# Year 2000 Compliance:

Will Your Computer Survive the New Millennium?

by Kent Kuo and Aviva Luria

There's a buzz in the air about something called the Year 2000 problem, and nearly as many theories and opinions as there are people discussing it. Depending on which Web site you browse or whom you talk to, you may end up with an impression that the Year 2000 problem is anything from an impending disaster to an overblown hoax.

The truth probably lies somewhere in between. In July, the National Science Foundation warned NSF grant recipients that an unmitigated Year 2000 problem was a serious issue. "Many computer systems may experience operational difficulties because they are unable to handle the change from the year 1999 to the year 2000," said NSF director Neal F. Lane. NSF grant recipients, he said, are responsible for "taking all steps necessary to mitigate potential problems. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry
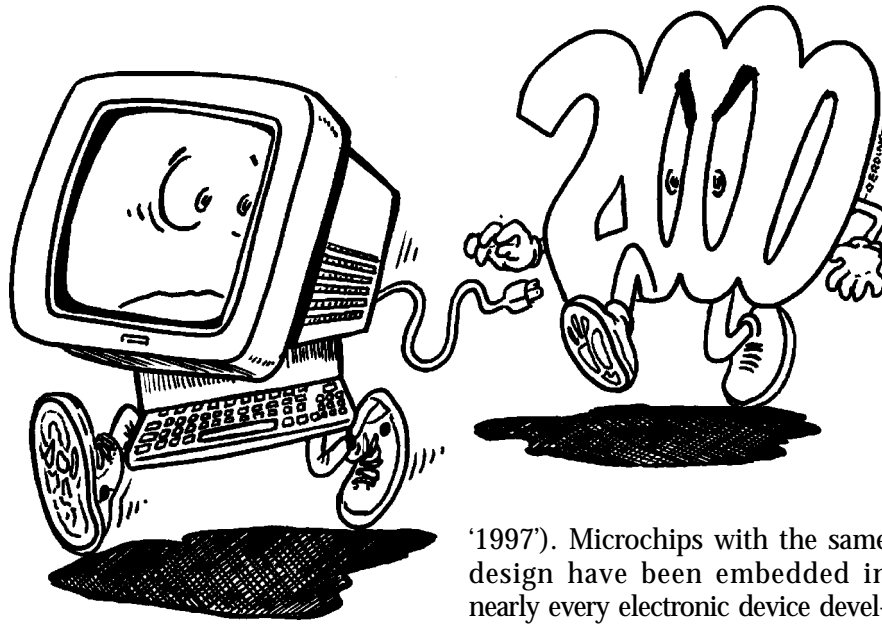
out an NSF grant."

Just what is this "Year 2000 problem"? In the early days of computing, computer memory was limited and therefore extremely valuable. To save memory, many programmers used a two-digit field (rather than a four-digit one) to record the year ('97' rather than

'1997'). Microchips with the same design have been embedded in nearly every electronic device developed over the last 30 years. Using this two-digit field has saved money over the years by saving computer memory, but with the year 2000 approaching, it has become a problem. Coded as '00,' the year 2000 will be read by affected computers as 1900. Systems of all types and sizes may corrupt data or reports. These in-

Sports Mechanics Lab Helps Top Athletes

by Aviva Luria

What do throwing a javelin and driving a bobsled have in common? Some very important things, according to Mont Hubbard, Professor of Mechanical and Aeronautical Engineering. Like all sports, each involves *motion*, and motion can be described by the laws of mechanics. Both sports are among those that have been analyzed by Hubbard and his graduate students in the Sports Mechanics Laboratory here at UC Davis.

As director of the laboratory, Hubbard uses computer simulation and complex computation to help athletes improve performance. Hubbard accomplishes this by quantifying those aspects of a sport that are "optimizable," or that allow for improvement.

Optimizing the Flight of a Javelin

Take a look at the javelin throw. The athlete runs 20 to 30 meters before throwing the javelin, a motion that lasts approximately one-seventh of a second. The conditions on the javelin at the instant of its release determine how far it will travel.

Hubbard and his students have created a computer program that takes these quantifiable conditions and integrates them with equations of motion to determine the trajectory of the javelin. The program then creates a real-time graphical representation of the flight sequence. Using the system, a user can compare various factors—different javelins, changed conditions—that affect the distance the javelin travels.

Yet even if the thrower knows what conditions are optimal, the information may not be useful unless the athlete also has information about his or her actual performance. Another program developed by the lab measures athletic performance, making it possible to provide specific advice. Reflective tape is applied at equal points along the length of the javelin, and a high-speed video system automatically digitizes these points as the javelin travels through the air, quantifying the release conditions.

"If we can tell the thrower about the conditions of his or her throw, the athlete can compare these to the

optimal conditions and change technique accordingly. It's a measurement tool that allows the athlete to hone in on the best set of release conditions," Hubbard says.

