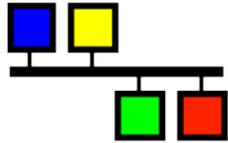


**EPICS**



NATIONAL INSTRUMENTS

**LabVIEW™**

# Connecting LabVIEW to EPICS network

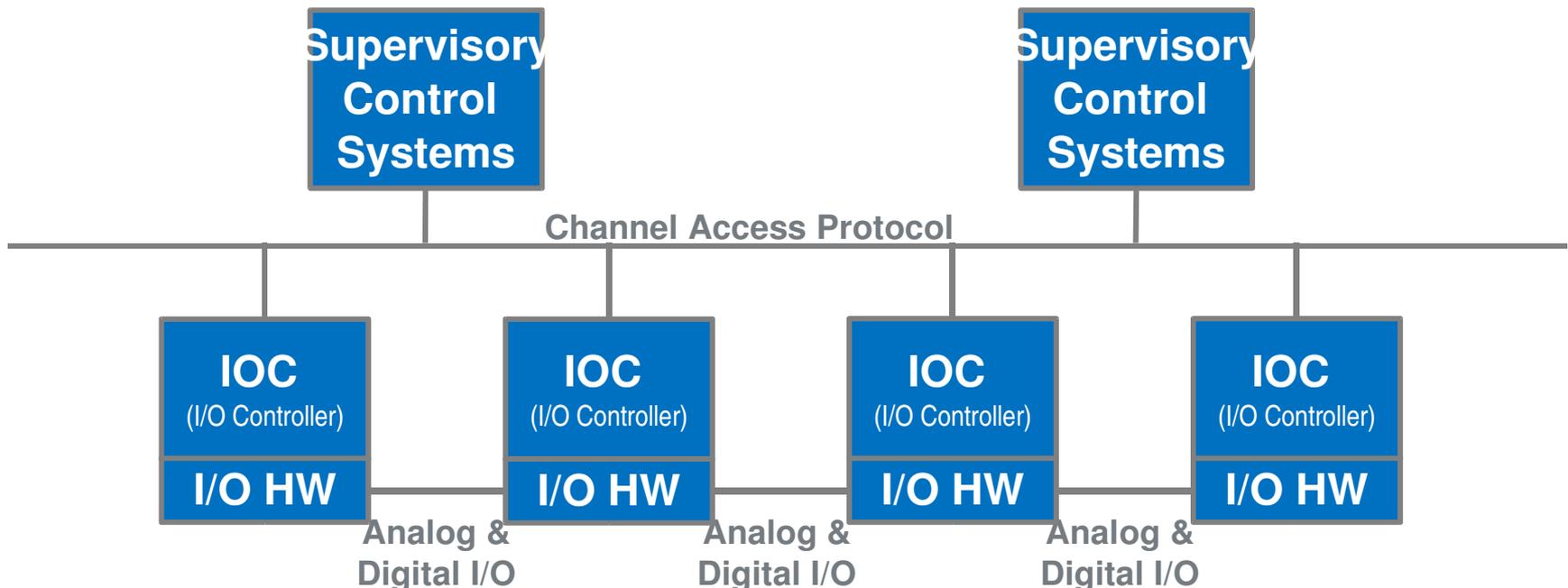
Xiang Yan

Reven.Yan@ni.com

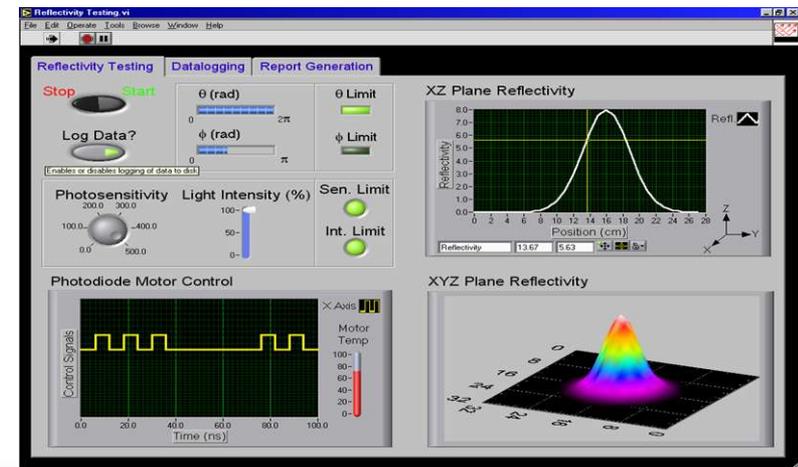
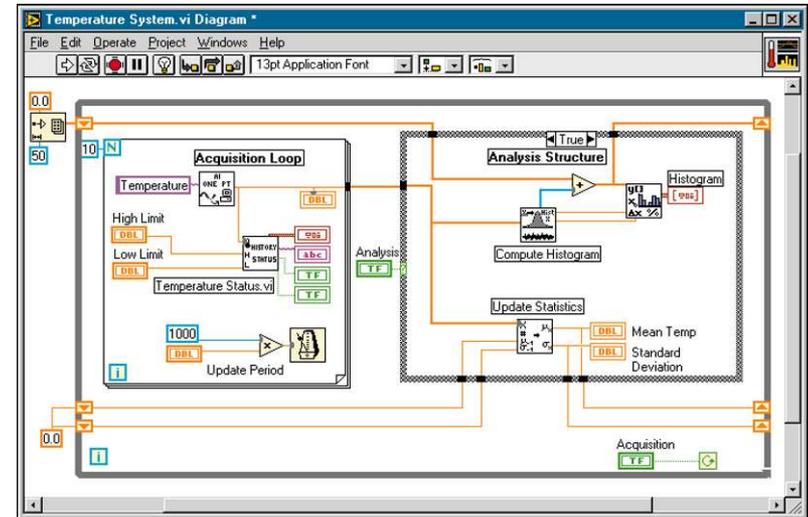
National Instruments

# EPICS Software Architecture

- Channel Access Protocol for non-real-time data (10 Hz update)
- Analog and digital I/O for deterministic data transfer
