FROM RESEARCH TO INDUSTRY

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GENERATE IOC COMMUNICATION FOR SIEMENS PLC

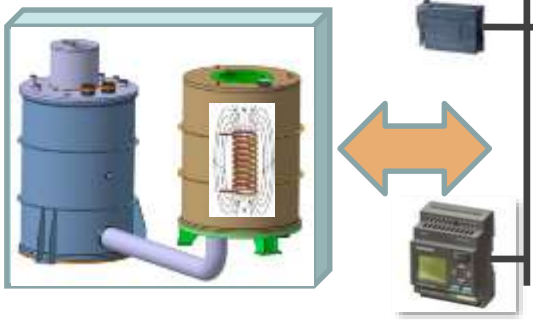
Paul Lotrus

CONTEXT

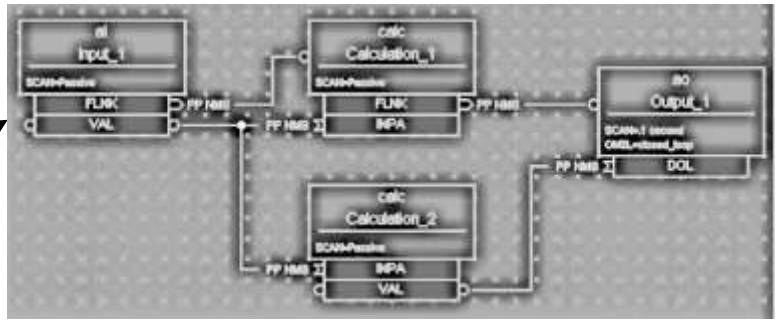
IOC
Input Output
Controler

Data block communication

PLC
Programmable
Logic Controler



CONTEXT



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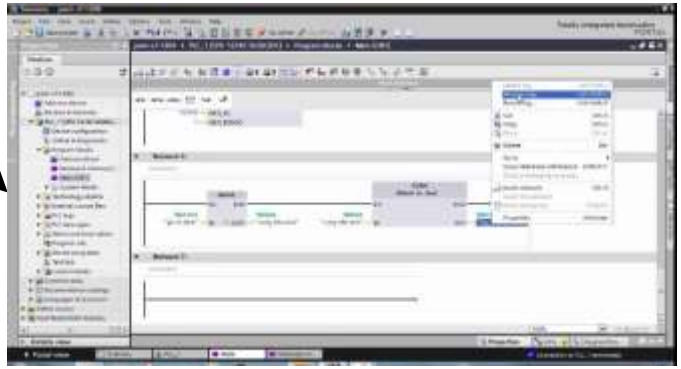
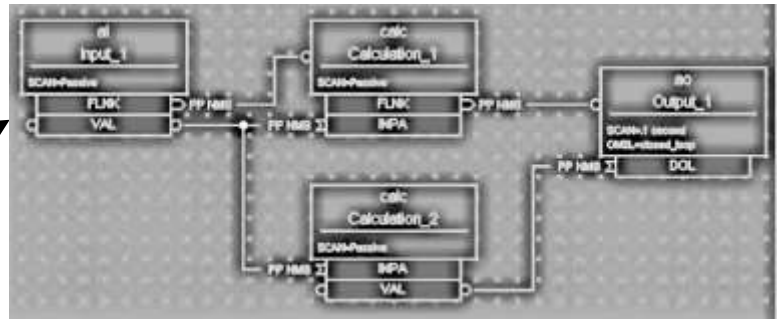


CEA CONTEXT

- 5 projects per year with PLC
- From 200 to 6000 variables
- Need a programming communication solution for non EPICS developer
- “Light” automatic solution