This analysis is especially important given the history of change in the sport. From the 1940s through the 1980s, the shape of the javelin had become so refined and so aerodynamic that it could actually generate enough lift to fly. Then, in 1986, after a javelin flew out of control and came close to hitting an Olympics official, the shape was again redesigned, making it more manageable, less erratic in its flight, and more resistant to traveling long distances.

Historically, world records have generally improved, Hubbard says, yet in 1986, after the redesign of the javelin, the 104.7 meter world record plummeted by about 15 meters. "The change had an immediate, abrupt effect on the world record, but now it's on its way up again," he says.

> *"The result is not that the world will come crashing down at midnight, New Year's Eve, but that computers will start generating inaccurate results."*
> — Kevin Schick, Gartner Group analyst, on the Year 2000 problem
> *quoted in the New York Times*

2000

clude mainframes storing institutional data, minicomputers used by campus departments or faculty researchers, and personal computers (PCs), which are increasingly found in offices, homes, and dormitory rooms.

There may be serious repercussions. For instance, an insurance company sold $1,000 policies that were to mature in 30 years. Policy documents promised a return of $50,000, but that figure had been calculated by a PC with a Year 2000 glitch. The actual return to the policyholder should have been $5,000. By the time this error was discovered, the insurance company had sold 20,000 policies, making it liable for $900 million in payouts.

The Year 2000 problem is as pervasive as technology in our society. It may affect the calculation of taxes, loans, and interest. Computer chips may be embedded in cars, video recorders, elevators, microwave ovens, and medical devices. Copy machines, power transformers, security systems, heating and air conditioning units, and pro-grammable sprinkler systems are all potentially vulnerable.

The problem might affect operating systems (Windows 3.1 or 3.1.1), software compilers, applications (Microsoft Word version 6.0, Lotus 123 versions 4 and 5), peripheral systems (tape backup systems), queries, spreadsheets, or database reports. The problem may exist in all types of personal computers. IBM-compatible PCs, especially those built prior to June 1996, will not correctly roll over to the year 2000. Even those built since June 1996 should be checked because some PC vendors might not have made the change. While the Macintosh does not have a hardware or operating system Year 2000 problem, applications produced by other vendors may be vulnerable.

Here at UC Davis, Information Technology has been evaluating the central administrative computing and telecommunications systems since 1996. Programming changes and system upgrades are being planned to achieve full Year 2000 compliance during the 1998 calendar year.

Many local systems around campus have yet to be evaluated. These systems have been written in a variety of programming languages across a multitude of hardware platforms. The magnitude of such an evaluation requires that every department organize its technical staff to review its systems and begin planning for possible Year 2000 modifications or upgrades. Individual workstations should be included in the departmental evaluations.

How can your department begin this process? Start with an inventory of your systems by your Technical Support Coordinator (TSC) or other technical staff. Work with Information Technology or other campus departments that are addressing the Year 2000 problem. Find information about agencies and organizations that have worked extensively on vendor Year 2000 compliance (see our recommendations below). Contact the vendors or manufacturers and ask for Year 2000 compliance certifications, or status reports on their products achieving Year 2000 compliance.

Information Technology is planning for Fall Quarter a series of Brown Bags and Technology Support Program (TSP) training semi-nars to help campus units inspect and modify local departmental servers, desktop systems, and applications. The presentations will provide the opportunity to share experiences and best-in-class practices for researching, preparing for, and managing the Year 2000 change.

A follow-up article in the September I.T. Times will explore in more detail the steps taken by Information Technology to resolve central administrative and infrastructure systems issues related to the Year 2000 problem. Meanwhile, you will find more information on Year 2000 compliance at the UC Office of the President (UCOP) Year 2000 Web site (*http://www.ucop.edu/irc/yr2000*), the State of Washington home page (*http://www.wa.gov/dis/y2000/y2000.htm*) or the Web site for the Year 2000 Internet Information Center (*http://www.year2000.com/cgi-bin/clock.cgi*). A UC San Diego document addressing the issue may be found at *http://www-act.ucsd.edu/year2000/y2kpref.html*.

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Sports

The Bobsled Simulator

Bobsledding presents its own challenges for engineers. Unlike a javelin throw, a bobsled run involves continuous motion. Although a bobsled's shape is very different from that of a javelin, and it travels on snow rather than through the air, the main difference is that the athlete controls its motion.

Hubbard and his students in the Sports Mechanics Lab have created a bobsled simulator that uses virtual reality to display the most effective way down a particular track. The simulator supplies data to four sensory systems that the driver would experience on an actual run: visual data (the view the driver has on the way down the track); vestibular (inner ear) sensations created by angular motions and accelerations of the head; tactile experience, or the "feel" of driving the bobsled; and auditory cues, similar to those the driver would hear on an actual course.