- Each IOC holds a subset of EPICS database variables

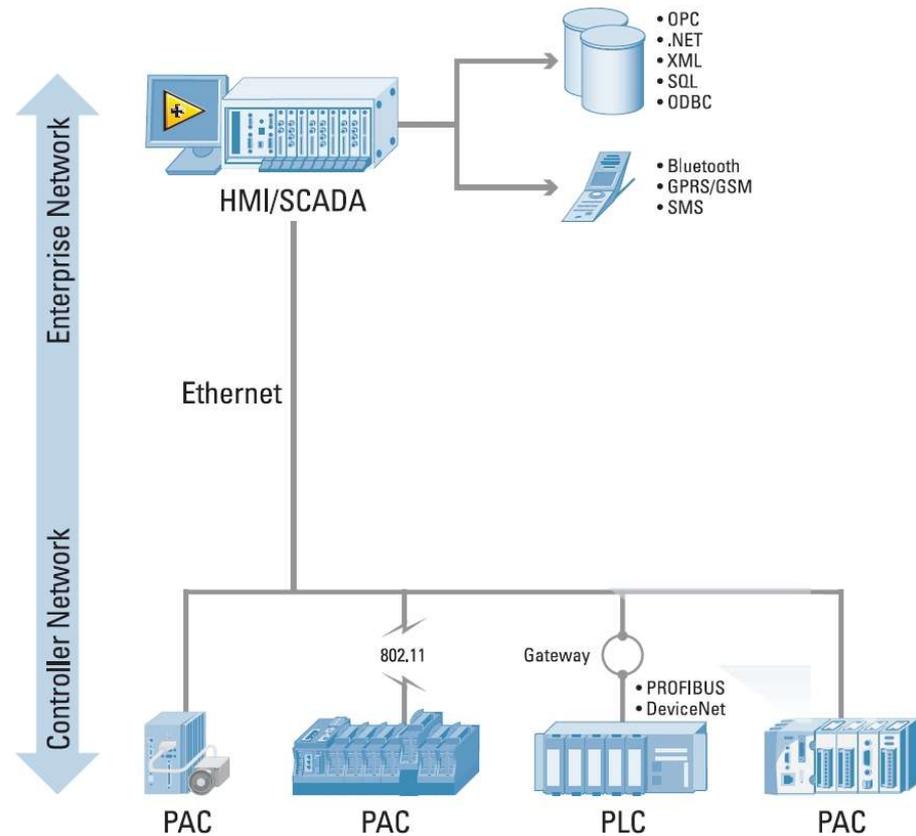


- Graphical dataflow programming
- Interactive front panel / GUI
- Efficient compiled execution
- Targets
  - Windows, Real-Time, FPGA, Linux, Macintosh, DSP, Other Processors
- I/O and analysis libraries
- Distributed networking capabilities



# Open Architecture

- Connectivity to different devices
  - OPC, Modbus, TCP/IP, Serial
- Flexibility
  - Windows, RTOS, FPGA