SOLUTION

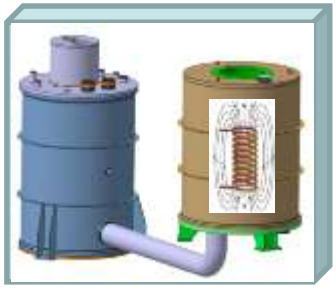


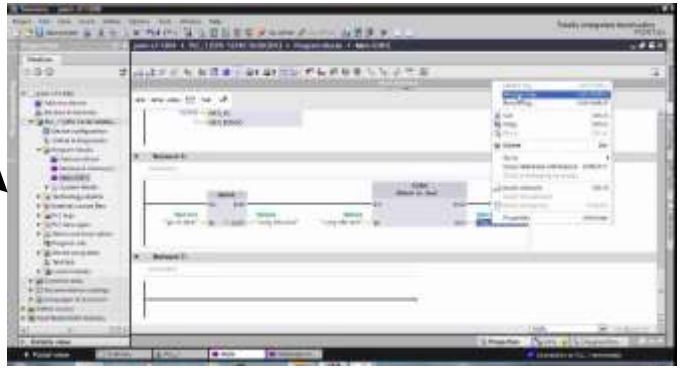
IOC
Input Output
Controler

Data block communication

Automatic generation

PLC
Programmable
Logic Controler





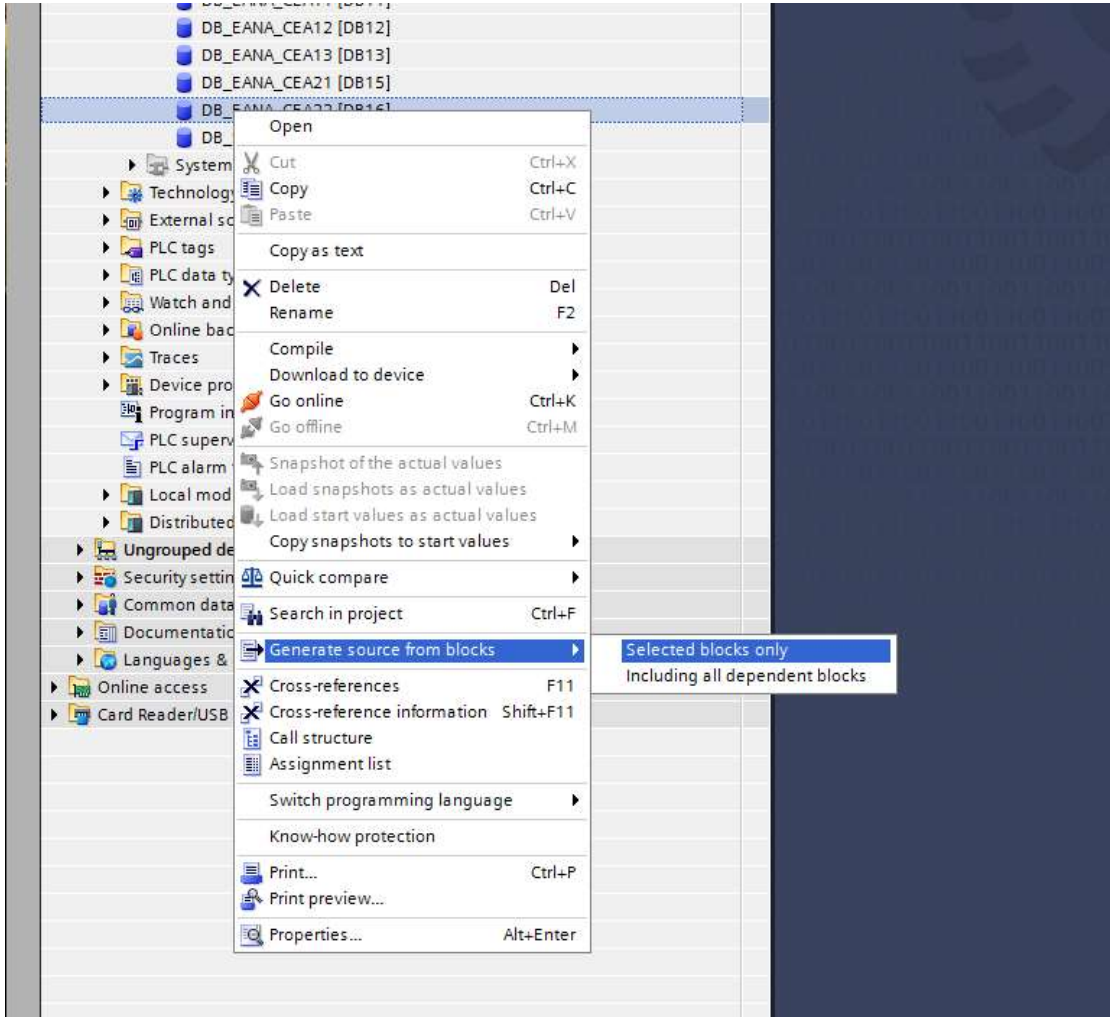
S7PLC PROTOCOL EXAMPLE

- TIA Portal: 2 awl files that contains 3 information: name, type, description

- Application:
  - Calculate data offset in data block message
  - Add EPICS fields: SCAN, alarm, PINI
  - Possibility to add other fields
  - Communication: @IP, port, timeout,…

