RCP in the Energy Industry
Network Central Recorder
Nuclear Power Station from Tricastin (France)

David Sciamma
Requirements

1. Record different kinds of physical units
2. Render curves in real-time
3. Multi-users application
4. Analyze the data:
   - Calculus of slopes, tangents, time deltas...
Current recorders
### Current context

<table>
<thead>
<tr>
<th>Obsolescence</th>
<th>• Outdated paper recorders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Obsolete pool of recorders</td>
</tr>
<tr>
<td>Overloading</td>
<td>• Overloading of the wire network</td>
</tr>
<tr>
<td>Expensive</td>
<td>• Maintenance and supplies</td>
</tr>
</tbody>
</table>
Current context

- Complexity
- Time consuming
- Restricted

- Human Machine Interface
- Implementation is time consuming
- Restricted number of recorded channels
### Objectives

<table>
<thead>
<tr>
<th>Functional Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td>• Standardization</td>
</tr>
<tr>
<td>• Ergonomics</td>
</tr>
<tr>
<td>• Space saving</td>
</tr>
<tr>
<td>• More channels available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase reactivity</td>
</tr>
</tbody>
</table>
Objectives

- Sustainable and scalable
- Transition to new technologies
Technical requirements

1. Easy to deploy application
2. Open source technologies
3. Data centralization
4. Compliant with the information system master plan
Technical solution
RCP in the Energy Industry

Big Picture

- **Sensors**
  - Temperature
  - Pressure
  - Voltage
  - ...

- **Data acquisition**
  - Analogic data
  - Numeric data

- **Server**
  - Configuration + Data + Authentication + ...

- **Clients**

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ECR Architecture

ECR

Teneo

GEF

EMF

Eclipse RCP

Server

(Jetty + Spring)

DB

(Derby)

Data acquisition

(C + TCL)

sensors

Clients

Server

JMS Bus (ActiveMQ)

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ECR Architecture

- Curve rendering Analysis
- Model storage in a database
- Metamodel
- ECR
- Teneo
- GEF
- EMF
- Eclipse RCP
- JMS Bus (ActiveMQ)
- Server (Jetty + Spring)
- DB (Derby)
- Data acquisition (C + TCL)
- Clients
- Server
- sensors

- Sensores
- Metamodel
- ECR
- GEF
- EMF
- Eclipse RCP
- JMS Bus (ActiveMQ)
- Server
- DB (Derby)
- Data acquisition (C + TCL)
- Clients
- Server
- sensors

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Issues
Deployement

Need

- Be able to use the software without any setup

Solution

- Java WebStart
  - Java 1.5
  - Eclipse 3.3
Curve rendering (1/3)

Needs

- Periodic refresh (~1s)
- Interactivity (annotations, alarms...)
- Analysis
- Scales : decimal, logarithmic...

Solution

- Creation of a complete framework based on GEF
<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely customizable</td>
<td>Performances: GEF needs to be optimized</td>
</tr>
<tr>
<td>Easy to handle interactivity</td>
<td>No existing framework</td>
</tr>
</tbody>
</table>
Curve rendering (3/3)
Synchronization

- Each client has a copy of the model
  - Local modification
  - Model saved in database
  - Need to resynchronize other clients
- Solution based on JMS notifications
Synchronization

Communication bus - JMS

Database

Client A

Client B
Synchronization

Communication bus - JMS

Database

Retrieve data

Local data (EMF model)

Client A

Client B
Synchronization

Communication bus - JMS

Database

Retrieve data

Local data (EMF model)
Client A

Local data (EMF model)
Client B
Synchronization

Communication bus - JMS

Database

Modified local data (EMF model)
Client A

Local data (EMF model)
Client B
Synchronization

Communication bus - JMS

Notify modifications

Modified local data (EMF model)

Client A

Save

Database

Local data (EMF model)

Client B
Synchronization

Communication bus - JMS

Notify modifications

Modified local data (EMF model)
Client A

Database

Apply modifications

Local data (EMF model)
Client B
Synchronization

Communication bus - JMS

Database

Modified local data (EMF model)
Client A

Apply modifications

Updated local data (EMF model)
Client B
Synchronization

Communication bus - JMS

Database

Modified local data (EMF model)

Client A

Updated local data (EMF model)

Client B
### Bilan

<table>
<thead>
<tr>
<th>GUI</th>
<th>Interactivity and simplification, Improvement of usability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Diminution of operating costs</td>
</tr>
<tr>
<td>Productivity</td>
<td>Global improvement</td>
</tr>
<tr>
<td>Domain</td>
<td>Quality of the sample analysis</td>
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Questions

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