Thoughts on GUI-based Data Acquisition Software and LabVIEW

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Outline

- Motivation
- Experience
- GUI program development with LabVIEW
- Examples of GUI principles in XDAC
- LabVIEW and EPICS

GUI Design Principles

- Know your users
- Keep it simple - minimize clutter
- Show only relevant information
- Information easy to decode
- Colors, layout, buttons, similar page-to-page

GUI Development with LabVIEW

LabVIEW - EPICS clients

- LabVIEW to EPICS Library Function
- SNS Shared Memory Interface
- National Instruments' EPICS interface

Shared Memory IOC

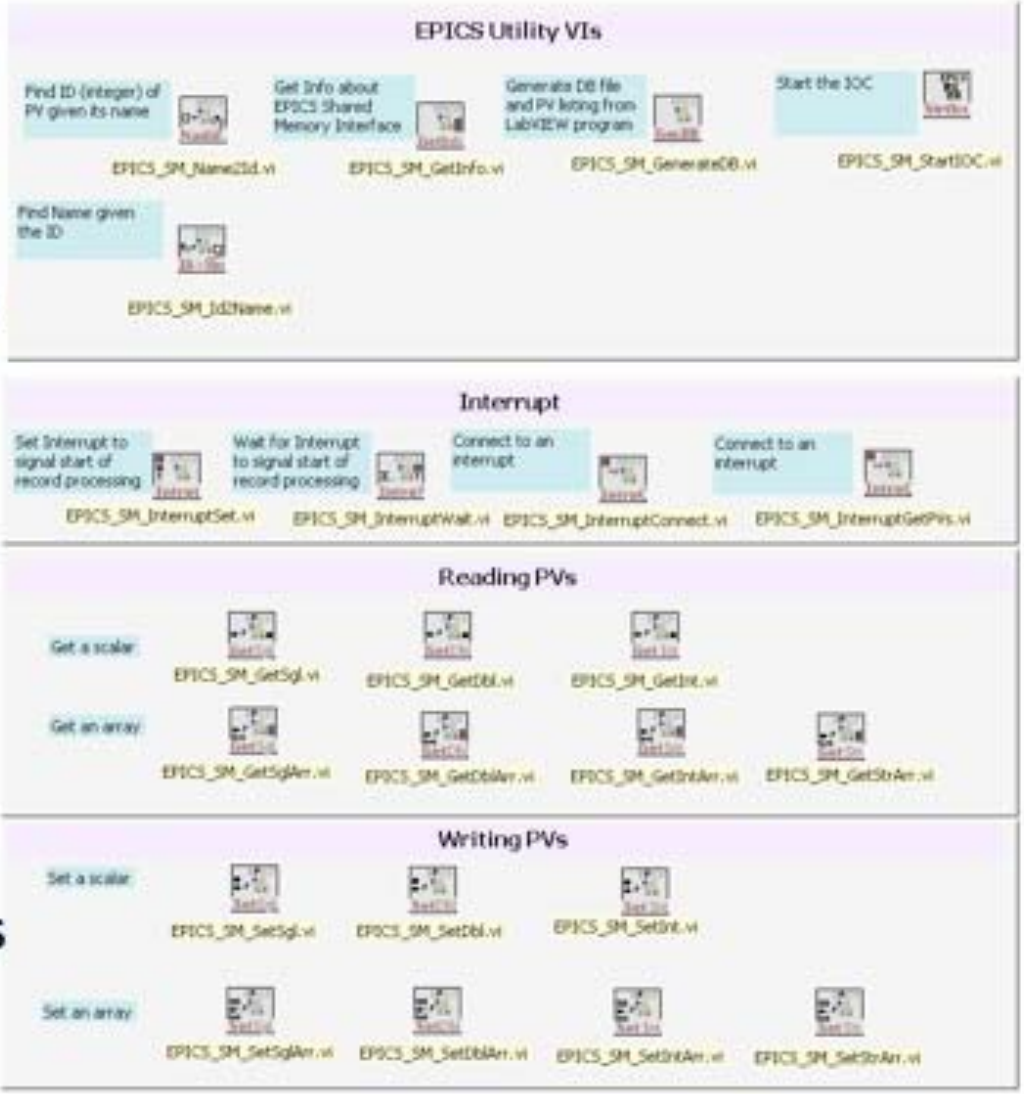
Integration with the control system

The Shared Memory IOC allows us:

- Support additional processes
- Use records as placeholder of data but no function
- Not worry about buffering data
- Respond to events
- Be compatible with other IOCs