S7PLC PROTOCOL EXAMPLE

- Export TIA Portal



S7PLC PROTOCOL EXAMPLE

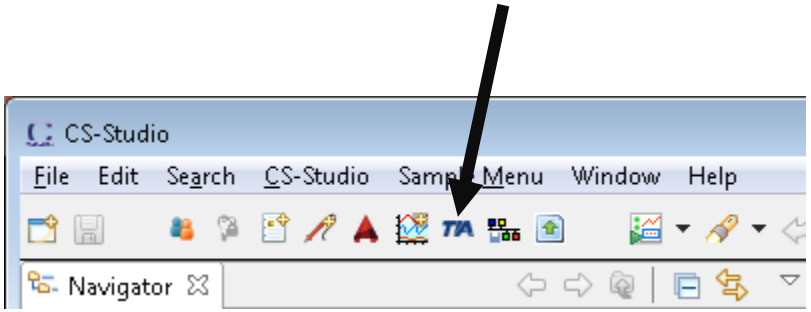
- Export TIA Portal

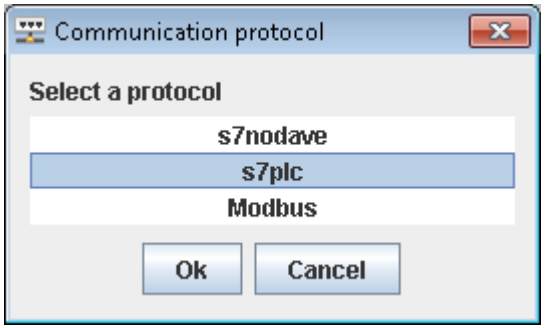
```
DATA_BLOCK "DATA_RECV_FROM_EPICS"
TITLE = SKID, Proj_Skid,,
{ S7_Optimized_Access := 'FALSE' }
AUTHOR : Joannem
FAMILY : ComEPICS
NAME : S7_PLC
VERSION : 0.1
NON_RETAIN
   STRUCT
      "SKID:PLC-001:R10P" : Real;   //  Regulation  P
      "SKID:PLC-001:R10I" : Real;   //  Regulation  I
      "SKID:PLC-001:R10U" : Real;   //  Regulation  U
      …
   ENDSTRUCT;
```