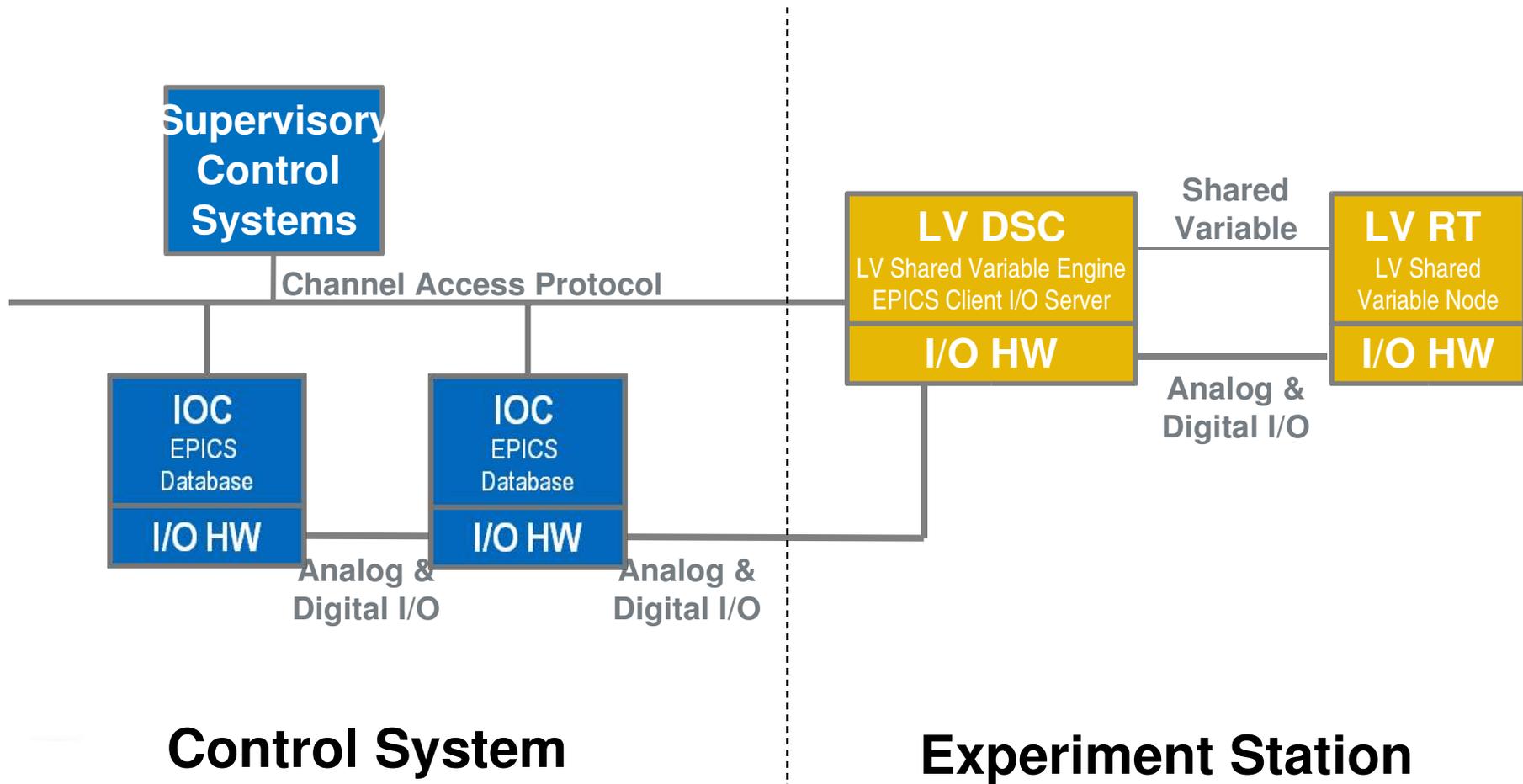
# Current LabVIEW-EPICS interfaces

- LabView display/EPICS DAQ:
  - ActiveX library – by SLAC
  - LabVIEW EPICS Client I/O server
- EPICS display, LabView DAQ:
  - Shared memory interface – by SNS ORNL

