Open source integrated remote systems and network management with OpenRSM

M. Kalochristianakis
E. Varvarigos
Contents

• Systems and network management
  ○ Aims, technologies
  ○ State of the art and open source solutions

• The case of the Greek School Network
  ○ Need for Scalable, installable, usable solution
  ○ Challenges

• Current state of the market/art

• OpenRSM
  ○ Architecture and components
  ○ Open technologies
  ○ Pilot installations
  ○ Extensions

Open, remote systems and network management with OpenRSM
System and network management

• Automation in large scale
  ○ Organizing the infrastructure and procedures
  ○ Management framework and methods

• Management systems
  ○ High level (strategic)
    ▪ components: systems, business units/processes/functions, architectural domains, infrastructure elements, etc
    ▪ references: information flow, landscape, portfolio, masterplan, etc
  ○ Low level (applications)
    ▪ errors, configurations, performance security… et
    ▪ SNMP, WBEM/CIM, WS-Management, SMASH, TMN, ASF, etc

Open, remote systems and network management with OpenRSM
The case of the School network
1/2

• Benefits from integrated management
  ◦ School labs management
    – Fast resolution of problems, high response times
  ◦ Central, systematic control
    – Organization, reports and stats

• Services
  ◦ Assets management
  ◦ Remote desktop control
  ◦ Software distribution
  ◦ Network management

Open, remote systems and network management with OpenRSM
The case of the School network

2/2

• EMS installation in 221 schools in 11 prefectures
• Problems
  ◦ Organizational procedures could not sustain the project of scaled installation
  ◦ Technical: low degree of automation, high complexity, insufficient installation procedure, low adaptation
• Solution: customisation
  ◦ Size reduction, unattended procedures, custom installater options
• The next step: OpenRSM

Open, remote systems and network management with OpenRSM
OpenRSM

- Open source, integrated, multiplatform management
- Integrated systems
  - Assets management and reporting
  - Remote command execution, job management
  - Software management
  - Network management
  - Extensions for wireless
- Funded by the National Information Society Operational programme
Component architecture 1/2

- **Server**
  - Control logic
  - Resource management
  - Informational systems

- **Management console**
  - Visual components and GUI
  - Integration of components

- **Agent**
  - Multiplatform
  - Conveys management commands

Open, remote systems and network management with OpenRSM
Component architecture 2/2

Open, remote systems and network management with OpenRSM
Low level communication

<table>
<thead>
<tr>
<th>DATA NAME</th>
<th>DATA TYPE</th>
<th>SIZE (bits)</th>
<th>SIZE (bytes)</th>
<th>INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>VER</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Protocol Version</td>
</tr>
<tr>
<td>TYP</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Packet Type</td>
</tr>
<tr>
<td>UID</td>
<td>LongWord</td>
<td>32</td>
<td>4</td>
<td>Sender identification (for agents=MID)</td>
</tr>
<tr>
<td>JID</td>
<td>LongWord</td>
<td>32</td>
<td>4</td>
<td>Working JobsMachine ID</td>
</tr>
<tr>
<td>CMD</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Command Type</td>
</tr>
<tr>
<td>PRM</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Command Parameter 1</td>
</tr>
<tr>
<td>PR2</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Command Parameter 2</td>
</tr>
<tr>
<td>PR3</td>
<td>Byte</td>
<td>8</td>
<td>1</td>
<td>Command Parameter 3</td>
</tr>
<tr>
<td>DKY</td>
<td>LongWord</td>
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<td>4</td>
<td>Data Key (General Purpose)</td>
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<tr>
<td>DAD</td>
<td>String[16]</td>
<td>128</td>
<td>16</td>
<td>Discovery Address</td>
</tr>
<tr>
<td>NAD</td>
<td>String[16]</td>
<td>128</td>
<td>16</td>
<td>Next Address</td>
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<tr>
<td>LEN</td>
<td>LongWord</td>
<td>32</td>
<td>4</td>
<td>Length of data bytes coming next</td>
</tr>
<tr>
<td>CRC</td>
<td>LongWord</td>
<td>32</td>
<td>4</td>
<td>Head or Data CRC – Not implemented yet</td>
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<tr>
<td>DAT</td>
<td>StringStream</td>
<td>~</td>
<td>~</td>
<td>Additional Data – Variable length</td>
</tr>
</tbody>
</table>

SUM: 464 58

For each cycle of data exchange:
- 4 packets client-server = 4x58 = 232 bytes
- 2 packets server-admin = 2x58 = 116 bytes
- Total: 348 bytes

Open, remote systems and network management with OpenRSM
Functionality

• Assets management

• Remote control
  ○ Remote desktop
  ○ Std and reverse mode VNC
  ○ File transfer, messaging
  ○ Routing via the server
  ○ Client acknowledgements

• Command execution
  ○ Random command support
  ○ Command priority, visibility, type

• SNMP based network monitoring

• Network discovery

• Management console
  ○ Jobs prototyping and instantiation
  ○ Single job and batch mode execution
  ○ Static and dynamic groups for jobs and stations

• Reports
  ▪ Static / dynamic
  ▪ Queries and stored queries
  ▪ Exportable reports in various formats

Open, remote systems and network management with OpenRSM
Features

• Management for Linux/Windows
  ○ Different agents distributions
  ○ Common administrative console
• Lightweight
  ○ Low memory, CUP, network and disk consumption
  ○ Επιλογή για αποδοχή ελέγχου
• High performance
  ○ Real time task execution
  ○ ~150 ms/job
  ○ Scalable
• No prerequisites
  ○ Standard TCP/IP connectivity
  ○ Platform independent

• Security
  ○ Encrypted communication
• Custom communication protocols
  ○ UTP trigger, TCP handshake
  ○ Connections on demand
  ○ Support for active connections
  ○ Server locking

Open, remote systems and network management with OpenRSM
Stress and scale testing

- 22 jobs/sec, 35 msec/job
- 10 MB max memory fluctuation
- Linear behaviour with respect to load

<table>
<thead>
<tr>
<th>Αριθμός Εργασιών</th>
<th>Διάρκεια (sec)</th>
<th>Troughput job/sec</th>
<th>RAM</th>
<th>CPU priv</th>
<th>CPU proc</th>
<th>CPU user</th>
<th>Net load Kbps avg</th>
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<tbody>
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<td>20,000</td>
<td>3605564</td>
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</tr>
</tbody>
</table>

Open, remote systems and network management with OpenRSM
Pilot installations

- Achaia prefecture
- Public administration control service
- Central citizen's disposition bureau offices

  - ~38000 downloads (Sept 2010)
Future work

• Extensions
  ○ Management for embedded devices
  ○ Sensor management
  ○ Integration with EGEE Grid technologies
• Single click, unattended installation
• Web based console
• Migration to middleware
  ○ High level programming frameworks
  ○ Enterprise level technologies
Questions?