SKID: name of EPICS IOC
Proj_Skid: PLC name in S7PLC

S7PLC PROTOCOL EXAMPLE

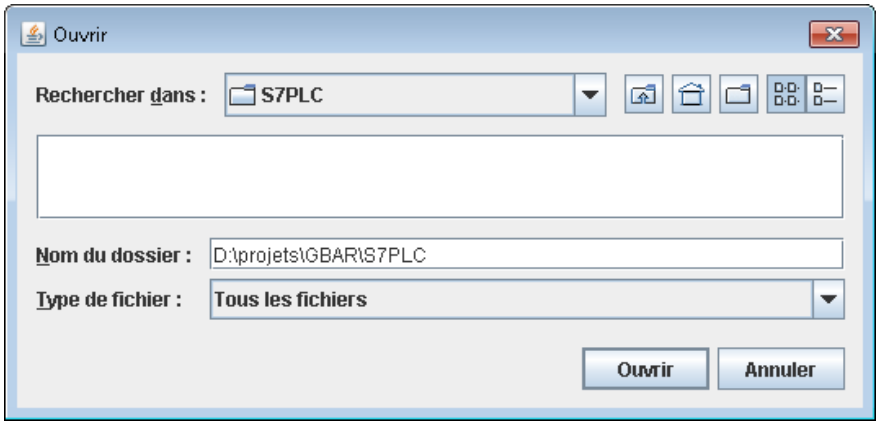
- Import awl file: choose protocol

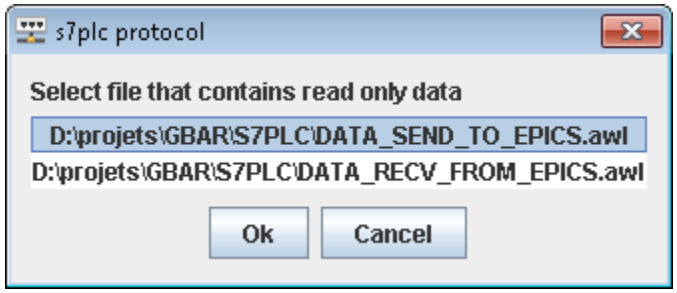