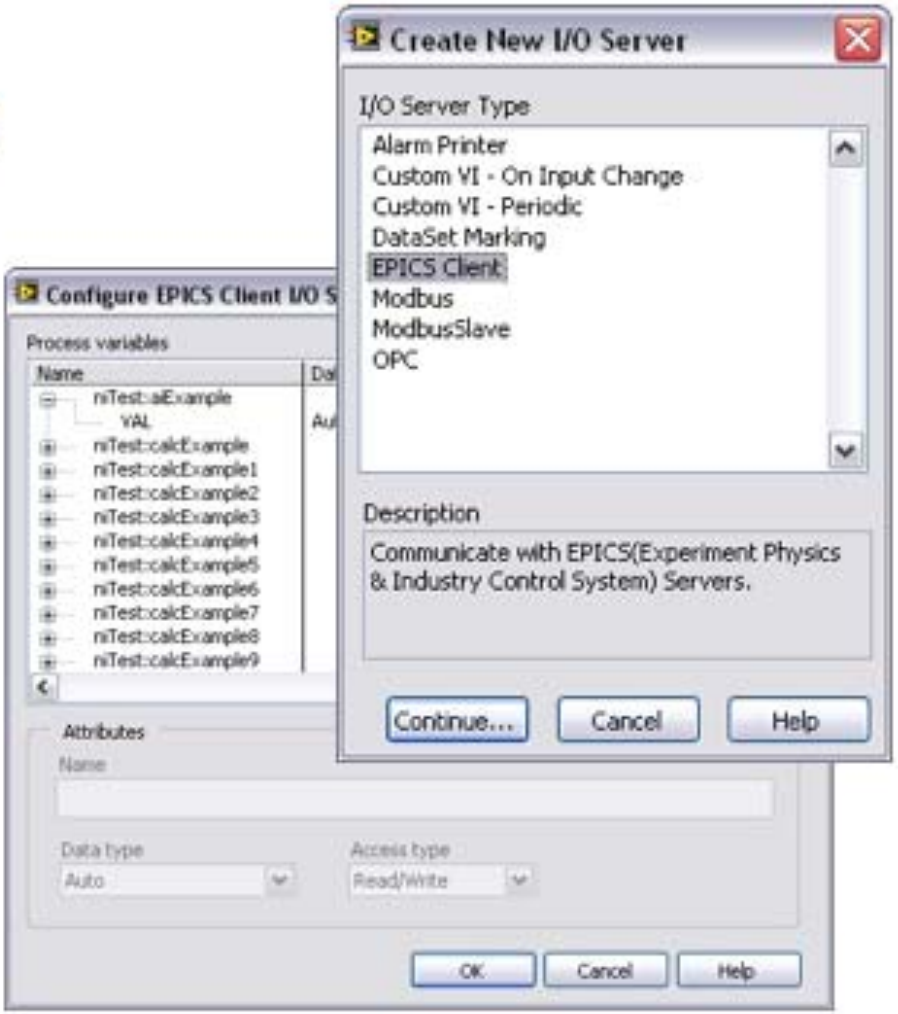
Functions:

- Create, find and destroy variables
- Read from and write to variables
- Set and receive events
- Retrieve information about variables
- Create IOC database