# CA ActiveX

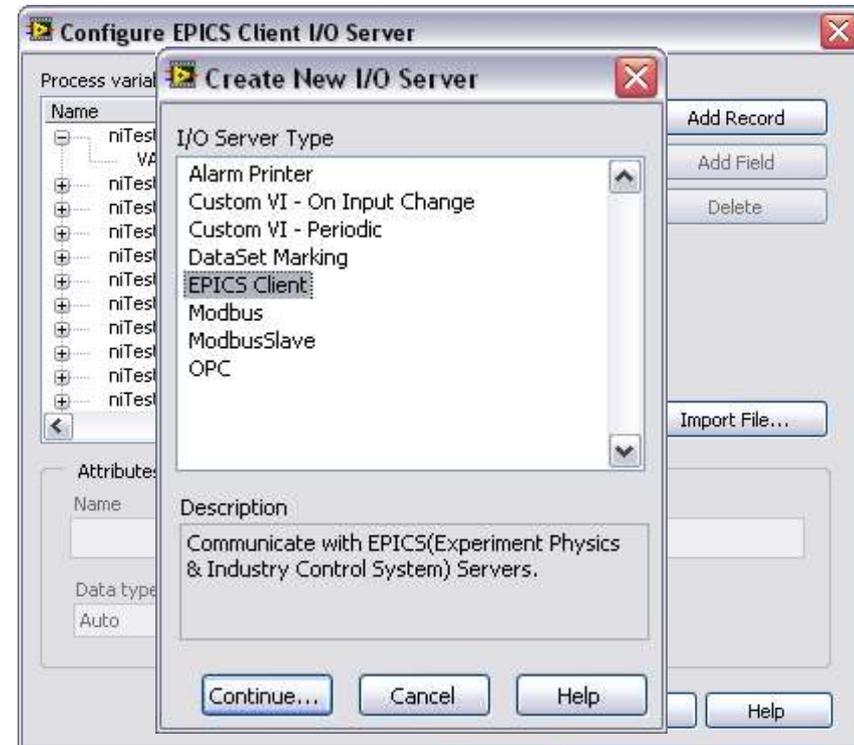
- Windows-specific
- Conceptually similar to CIN
- Used for SNS BLM electronics calibration
  - Picoamp source

# EPICS and LabVIEW

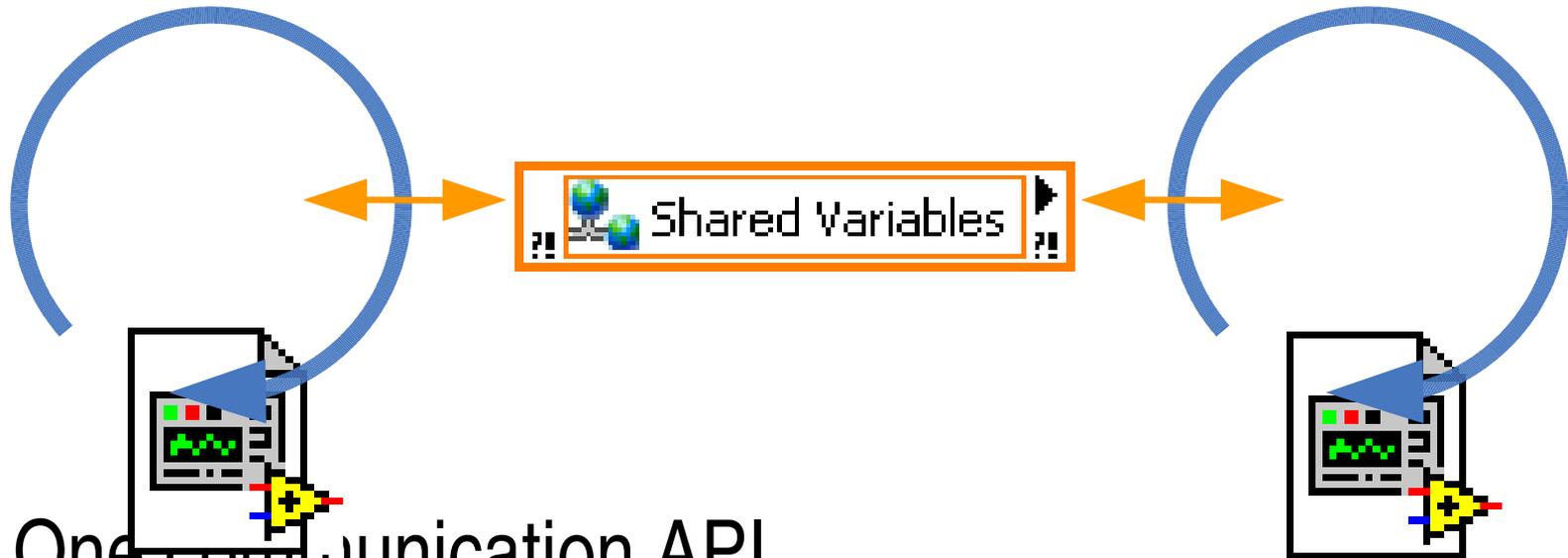


# LabVIEW EPICS Client I/O Server

- Runs on LabVIEW for Windows
- Requires LabVIEW DSC
  - Data archiving
  - Alarming
  - Scaling
  - User interface
- Based on shared variable technology

