

# Generating EPICS Databases from Enterprise Architect UML Models

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# Enterprise Architect vs EPICS

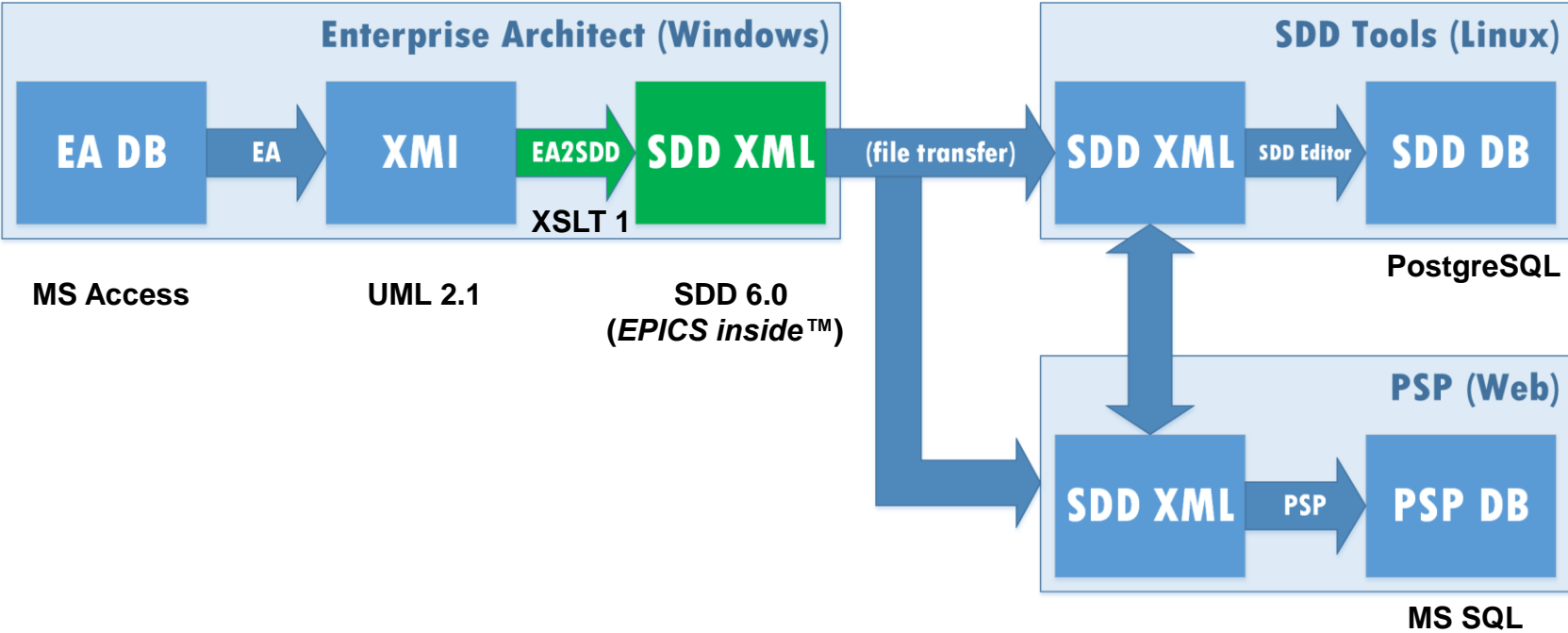
- Enterprise Architect (EA) is a UML / SysML modeling tool
- ITER defined UML profiles to describe certain I&C concepts (components, functions, variables) in more detail
- “Diagnostics variable” profile was influenced by EPICS and has a few properties which can be mapped directly to EPICS

The screenshot shows the 'Project Browser' window with the 'Functional Analysis Editor' open. The editor is titled 'Diagnostics Functional Analysis' and displays the configuration for a variable named 'D2-Q0-Q100:GLPCMEFLP1-MROV4'. The configuration is organized into several sections:

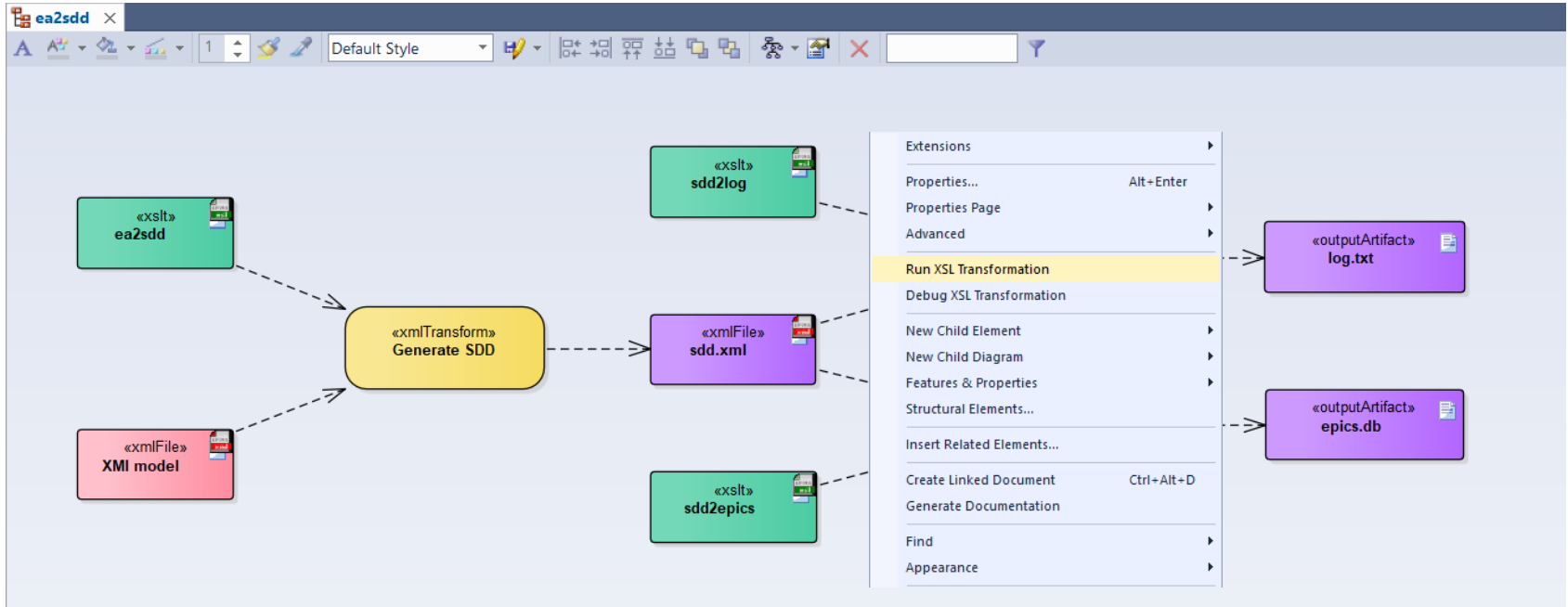
- Id:** 010101010101
- Name:** D2-Q0-Q100:GLPCMEFLP1-MROV4
- CBS 3:** Q100
- Description:** Flux Measurement
- Attributes:**
  - Attribute 1: Measuremer (dropdown)
  - Attribute 2: Read (dropdown)
  - Attribute 3: PON (dropdown)
  - Attribute 4: Voltage (dropdown)
  - Attribute 5: Quantity (dropdown)
- Priority:** High (dropdown)
- Archive:** Yes (dropdown)
- Upper Limit:** 110
- Lower Limit:** 50
- Alarm:** Yes (dropdown)
- Alarm Type:** HIHI (dropdown)
- Alarm Priority:** Major (dropdown)
- Alarm Low Limit:** (empty)
- Alarm Low Low Limit:** (empty)
- Alarm High Limit:** 90
- Alarm High High Limit:** 110
- Available on HMI:** Yes (dropdown)
- Interface:** PON (dropdown)
- Data Type:** I16 (dropdown)
- Data Kind:** Continuous.1 (dropdown)
- Category:** State data (dropdown)
- Unit:** V
- HW Allocation:** PCF
- Signal Name:** (empty)
- Status:** Proposed (dropdown)

Buttons at the bottom include 'Add', 'Edit', 'Save', 'Delete', 'Cancel', 'Import', and 'Export'.

# EA2SDD Workflow



# 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")
}
```

Records	Fields
ai / ao	DESC
bi / bo	EGU
mbbi / mbbo	LOPR / HOPR
	LOW / LOLO
	HIGH / HIHI
	LSV / LLSV
	HSV / HHSV

```
EA2SDD: variable D1-I2-B2A0:SMSLHECH00-GTOCB: EPICS does not support operating ranges for non-analog records; upper limit ignored
EA2SDD: variable D1-I2-B2A0:SMSLHECH00-GTOCB: EPICS does not support analog alarm ranges for non-analog records; "low" limit ignored
EA2SDD: variable D1-I2-B2A0:SMSLHEHS00-HROTV: undefined importance (interface); assuming "conventional"
EA2SDD: variable D1-I2-B2A0:SMSLHEHS00-HROTV: description reaches 40 characters EPICS limit; it will be truncated and/or normalized
```

# 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