Solving equations of motion and incorporating the driver's steering into those equations one hundred times per second, the simulator draws a picture thirty times per second, thereby maintaining the driver's sense of visual reality. But most important, the program provides information to the driver that he or she wouldn't get in an actual run.

"We're computing everything," says Hubbard, "the forces on the sled and where the sled goes in response to the driver's steering. We can tell drivers where the sled went, and the difference in velocity from the fastest path down the track so far." Anything that is quantifiable, he says, can be shared with the driver.

"It would be extremely expensive to develop the instrumentation required to do this on the actual track, so the simulator has a lot of financial motivation behind it," Hubbard says. Bobsledding is an expensive sport, with tracks costing about $20 million to build, and sleds themselves costing anywhere from $25,000 to $40,000. For an athlete to practice on an actual track would require worldwide travel, and with runs on the track limited to four or five per day, the athlete's daily practice would amount to a mere five minutes for as many days as he or she could afford.

The site of the 2002 Winter Olympics, Salt Lake City has recently opened its new bobsled track. The UC Davis Sports Mechanics Lab, which already has installed a simulator at the U.S. Bobsled Federation in Lake Placid, New York, is currently building one to be housed in Utah, which Hubbard says may soon become the center for U.S. bobsledding. Hubbard is also attempting to obtain permission and data to program into the simulator the track at Nagano, Japan (site of the 1998 Winter Olympics). This summer, during a trip to Japan, he'll take photographs of the scenery surrounding the track in order to create for the simulator a realistic ambiance.

The Sports Mechanics Lab has received a good deal of media attention, including a spot on the PBS science program *Nova*. In fact, the lab's first donation of computers came as a result of a 1991 article in the *San Jose Mercury News*. The group had written the code for the simulator, but didn't have access to a machine that would run it fast enough to be useful. NASA and Silicon Graphics got involved, and loaned the group computers for their project. In 1994, IBM, an official Olympics sponsor, began its sponsorship of the lab with a loan of computers. The Lab now uses IBM RS 6000 high-speed graphics workstations, loaned by IBM for this project.

Initial and ongoing funding for the development of the simulator has come from U.S. Olympics Committee grants. The U.S. Bobsled and Skeleton Federation recently awarded the Lab with funding for continuing research and development.

In addition to its analysis of the javelin throw and bobsledding, the Sports Mechanics Laboratory researches baseball (both pitching and flight of the ball), fly casting, golf, and snowboarding. A recent project, in collaboration with the veterinary school, involves thoroughbred horses, and one graduate student is designing an amusement park ride for her master's thesis.

I.T. Times Brings Visitors from New Zealand

Robin Harrington is the Director of the Computer Services Centre at the University of Canterbury in Christchurch, New Zealand, and an avid reader of the I.T. Times. His interest in a story about the network ports installed in the Shields Library (see April 1997 issue) prompted a follow-up question: Might he and four other information technology directors stop by UC Davis on a trip they were planning to Apple Computer in June? The answer was an emphatic *yes.*

Accompanying Harrington were Gerrit Bahlman of Massey University in Palmerston North; Ron Wilson of the University of Waikato in Hamilton; and Martin Anderson and Neil James of the University of Otago in Dunedin. As directors of the information technology divisions of their respective universities, all were particularly interested in UC Davis' Network 21 project, as well as in Odyssey '97.

The visitors were quick to point out that each of the universities is different from the others, although similar challenges face them as well as UC Davis. Funding issues are of primary importance. Many New Zealand universities are moving from a distributed environment, with faculty working in isolation, to a campuswide network. Funding might happen in peaks, said Bahlman. Large sums might be raised for a major project, but it is often more difficult to find the money to maintain infrastructure. Issues of authentication, core competency, distance learning, and staff training are being addressed at New Zealand universities as well as at American ones.

The Internet and other technologies are finding their way into the classroom. Information Technology Services at Otago University hopes to one day become a "one-stop shop" for faculty wishing to develop programs for use in teaching, said James. Otago last year held a technology fair similar to Odyssey, but was disappointed in the turnout of faculty and staff, he said, adding that he'd like to give the fair another go. Wilson too expressed enthusiasm for Odyssey and said the idea of a technology fair was one he would take back with him.

PROJECT UPDATE

NetWork 21

ATM Chosen as Network 21 Electronics

On July 9, the Network 21 Oversight Committee accepted the recommendation of its technical subcommittee to designate ATM, or Asynchronous Transfer Mode, as the technology of choice for the Network 21 electronics. The decision was made within the two-month time frame designated at the Think Tank session in May.