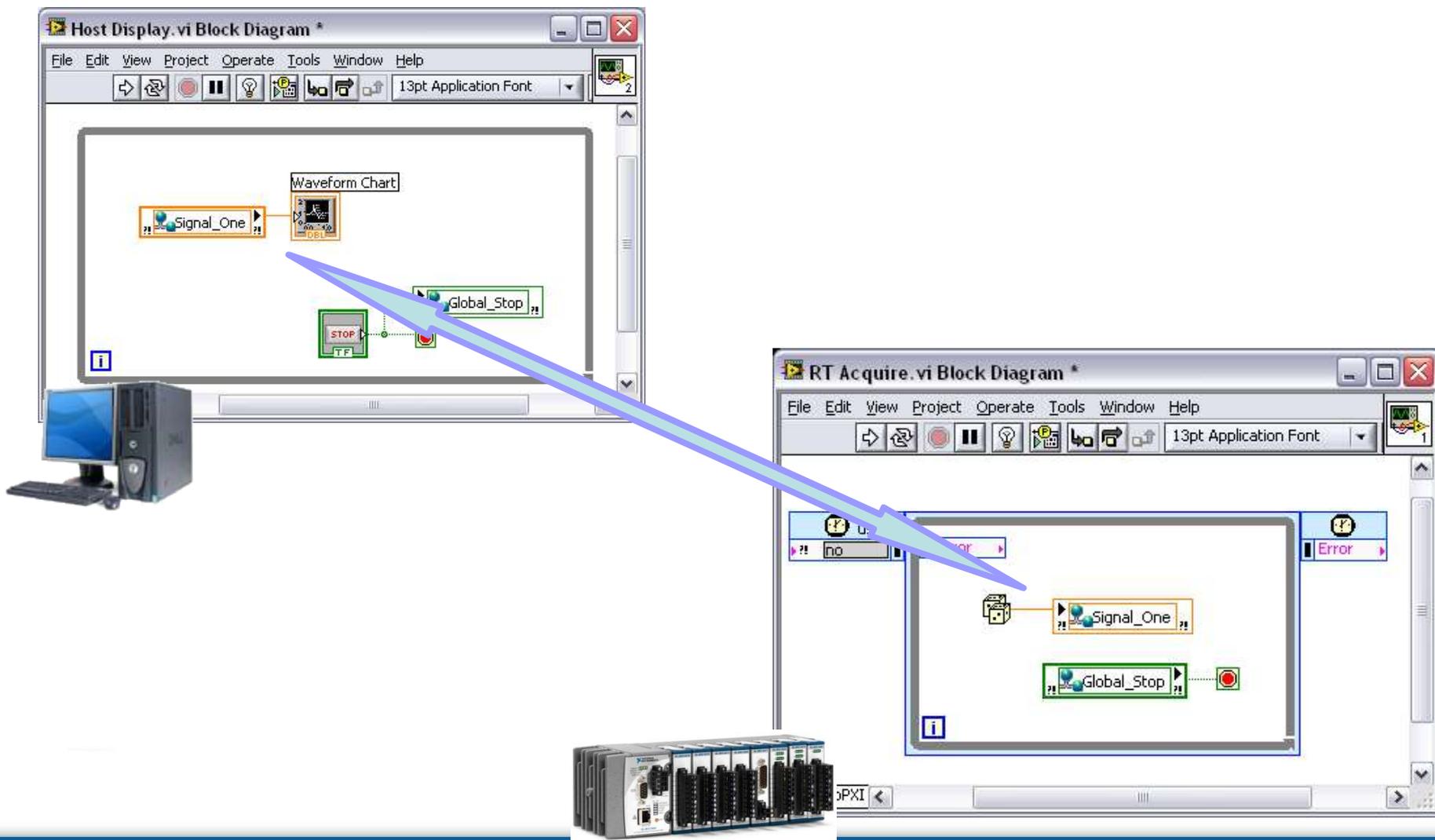


# The LabVIEW Shared Variable

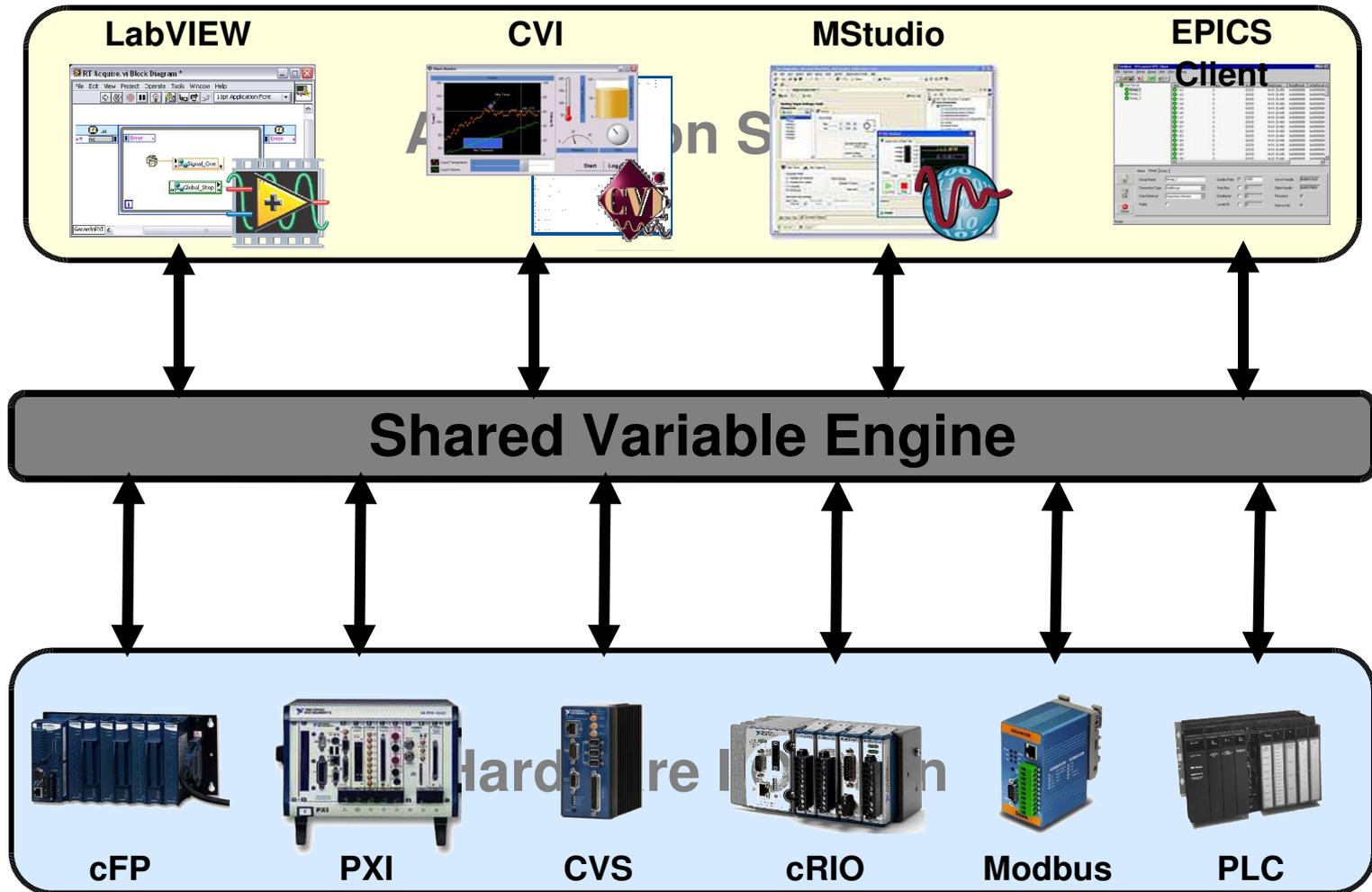


- One communication API
- Scales from simple to large distributed applications
- Supported on Linux

# Communication between Targets



# Shared Variable Engine



# IOC (I/O Controller) Software

## Network Traffic

(Channel Access Protocol)

### Channel Access Sequencer Protocol Server

(Finite State Machine)

Publishes values from the database onto the network using Channel Access protocol.

Reads values from the database to drive state changes in the IOC control application.

### EPICS Database

### Database Engine



Write I/O values to database. Default update rate is 10 Hz. Can be as fast as 25 Hz.