S7PLC PROTOCOL EXAMPLE

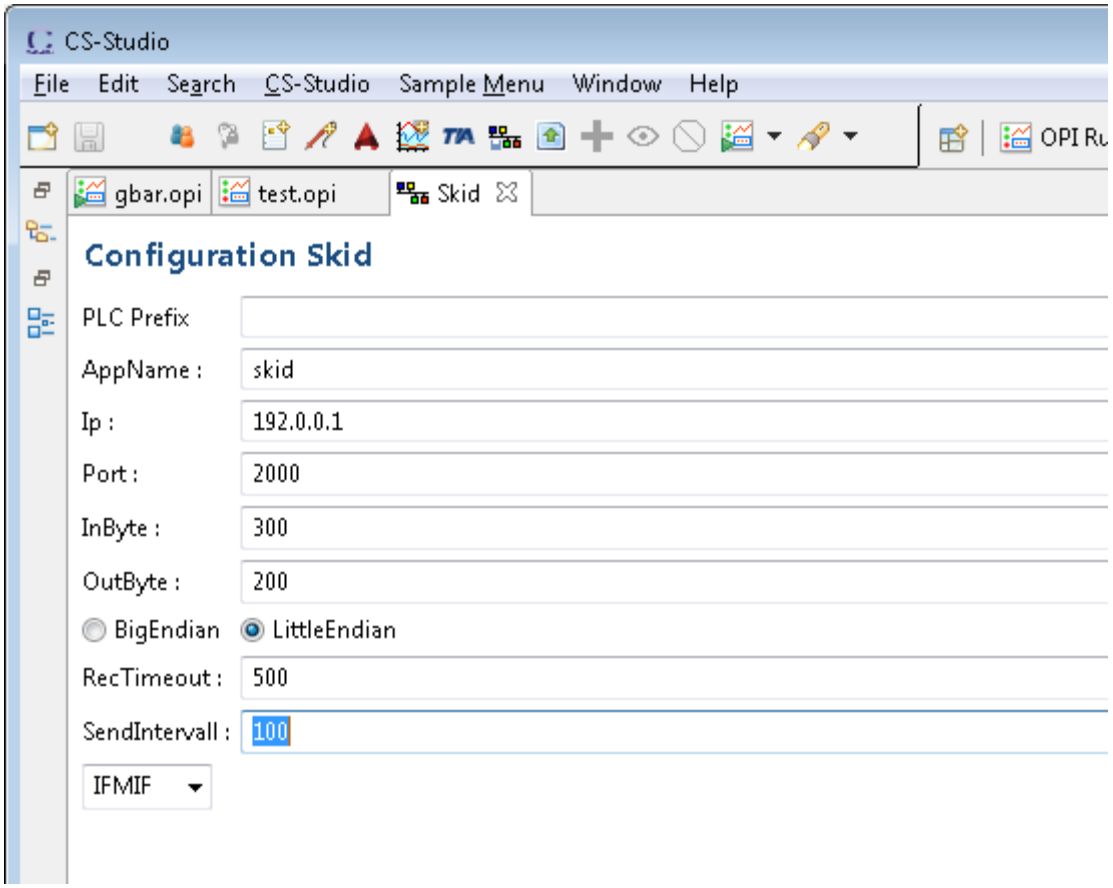
- Import awl file: choose file





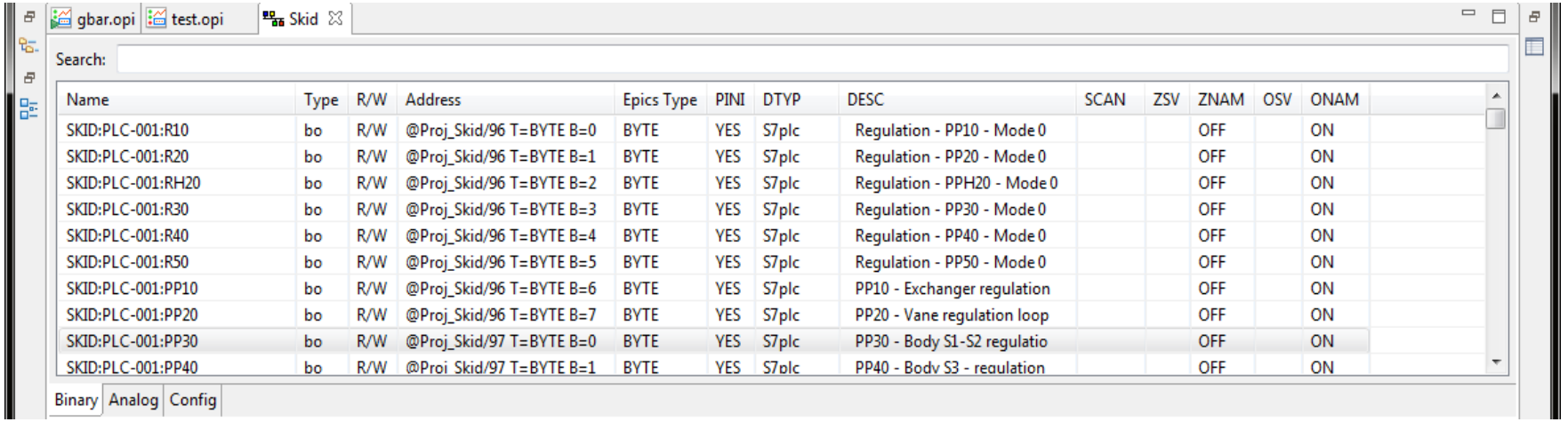
S7PLC PROTOCOL EXAMPLE

