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#### Developing an EPICS IOC in LabVIEW

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Block Diagrams
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The goal of this project was to prove (or disprove) the ability of caLabs soft IOC, which is an interface between LabVIEW and EPICS, to serve data over a network. The larger project this will be implemented in is the upgrade of the superconducting test facility, called the

Vertical Test Area.

Jefferson Labs builds superconducting cavities for particle accelerators around the world. Once these superconducting cavities are built they need to be cooled with liquid helium and injected with high power radio frequency (RF).

The output power of the radio frequency is then measured to determine proper quality. There are 8 dewars that hold the liquid helium that is used to cool the cavities to the proper temperature.





# Developing an EPICS IOC in LabVIEW





#### **Original System**

• Apple II computers read dewar data and relayed information to a computer running labVIEW • This data is sent to a soft IOC running on Linux

## Initial Proof of Concept

- This LabVIEW program acts as a softIOC server
- the network on port 5065

Wait (ms) # variables counter status   1000 1 394 STOP Don't forget to start DEMO IOC shell before you start this vi, please!										
table										
#	PV Name	Value	STAT	SEV	Time	EGU	DESC	A		
1	test	testValue	NO ALARM	NO ALARM	2015-03-27 14:27:49.495195		SimpleIOC	Normal successful completion		
<u> </u>										
<u> </u>										
<u> </u>										
-										
<u> </u>										
		ł					l	<u> </u>		
								4		
path	path									
ፄ C:\Program Files (x86)\National Instruments\LabVIEW 2013\user.lib\caLab\Examples\pvList2.txt										

VIRGINIA COMMONWEALTH UNIVERSITY

- This LabVIEW program acts as the softIOC client
- It searches the network for PV names given in list format
- Displays the PV values for the names listed (Test input displayed above)

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#### **Proposed System**

• Dewar information is read by Programmable Logic Controllers (PLCs) then relayed to a Cisco • Data is then read using soft IOCs

#### Our Task

• Prove data can be passed from server to client over a TCP/IP connection using Windows LabVIEW and caLabs Test reliability of data transfer • Develop UI for testing softIOCs

ield names		main while loop for epics PVs dialog for stringin		
ab ()		User input		
neout (3) 5	write status	OK error out Enable error in (no error String to write		
	i – 132 write count			

## • Process Variables (PVs) are given a name and a value (via string input) and broadcast over

## **Initial Proof of Concept**



Read P	V values X
Add PV Field	Remove PV Field
Enter PV name =	

kbutler@	)localhost:~/Pro	jects/capston	e-epicsIOC-project	t/capsto	ne-epicsIOC	×				
File Edit View	Search Term	ninal Help								
[kbutler@localhost capstone-epicsIOC]\$ cat test.db record(stringin, "baseball") {										
field(DESC, "1 field(PINI, ")	Leld(DESC, "Testing the softIOC") Leld(PINI, "YES")									
}										
record(longin, "long") {										
field(DESC, "Testing long input sofIOC") field(PINI, "YES")										
} [kbutler@localhost capstone-epicsIOC]\$ caput baseball season Old : baseball season [kbutler@localhost capstone-epicsIOC]\$ caput long -999 Old : long 0 New : long -999 [kbutler@localhost capstone-epicsIOC]\$ []										
	Re	ad PV values		×						
A	dd PV Field		Remove PV Field							
baseball	=	s s	eason							
long	=		999							
tong				_						

over a network.

In the future, these findings will serve as a basis for Jefferson Labs to move forward in their implement this system on their network.



# **UI Demo**

#### **User Interface**

- Interface was designed in python using pyepics and wxpython libraries
- Can dynamically add or remove PV fields for monitoring **PV** values
- Takes PV name as string input (Enter PV name)
- Outputs PV value associated with that PV name

#### Demo

- This is an example of the UI reading two PVs and displaying their values
- When a PV value is changed the UI updates the value field accordingly
- (In the background) using the EPICS command line tools to set the values for the PVs

## In Conclusion

Our concept has proven that LabVIEW, caLabs, and EPICS can be served over a Windows platform and

Make it real.