Programming Large Scale Data Acquisition and Control Systems

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Climate change studies are one of the most important aspects of modern science and related experiments are getting bigger and more complex. One such experiment is the
Spruce and Peatland Responses Under Climatic and Environmental Change experiment (SPRUCE, http://mnspruce.ornl.gov) conducted in in northern Minnesota, 40 km north
of Grand Rapids, in the USDA Forest Service Marcell Experimental Forest (MEF). The SPRUCE experimental mission is to assess ecosystem-level biological responses of
vulnerable, high carbon terrestrial ecosystems to a range of climate warming manipulations and an elevated CO_2 atmosphere. This experiment requires more than 30 datalogger systems and associated hardware.
The presentation shares how a single datalogger program was developed that allows each datalogger to determine what tasks it needs to perform depending on the datalogger's position and its plot assignment. The same program also provides to the system operators a simple way to change sensor calibration coefficients, modify control and alarm set points, and change communication paths when needed without major modifications of the program