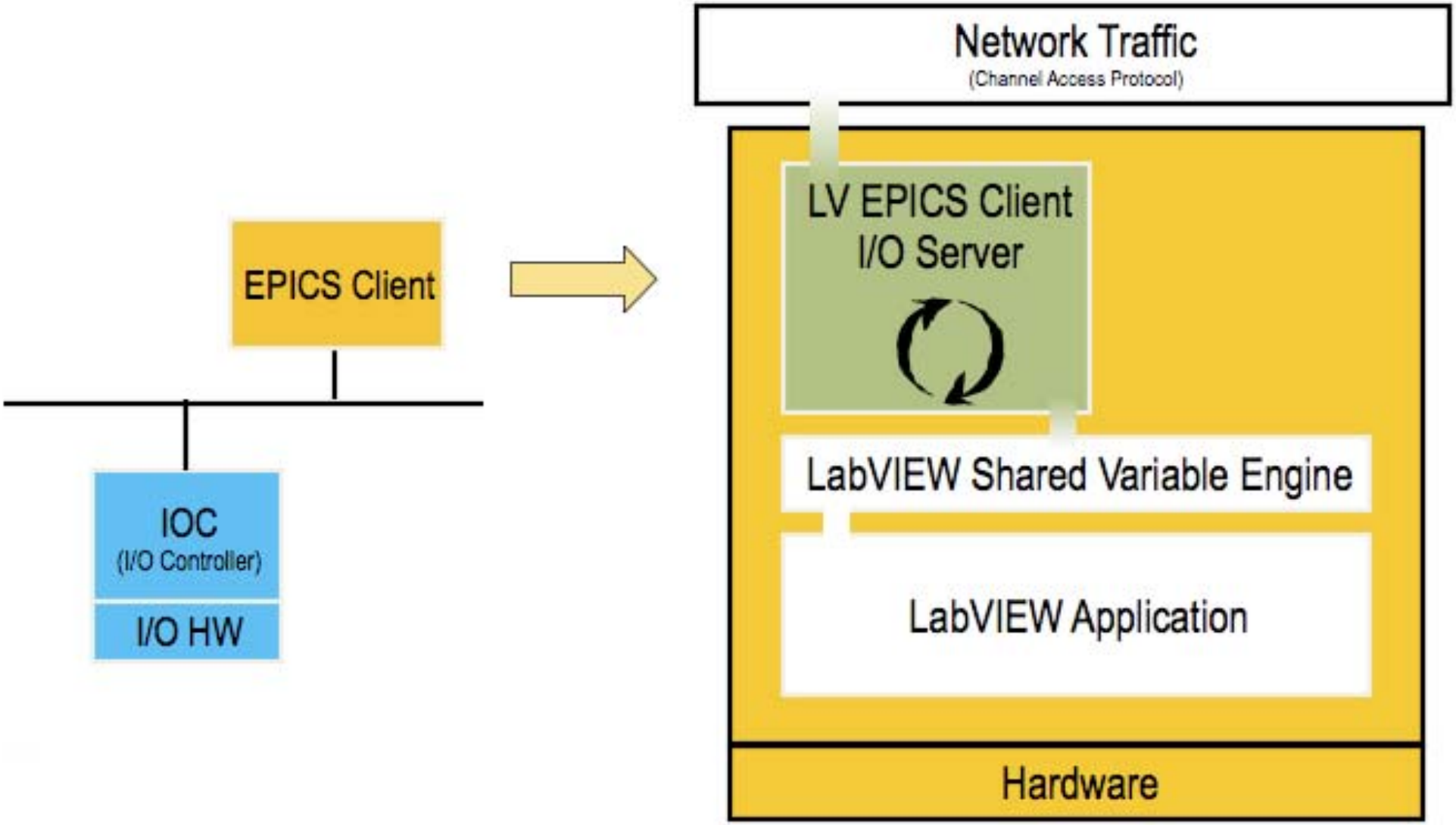


LabVIEW EPICS Client

- Runs on LabVIEW for Windows
- Included in LabVIEW DSC
- Also available via download
- Implemented as an I/O Server
- Interfaced via shared variable



LabVIEW EPICS Client



LabVIEW - EPICS servers

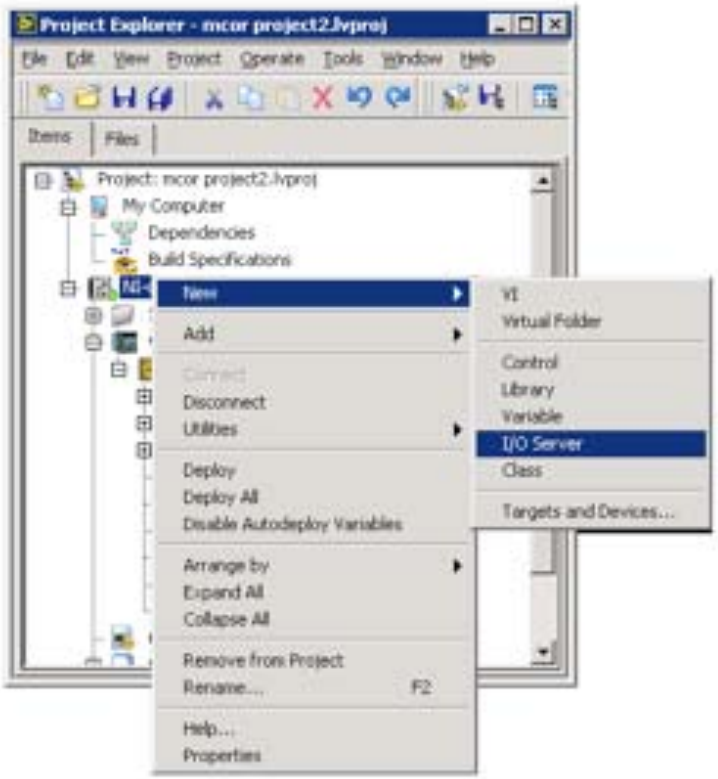
- CA Server to any LabVIEW-interfaced hardware
- CompactRIO IOC

