Generating EPICS Databases from Enterprise Architect UML Models

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Enterprise Architect vs EPICS

- Enterprise Architect (EA) is a UML / SysML modeling tool.
- ITER defined UML profiles to describe certain I&C concepts (components, functions, variables) in more detail.
- “Diagnostics variable” profile was influenced by EPICS and has a few properties which can be mapped directly to EPICS.
EA2SDD Workflow

- **Enterprise Architect (Windows)**
  - EA DB ➔ EA ➔ XMI ➔ SDD XML

- **SDD Tools (Linux)**
  - SDD XML ➔ SDD Editor ➔ SDD DB

- **SDD XML** (file transfer) ➔ XSLT 1 ➔ SDD XML

- **MS Access**
- **UML 2.1**
- **SDD 6.0** *(EPICS inside™)*

- **PostgreSQL**
- **PSP (Web)**
- **PSP DB**

- **MS SQL**
XML Pipeline
Generation Example

# PVs on controller 550000-PSH-1202
record(ai, "D1-I2-B2A0:SMSLMOTE00-GROSV") {
  field(Desc, "Cubicle Internal Temperature (°C)")
  field(EGU, "deg C")
  field(LOPR, "10")
  field(HOPR, "50")
  field(HIHI, "45")
  field(HHSV, "MAJOR")
}

<table>
<thead>
<tr>
<th>Records</th>
<th>Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>ai / ao</td>
<td>DESC</td>
</tr>
<tr>
<td>bi / bo</td>
<td>EGU</td>
</tr>
<tr>
<td>mbbi / mbbo</td>
<td>LOPR / HOPR</td>
</tr>
<tr>
<td>LOW / LOLO</td>
<td>HIGH / HIHI</td>
</tr>
<tr>
<td>LSV / LLSV</td>
<td>HSV / HHSV</td>
</tr>
</tbody>
</table>
Caveats

- No reverse workflow
- No concept of templates (aka substitution files)
- Main usage is to avoid retyping information
- Essential things to be entered on top to get a working IOC (e.g., device support details or PV links) – see SDD
- EPICS-specific limitations (lengths or combinations of fields) are partially implemented or not known in the UML model
- XSLT 1 limitations (e.g., cannot produce multiple files)
Conclusion

- Direct link from UML world to EPICS DB configuration
- Converter is small, fast and simple to run (3 XSL scripts of 90 kB total)
- Generation is incomplete for run-time, but gives a good start for a project