- Import awl file: Define communication parameters



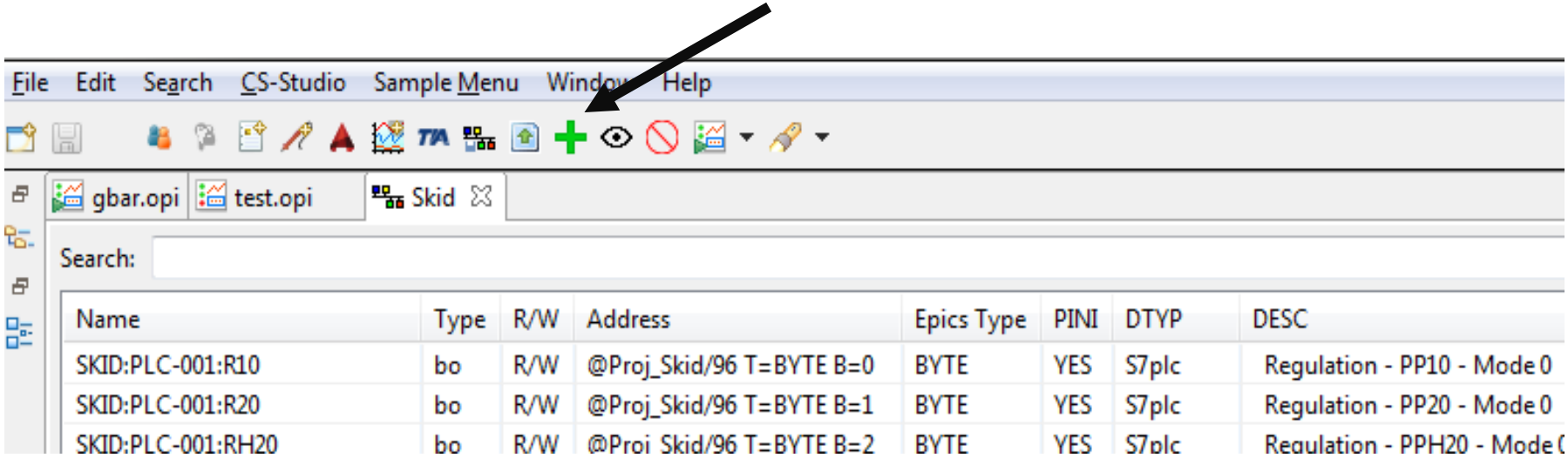
S7PLC PROTOCOL EXAMPLE

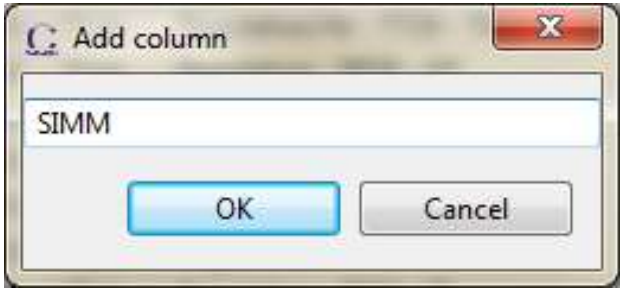
- Default EPICS parameters : SCAN, ZNAM, ONAM, ZSV, OSV



