

Resource Locking Controlling Shared Access to High-Cost Instruments

Sometimes it is necessary to give remote users access to one centrally located instrument to perform important measurements. This task requires control of access to the instrument to prevent users from interfering with each other. To help one customer allow multiple remote users to use a high-demand, high-cost dispersion analyzer, Bloomy Controls created an architecture using National Instruments GPIB-ENET hardware, LabVIEW, and Virtual Instrumentation Software Architecture (VISA) resource locking techniques.

Consider an instrument that communicates to a host PC using GPIB. While GPIB is a powerful communication method, it imposes distance limitations. If the GPIB cable is longer than the recommended maximum of four meters, timing issues could cause data loss. This would make it impossible for many users throughout a company to be able to access any GPIB instrument without being physically close to the device.

National Instruments tools provide a solution to this proximity problem. The GPIB-ENET module, a key hardware component, allows access to GPIB instruments through a standard Ethernet-based network. The GPIB-ENET module is assigned a host name, and any PC that can connect to that host is capable of sending commands to instruments attached to the GPIB-ENET, as if the instruments were local to the PC.



Any remote PC connected to the National Instruments GPIB-ENET module can control a GPIB instrument attached to the module as if the instrument were local to the PC.

queue has a priority encoded into it. This priority determines where in the queue the new item should be placed. Adding priorities to a queue gives certain processes preferential treatment to access the instrument more quickly.

Client programs used to access the instrument work with the queue. A process puts itself on the queue by priority level. The requesting process then waits to be placed at the front of the queue. When this occurs, the process knows that it has been granted access to the instrument. The process takes control of the GPIB-ENET module by acquiring a VISA Resource Lock on the GPIB interface, preventing other users from being able to access the device. When the client program is done with the instrument, it will unlock the GPIB interface and remove itself from the front of the queue. This brings the next process in the queue to the front of the queue, which signals to that requesting process that it is allowed to use the instrument.

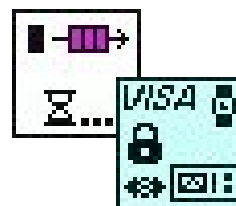
Using a varied set of National Instruments tools, Bloomy Controls was able to provide the customer with multiple-user access to a very expensive instrument without having to purchase more than one of the instrument. GPIB-ENET provides the means to overcome the instrument proximity issue. VISA resource locking and a queue server program provide a way to handle multiple users trying to simultaneously access the instrument. These technologies come together to demonstrate how advanced hardware and software tools used together can add up to money savings for a company. ↻

Bloomy Controls project engineer Keith Brainard developed the resource sharing application. For more information about this application, e-mail info@bloomy.com.



The Advantest Q7750 Optical Network Analyzer measures chromatic dispersion of fiber optic network components.

With multiple users having access to this instrument at any time, there is a need to regulate access to it. A priority-based queue can control when users are allowed to access the instrument. A queue is a data structure used to represent a list. Items are added to and removed from the list in a First-In-First-Out (FIFO) manner, where the first element put onto the queue is the first element to be removed from the queue. A priority-based queue operates like a queue, but not strictly by FIFO principles. Each item to be put onto the



Insert Queue Element.vi and VISA Lock Async.vi

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Newsletter Staff

Editor, Phia Pascua

phia.pascua@bloomy.com