Silicon Detector Test Setup in Elementary Particle Physics with Mac OS X

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1 Abstract

In particle physics, silicon detectors are used to track and measure elementary particles produced in experiments at particle accelerators. Before assembly these detectors need to be thoroughly tested and verified as there is no possibility to replace defective parts after installation in the accelerator. For the last few years the H1 group at Deutsches Elektronen-Synchrotron have used a Macintosh Quadra 840 system with a Nubus extension card providing a VME interface. A piece of custom VME hardware (OnSiRoC) was used to control and test drive the detector modules. The test programs were run from within LabView[1] on Mac OS 8. With the demand to replace the hardware with newer equipment, and the need to run more complex tests on the detectors, a new system had to be built. The goal was to switch the test workflow to a Mac OS X based system. A PCI-VME interface was provided by the german Struck GmbH, but only Windows and Linux drivers were available for their PCI cards. Maccent Software Development developed a high performance driver for this card, and helped to port existing LabView and other VME test programs to the Mac OS X platform. At the end the complete test workflow could be switched to a PowerMac G4 running Mac OS X. The driver implements several VME access methods including direct VME bus access for fast random access within a small designated VME memory range. To allow LabView to access the driver, a seperate library was developed. Some utility programs developed alongside the driver allow peeking, poking and investigation of mirrored VME memory space. For the H1 group it was important to get a system which is future-proof and more powerful than their existing one, in order to perform more and more complex tests on their silicon detectors.

[1] National Instruments Corp.