S7PLC PROTOCOL EXAMPLE

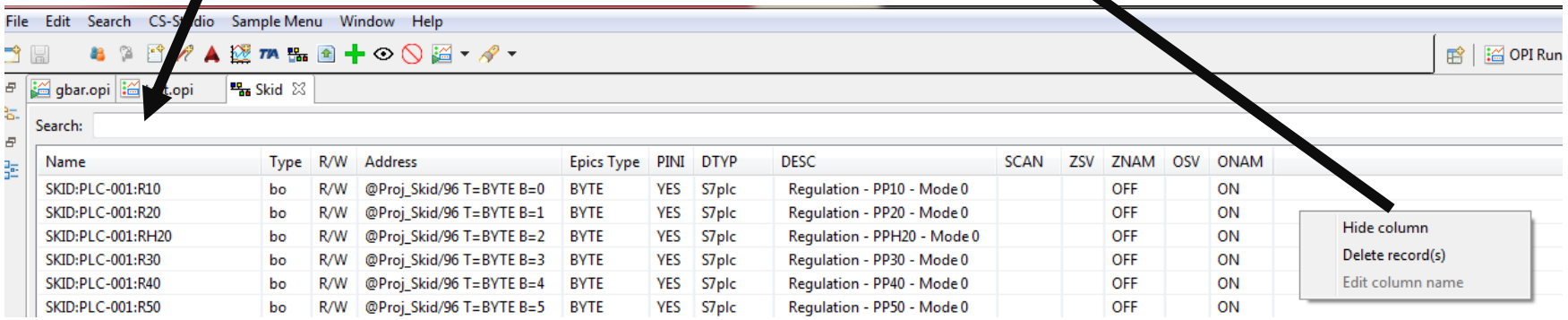
- Add new EPICS field





S7PLC PROTOCOL EXAMPLE

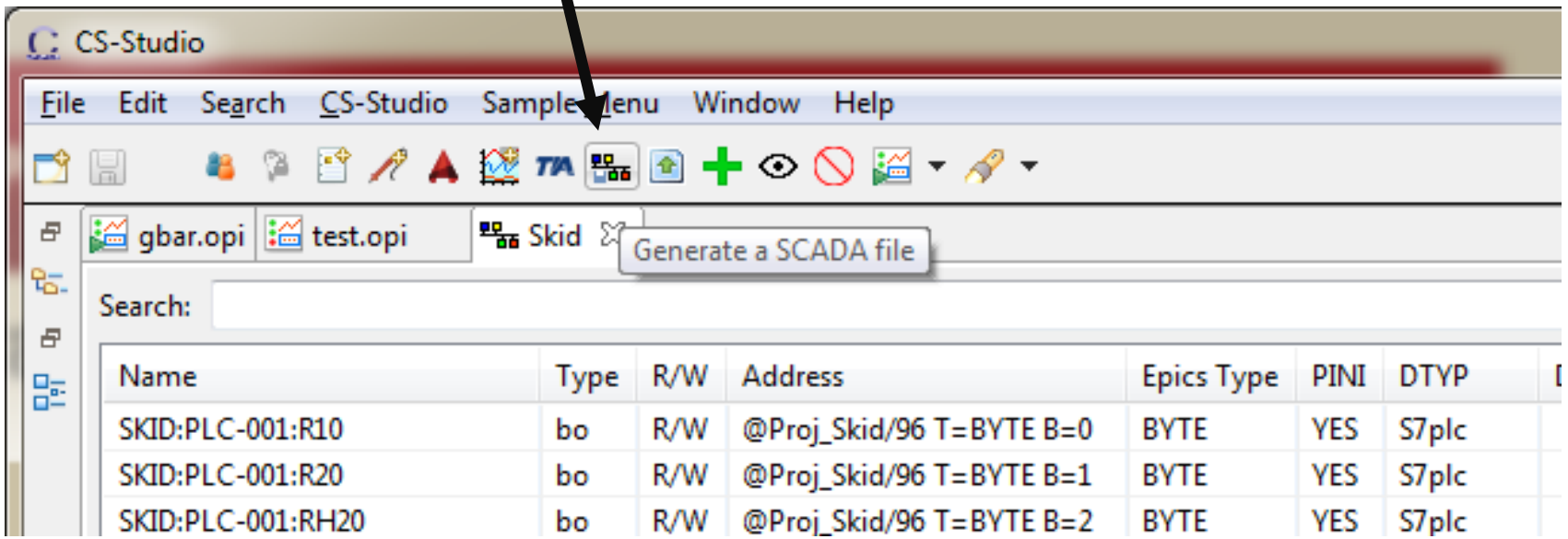
- Tricks
  - Search variable
  - Right click: Hide column, delete columns