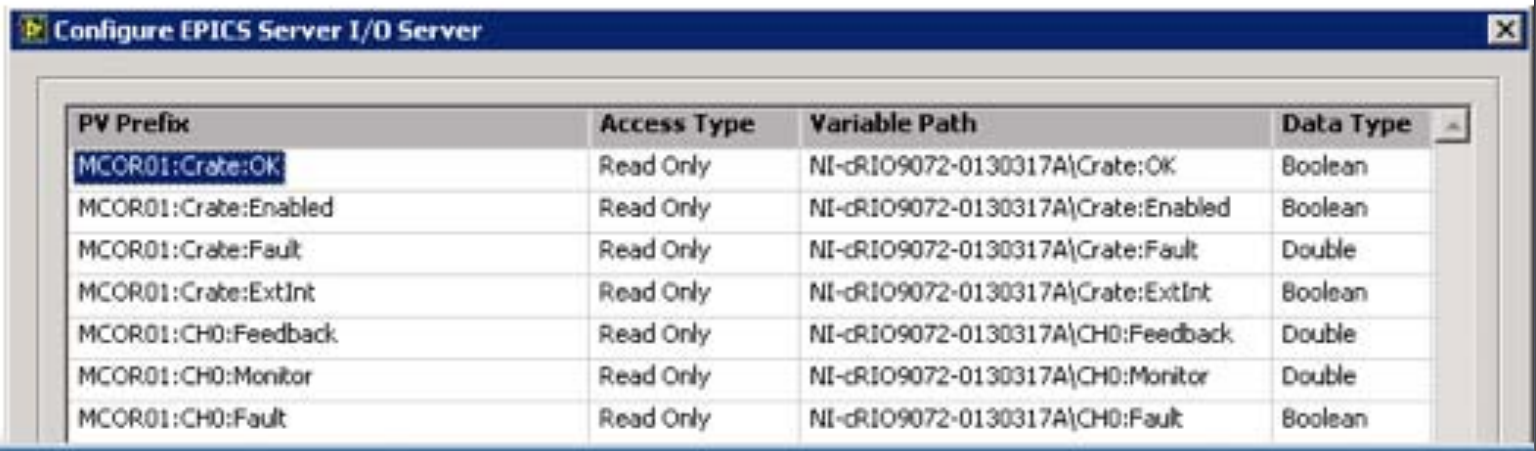
LabVIEW EPICS Server

- NEW in LabVIEW 2009
  - Support for Channel Access Server in LabVIEW RT and LabVIEW DSC
  - Can run on PXI and CompactRIO
- Custom option for CompactRIO
  - Prototype code to run full EPICS IOC Server side by side with LabVIEW RT

LabVIEW EPICS Server

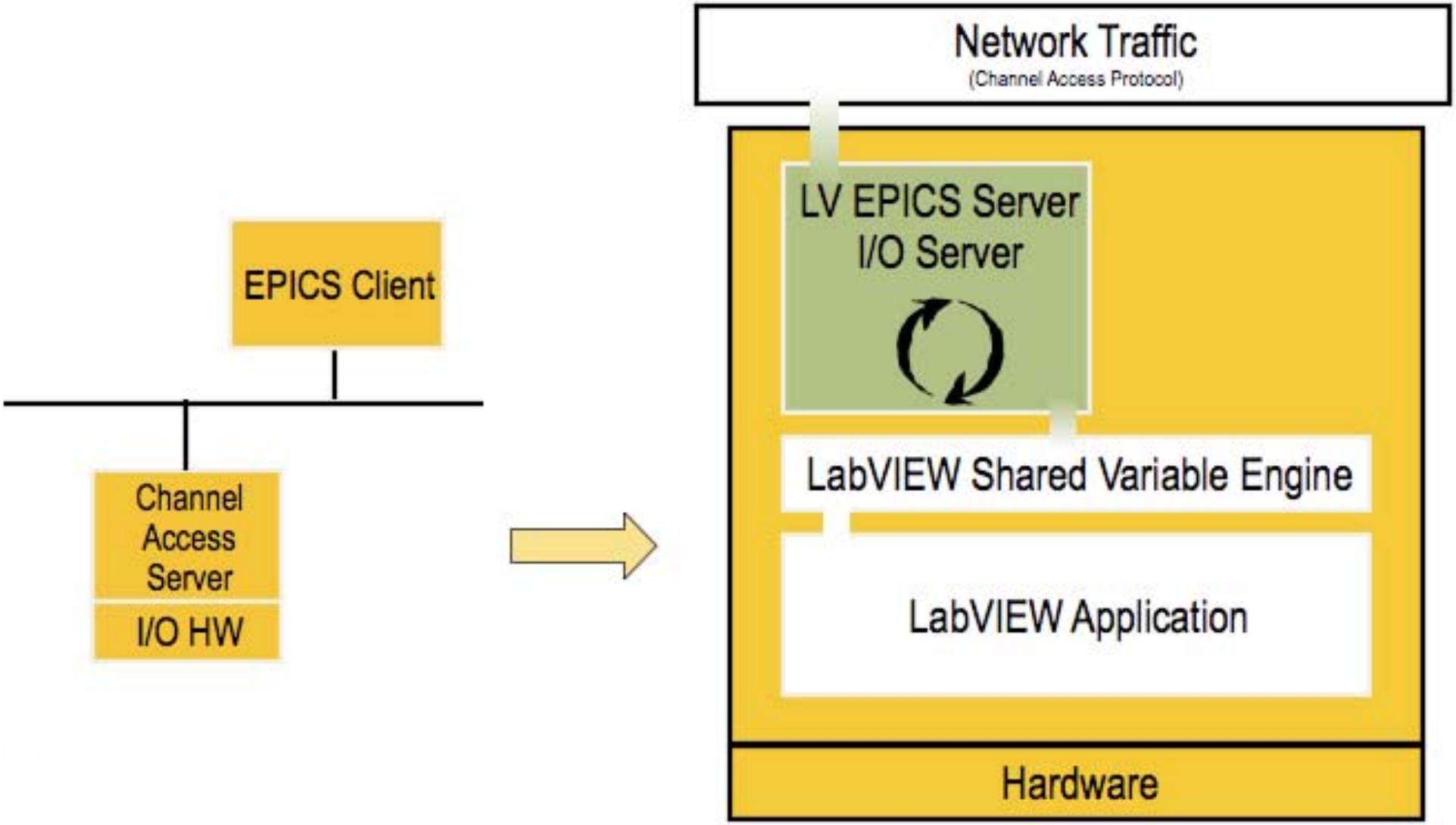
- Runs on LabVIEW for Windows and LabVIEW Real-Time
- Implemented as an I/O Server
- Interfaced via shared variable





PV Prefix	Access Type	Variable Path	Data Type
MCOR01:Crate:OK	Read Only	NI-cRIO9072-0130317A\Crate:OK	Boolean
MCOR01:Crate:Enabled	Read Only	NI-cRIO9072-0130317A\Crate:Enabled	Boolean
MCOR01:Crate:Fault	Read Only	NI-cRIO9072-0130317A\Crate:Fault	Double
MCOR01:Crate:ExtInt	Read Only	NI-cRIO9072-0130317A\Crate:ExtInt	Boolean
MCOR01:CH0:Feedback	Read Only	NI-cRIO9072-0130317A\CH0:Feedback	Double
MCOR01:CH0:Monitor	Read Only	NI-cRIO9072-0130317A\CH0:Monitor	Double
MCOR01:CH0:Fault	Read Only	NI-cRIO9072-0130317A\CH0:Fault	Boolean