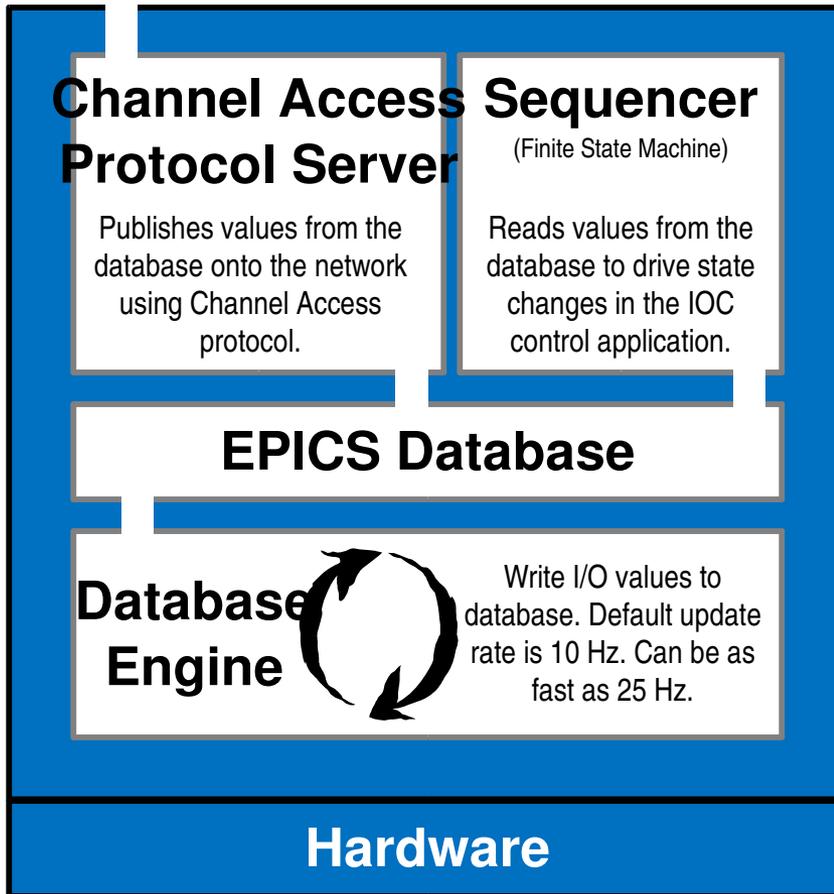
### Hardware

## EPICS Node

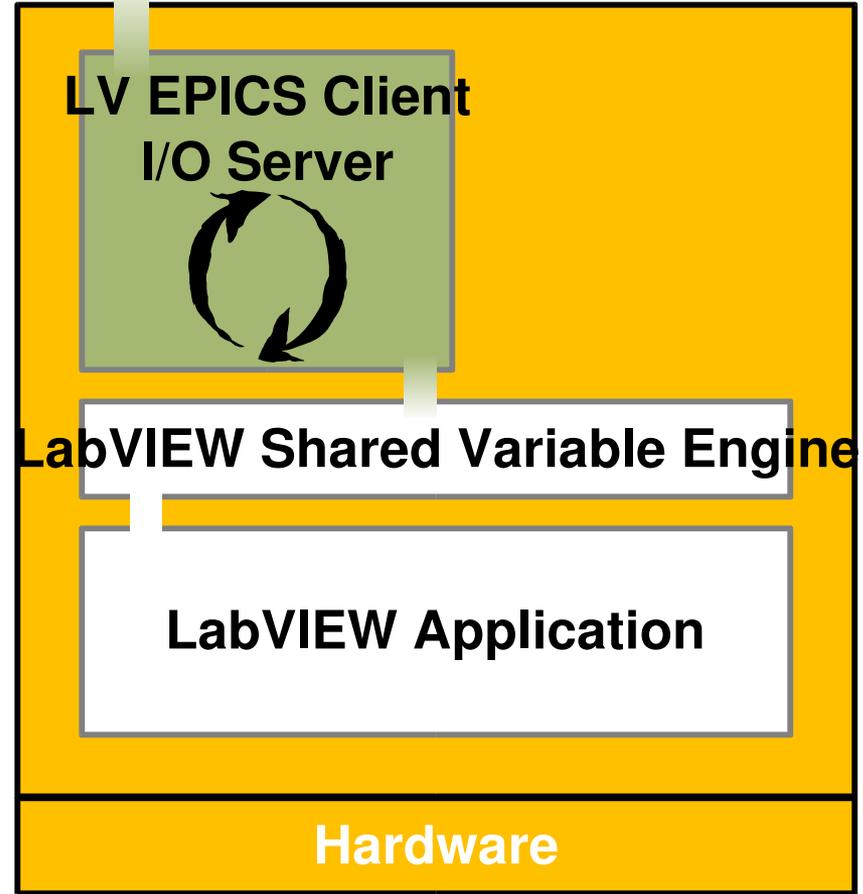
# IOC Software with LV EPICS

## Network Traffic

(Channel Access Protocol)



