution for tackling the heterogeneity of this situation is key.
Present management (short term)

Independent operators

Home gateway
Mobile device
Vehicle
Server
Desktop/RCP

Telefónica I+D
Integrated Management (medium/large term)

Integrated operator

Adaptation Layer

TR-069
OMA DM
Vehicle
JMX

Home gateway
Mobile device
Server
Desktop/RCP
Telefónica I+D

OSGi Remote Management Architecture

To define an API?

Integrated remote management (operator)

Specific information models and protocols

Home Gateway extension
Mobile device extension
Vehicle extension
Enterprise extension
Desktop extension ???

Basic profile (OSGi Core)

OSGi

Java VM

OS

Native remote management

ACCELERATE TO INCREASE OUR LEADERSHIP
Future scenario based on HG

Server for ambient intelligent techs. (speech recognition, natural language, etc..)

Set Top Box as OSGi node

Integrated management

Home Gateway

Desktop applications

Home networks

Internet

Vehicle

Mobile device
Our Current solutions

- Several approaches have been followed:
  - SOAP/HTTP using Apache Axis
    - Some methods that use basic functionality of Web Services (mainly Strings containing XML)
  - kSOAP for mobile devices:
    - Lightweight technology
    - Allows to manage mobile devices (absolutely transparent to the server whether there is Axis or kSOAP)
  - JMX
    - Standard solution for Java SE and Java EE.
    - Very popular approach in open source world
  - Remote management API
    - OSGi Access is LGPL-licensed and available at http://osgi-access.forge.os4os.org/
    - Without standards solutions, in each project the remote management solution could have been different. We have implemented this API for different solutions to reuse management logic at the management server.
Take into account OSS projects

- Some efforts have been done in collaboration with other partners in projects related to Open Source Software:
  - DIT at UPM (Universidad Politécnica de Madrid)
  - Telvent (Abengoa group)
  - Both involved in the OSGi Users’ Forum Spain

- Most relevant:
  - Several OSGi resources, including some about OSGi remote management at OS4OS forge:
    - [http://forge.os4os.org/](http://forge.os4os.org/)
  - Integration with Apache Felix project:
    - JMood, JMX based management agent for OSGi developed by DIT-UPM, integrated in the codebase of Apache Felix
    - JMood is a very popular JMX management solution (5 thousand downloads)
Remote Management Group Scope

- **What is the scope?**
  - Defining an instrumentation model for the OSGi platform is probably the first step for the group

- **Instrumentation model**
  - Defining entities (attributes and operations), relationships and data structure (OSGi Mobile group has adopted OMA DMT)
  - Basic requirements to fulfill:
    - Handle life-cycle management, i.e. install, update, uninstall, start and stop bundles
    - Check OSGi node status: bundles, services, configurations and so on
    - Configuration of services

- **Operation and management capabilities**
  - Execution of operations: transactions and security are key issues
  - Polling, notifications, statistics, any other?

- **Communications layer:**
  - Pay special care to data types to ease remote operations
  - Offer different options to remotely access the instrumentation model
Jmood@ApacheFelix

- **Jmood** is a JMX-based OSGi management agent
  - ASL 2.0 licensed
  - Currently is part of Apache Felix codebase, but only uses OSGi specs and thus can be used with other OSGi frameworks (also tested with Equinox)

- **Instrumentation model for OSGi R4 core:**
  - Main entities: Bundles, Services, Packages and Framework
  - Configuration Admin, User Admin and Log Service are exposed as JMX Mbeans

- **Different network interactions for different needs:**
  - Fine-grained access, suitable for point to point management interactions
  - Bulk-mode transfers, this kind of operations are necessary to reduce network overhead (round trips for getting each data)

- **Remote management has been tested with RMI and SOAP connectors**

- **MiShell prototype:**
  - Using dynamic languages based on JSR 232, e.g. Python or Ruby
  - Dynamic typing at the server side:
    - You don’t need to add extra libraries to your management server
    - New types are easily discovered and accessed using reflection