TUPV011

Interfacing EPICS and LabVIEW using OPC UA for Slow Control Systems

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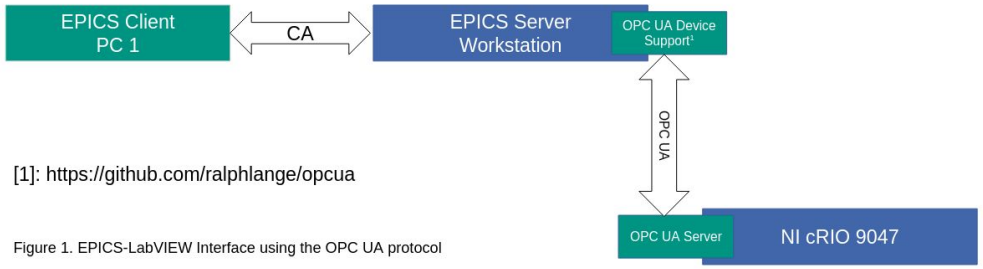
KATRIN Slow Control System

- Heterogeneous System managed by different institutes and parties e.g. NI cRIO/cFieldPoint, Siemens S7
- ~10,000 Process Variables
- Mostly Operating at 2Hz, few sensors at 10Hz
- EPICS as an abstraction layer for all control systems? Integrating EPICS with LabVIEW applications?

Integrating EPICS with LabVIEW



[1]: https://github.com/ralphlange/opcua

Figure 1. EPICS-LabVIEW Interface using the OPC UA protocol

Performance Evaluation Setup

1. Two experiment modes for one hour
   a. Sensor Mode: Simulate reading incremental values from 300 sensors from cRIO OPC UA server and channeling them through EPICS.
   b. Setpoint Mode: Simulate writing incremental values to 300 PVs in the cRIO OPC UA server through EPICS. Another EPICS client to push values to OPC UA through EPICS. (Figure 2.)
2. For each mode we run two experiments: 10Hz and 2Hz
3. We calculate loss by monitoring the number of values received by the EPICS client

Update Rate	Expected Number of Values in an hour
2Hz	7,200
10Hz	36,000

Table 1. Expected number of values in an hour for 2Hz & 10Hz experiments

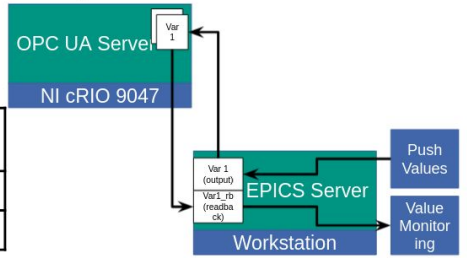


Figure 2. Setpoint Experiment Mode

Performance Evaluation Results

Update Rate	Sensor Mode Loss Rate (%)
2Hz	0%
10Hz	0%

Table 2. Loss Rate for Sensor Mode Experiments

Update Rate	Setpoint Mode Loss Rate (%)	
	Output Record	Readback Record
2Hz	0%	0%
10Hz	0%	0.6%

Table 2. Loss Rate for Setpoint Mode Experiments

Conclusion

- Data loss only happens on high update rate.
- OPC UA can be a good interface to integrate EPICS and NI LabVIEW hardware with no impact on performance for slow control systems.

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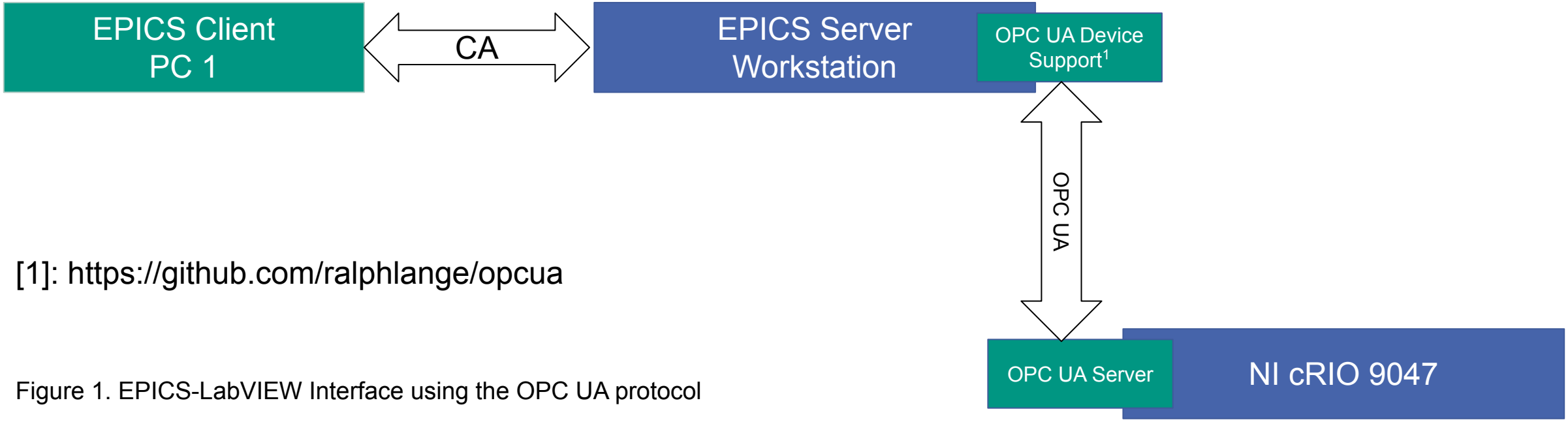

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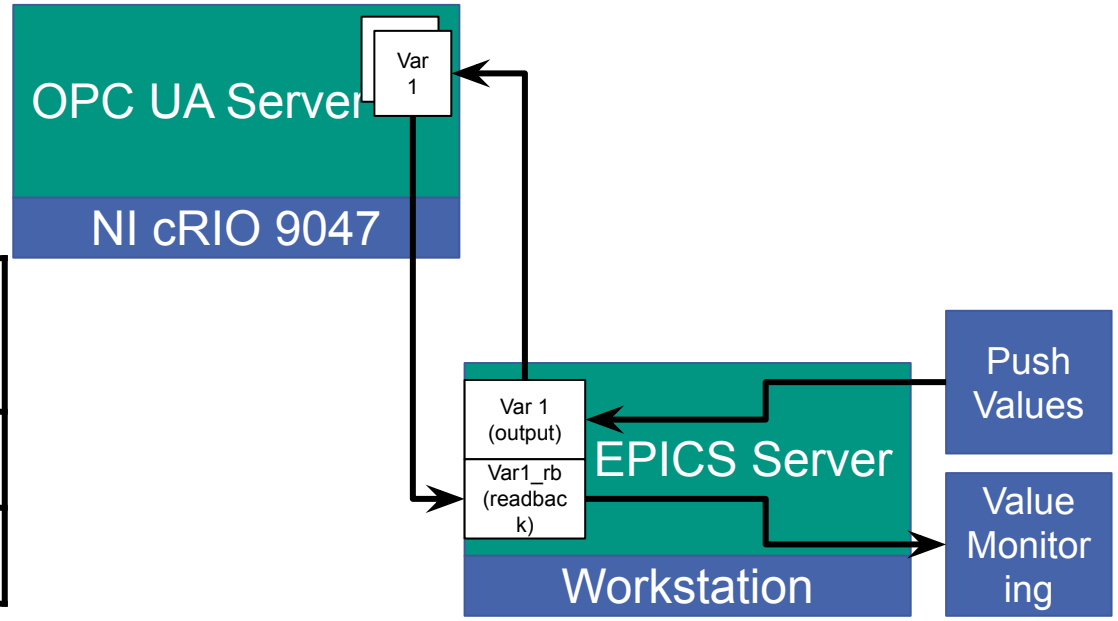

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