  - Display hide columns
  - Sorting and unsorting by columns

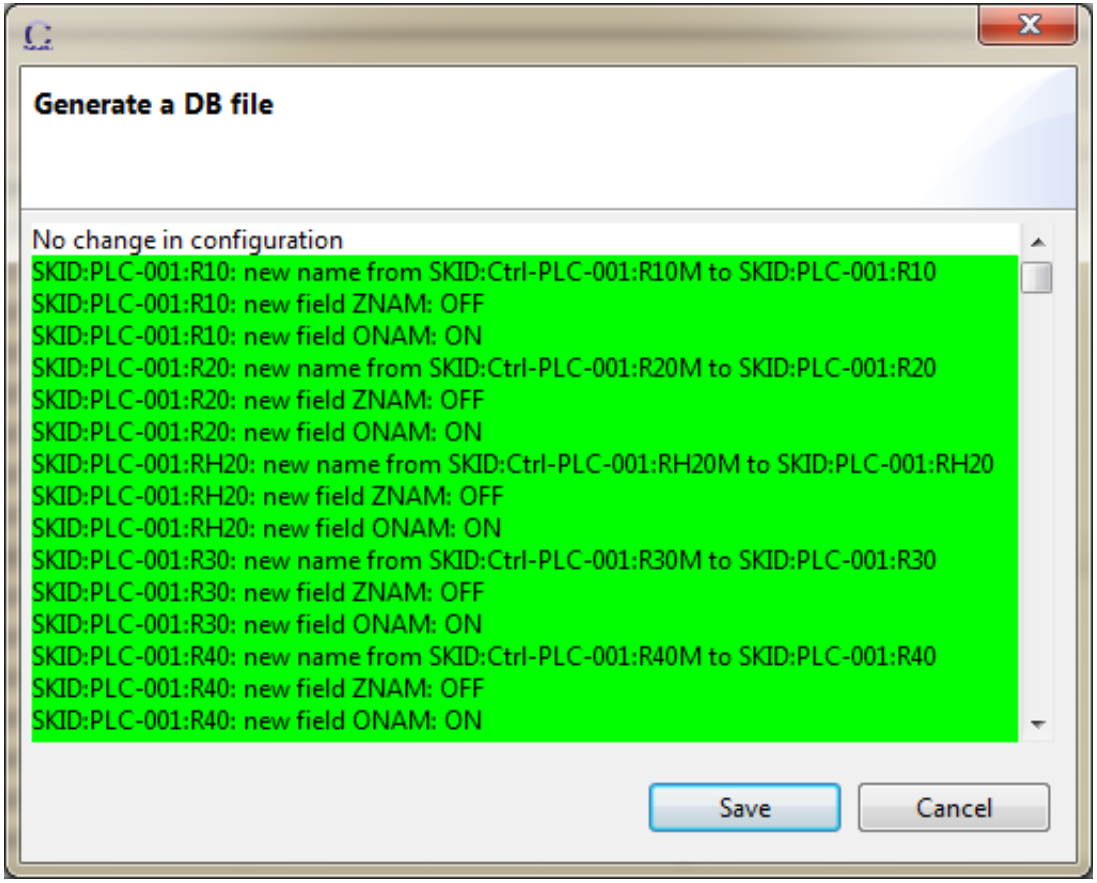
S7PLC PROTOCOL EXAMPLE

- Generate IOC



S7PLC PROTOCOL EXAMPLE

- Generate IOC: display new parameters, change, and deleted



S7PLC PROTOCOL EXAMPLE

- Generate IOC:
  - iocBoot/iocSkid/boot/iocTest.cmd
  - iocBoot/iocSkid/src/iocTestInclud.dbd
  - iocBoot/iocSkid/src/Makefile
  - skidApp/db/skid.db
  - skidApp/db/Makefile

S7PLC PROTOCOL EXAMPLE

- Generate IOC: db file

```
#! DBDSTART
#! DBDEND

record(ao, "SKID:PLC-001:R10P"){
 field(PINI, "YES")
 field(DTYP, "S7plc")
 field(DESC, "  Regulation - PP10 - KP")
 field(OUT, "@Proj_Skid/0 T=FLOAT")
}

record(ao, "SKID:PLC-001:R10I"){
 field(PINI, "YES")
 field(DTYP, "S7plc")
 field(DESC, "  Regulation - PP10 - TI")
 field(OUT, "@Proj_Skid/4 T=FLOAT")
}
…
```

TODO

- TODO:
  - Bugs resolution in progress like calculation of inSize and outSize
  - Better merge
  - Better design: Model View Controller
  - Standalone without Eclipse
  - Modbus/TCP

Thanks for your attention