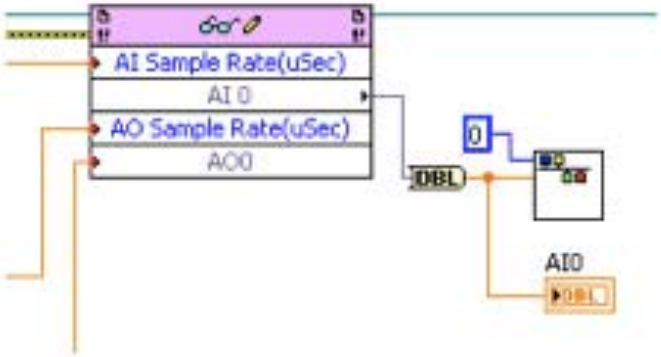
LabVIEW EPICS Server



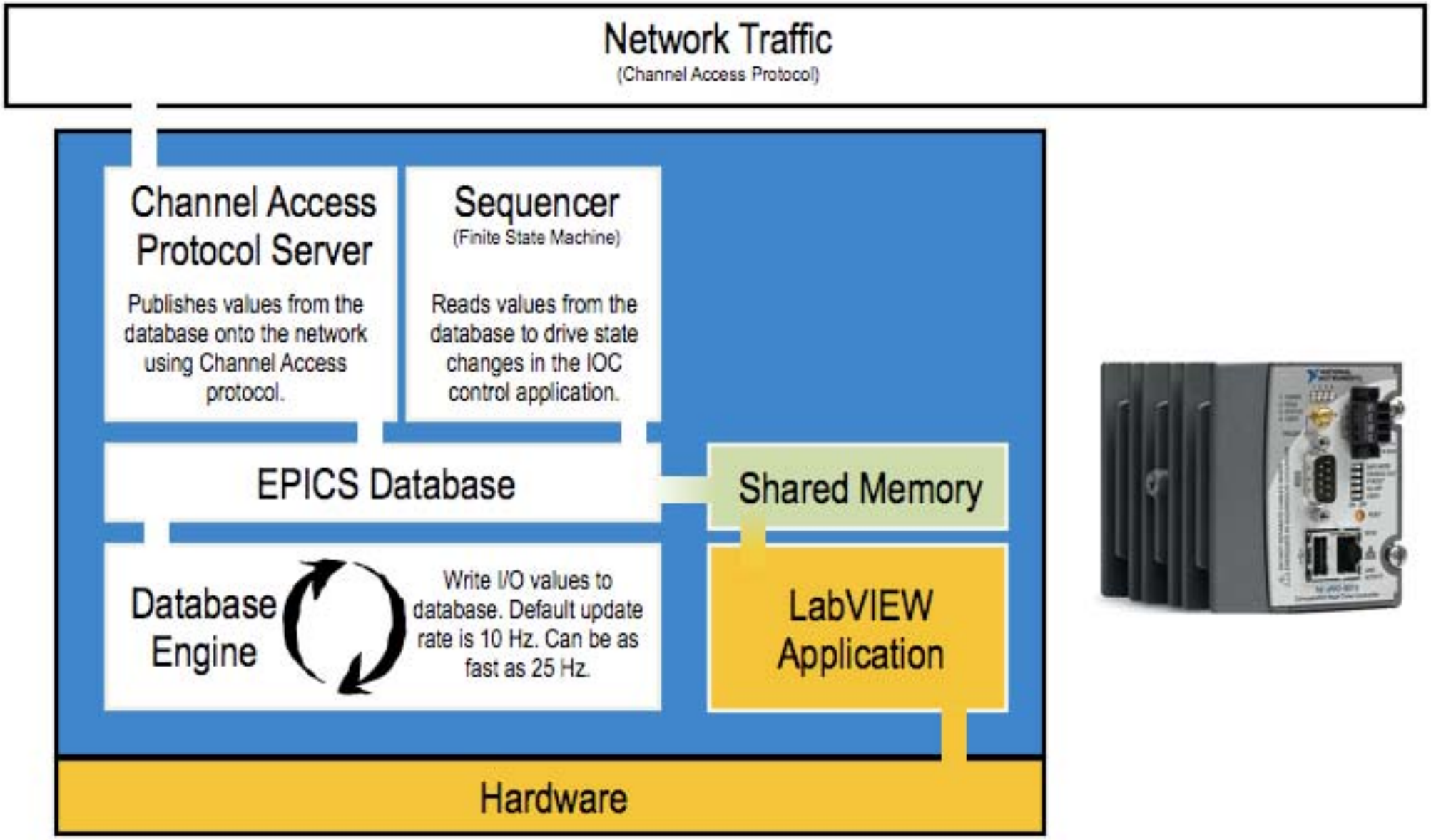
IOC Server on CompactRIO

- CompactRIO controller runs vxWorks
- Implemented via shared memory
- Interface to hardware via LabVIEW RT and FPGA
- Can be used with Scan Mode
- Available upon request

```
# Read a double from shared memory
record(ai,"$(NAME):AI0") {
# field("Read a double from SM")
  field(DTYP,"SM Device")
  field(INP,"@0")
  field(SCAN,".1 second")
}
```



IOC Server on CompactRIO



Summary

- EPICS Client
  - Available in LabVIEW DSC or via free download
- EPICS Server – Channel Access
  - Included in LabVIEW RT 2009
  - Supports PXI and cRIO
- EPICS Server – IOC
  - Available upon request
  - Currently supports cRIO only