**EPICS Node**

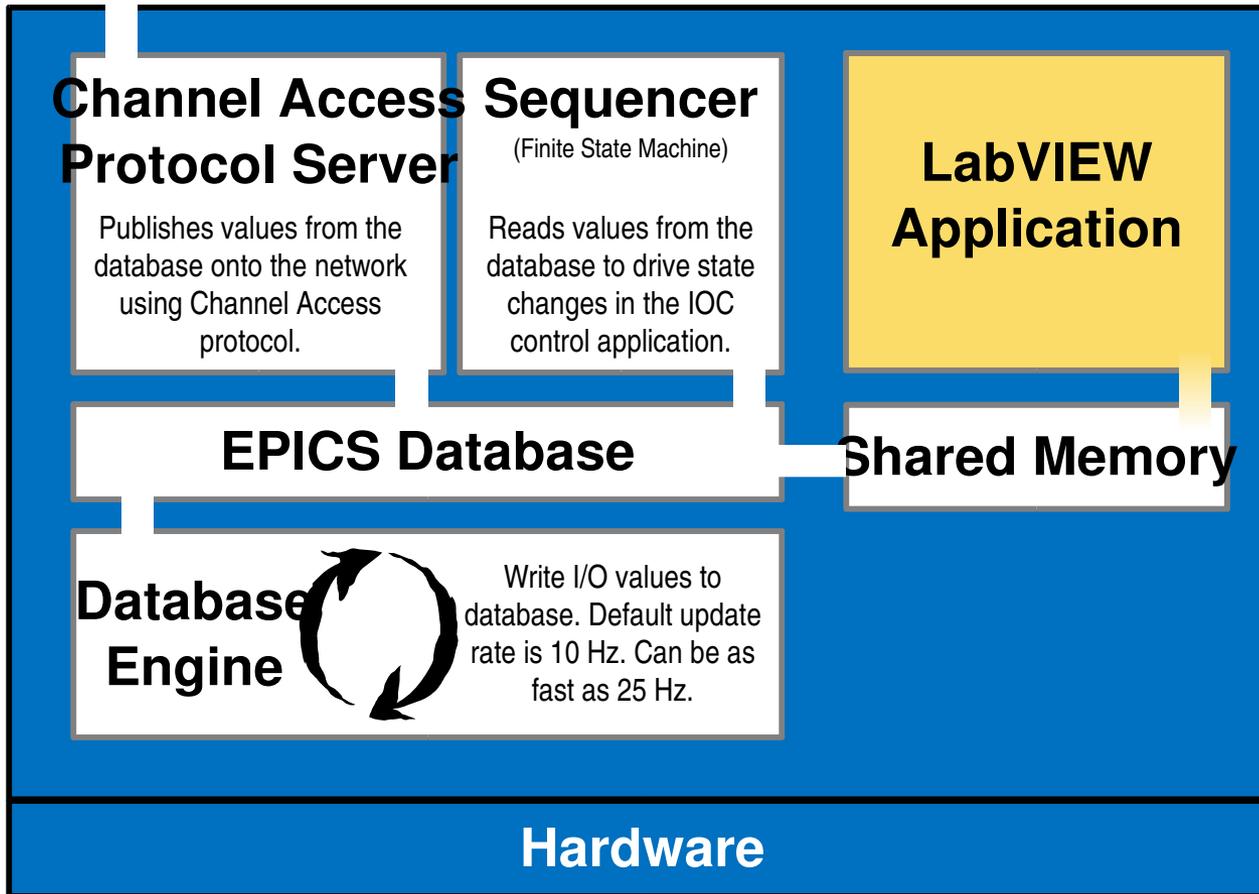


**LabVIEW Node – Windows**

# IOC Software with Shared

## Network Traffic

(Channel Access Protocol)



**EPICS Node – Windows**

**Willem  
Blokland**

Oak Ridge National

Labs – SNS

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# The concept:

