PHYSICS

Physics faculty create and share custom physics courseware

Davidson College

Davidson College, a small North Carolina liberal arts school, has no computer science faculty and offers no computer science major. Yet, many of the school's physics students decide to pursue careers in computer science.

To address this situation and provide students with the thorough grounding in mathematics required for upper-division science courses, the Physics Department purchased a cluster of IBM PCs in 1985 and began integrating computer-based instruction into its curriculum. A year ago, though, the faculty concluded that faster, more powerful machines were needed in their upper-division curriculum. After evaluating several workstation platforms, the faculty decided to establish a cluster of NeXT workstations.

In 1991, with funding from the Keck Foundation, the National Science Foundation, and Davidson College, the department founded the Davidson Center for Scienti®c Computation, a high-level computational facility containing 11 NeXTstations, used for advanced courses as well as faculty workshops and student research projects.

When the machines' arrived in the spring of 1991, within a week faculty and students began experimenting with NeXTSTEP and the Objective C language. In the classroom, many faculty members now use customized physics applications developed by Allegheny College (Meadville, PA), the Rose-Hulman Institute (Terre Haute, IN), and other institutions.

According to Associate Professor Wolfgang Christian, ªNeXT computers are easy to install and are the machines best-suited for a department of computer nonspecialists. We don't have a computer science faculty or a technical staff, so we need workstations that are easy to con®gure and maintain. The inclusion of *Mathematica* and the availability of the standard campus word processorÐ WordPerfectÐwere also positive factors.

ªStudents now have the ability to cut and paste *Mathematica* graphics directly into a word processing environment,º Christian says. ªTheir lab write-ups are neater and more clearly written since they incorporate data, equipment schematics, and the results of mathematical simulation.º

Although faculty members had originally decided against creating their own customized applications on the NeXT, Christian says that ªthe power of Interface Builder and NeXTSTEP convinced us that a modest amount of effort could produce very effective and professional educational software. And what we create on our campus we can share with other campuses, as so many institutions now do with their custom-developed NeXT software.º

This winter, Christian created a two-dimensional Ising model while a student developed a series of laser spectroscopy simulations as part of his senior thesis project.

Davidson faculty also worked with the NSF to sponsor a conference on ªComputational Physics in the Undergraduate Curriculumº at the school in the fall of 1991. The meeting explored a variety of developments in computational physics, including symbolic computation, visualization, and object-oriented programming. During the conference, several attendees presented papers on physics applications they had developed on the NeXT platform. Jim Feagin, on the physics faculty at California State University, Fullerton, also led a *Mathematica* workshop, using 18 NeXT machines.

ªAfter almost one year of working with the NeXT machines, we're more than pleased with the results,º says Christian. ªWe would buy exactly the same hardware and software again if we had our money back in the bank. That NeXTSTEP is not outdated a year after we purchased the machines says a lot about how advanced the software is. Other vendors have yet to catch up with NeXT technology.º

WOLFGANG CHRISTIAN
ASSOCIATE PROFESSOR OF PHYSICS
DAVIDSON COLLEGE
DAVIDSON, NC 28036
(704) 892-2322
wc@phyhost.davidson.edu