At the two-day Think Tank, technical experts from five UC campuses (including UC Davis) and Stanford analyzed the possibilities for Network 21 electronics and narrowed the choice to two options: fast ethernet and ATM. The technical subcommittee used the Think Tank recommendations to perform a detailed evaluation, which showed distinct advantages of ATM.

While ATM is the more expensive option, the additional cost is anticipated to buy longevity in the network infrastructure. ATM is easier than fast ethernet to upgrade, making improvements to the backbone less costly in the future.

With the choice made, bid specifications can be detailed. Next, criteria will be developed for multiple pilots, along with performance criteria by which the pilots will be evaluated. Implementation of the final stage of Network 21 (Stage 3) is planned for February 1998, for an October 1998 completion date.

For an overview of the re-evaluation process, see *http://net21.ucdavis.edu/Reev.htm*. More detailed information, together with a glossary of terms, may be found at *http://net21.ucdavis.edu/assess.htm*. E-mail comments, questions, and concerns to *net21electron@ucdavis.edu*.

Alice Harrison inspects one of the more than 600 link switches to be installed this summer.

Martin Redlich (foreground) and Alex Tobar test Network Operations Center equipment for connectivity.

Town Hall Meeting

Members of the Network 21 Oversight Committee and Network 21 project directors led a Town Hall Meeting on July 8 for the campus community to discuss and provide input into the Network 21 electronics plan. Jay Lund, chair of the Oversight Committee's technical subcommittee, reviewed the history and mission of the re-evaluation process. Russ Hobby, one of the architects of the original Network 21 design, described in detail the Think Tank evaluation process and enumerated its recommendations: (1) A timely, detailed evaluation of fast ethernet and ATM; (2) evaluation of standards versus costs of each; (3) design of multiple pilots to ascertain whether the equipment will meet Network 21 requirements; and (4) implementation of the electronics phase of the project within the next eight months.

Lund explained that the technical subcommittee used two levels of criteria to evaluate and compare the various technologies. First they applied screening criteria in order to narrow down the 22 options to those that were acceptable. These criteria were based on functionality (including the requirement that Virtual LANs (VLANs) be supported) and cost (requiring that it remain within the $23 million cap for the entire Network 21 project). The choices remaining after applying these criteria still provided for both a Fast Ethernet or an ATM solution. Next, ranking criteria were applied. In comparing ATM and fast ethernet on the bases of cost,

bandwidth, functionality, operability, and risks, ATM ranked higher in nearly all categories. The primary exception was cost. While the costs used in the analysis were estimates, rather than those of bidding vendors, it was proposed that the cost for ATM would be an additional $700,000. (For more details about the ranking criteria, see *http://net21.ucdavis.edu/assess.htm*.)

Switching to the Fiber-Optic Backbone

Network 21 technicians are in the process of cutting over campus users to the fiber-optic infrastructure. To date, approximately 4,000 users previously connected to UCDNet have been connected to the fiber backbone. All users in previously unconnected buildings in Network 21-designated Areas have been cut over as have all DaFIS users. Another group of nearly 1,000 "problem LAN" users were connected via switched 10BASE-T technology in late June. These users have reported a notable increase in the speed of their connections.

Network 21 technicians will spend the next two and a half months on ResNet, connecting approximately 3,750 residence hall NAMs to the backbone using switched 10BASE-T technology. ResNet connections are expected to be complete by mid-October.

The next phase will connect approximately 2,000 unconnected users in connected buildings. All users in the Network 21 Areas will be connected to the fiber-optic infrastructure by Thanksgiving. This will pave the way for Stage 3 of the Network 21 project (the implementation of ATM electronics) in early 1998.

I.T. CALENDAR

AUGUST 1997

S	M	T	W	T	F	S
					1	2
3	4	5 Intro to Eudora	6	7 WWW Frames	8	9
10	11	12 MELVYL Searching	13 MELVYL Searching	14	15	16
17	18	19 MELVYL Searching	20 Web-Database Connectivity	21 Thin Clients	22	23
24	25	26 Simple Image Manipulation	27	28	29	30

SEPTEMBER 1997

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9 Mail List Admin	10	11 Class Mail Lists	12	13
14	15	16	17 Expo '97	18	19	20
21	22	23	24	25	26	27
28	29	30				

AUGUST

12 **Basic MELVYL Searching - Use the new Web interface to find books and journal articles**: Library Instruction Programs, 10 - 10:50 a.m., Shields Library Microcomputer Room; *LibraryClass@ucdavis.edu* or 752-4381.

13 **Basic MELVYL Searching - Use the new Web interface to find books and journal articles**: Library Instruction Programs, 3:10-4 p.m., Shields Library Microcomputer Room; *LibraryClass@ucdavis.edu* or 752-4381.

19 **Basic MELVYL Searching - Use the terminal interface to find books and journal articles**; Library Instruction Programs, 3:10-4:00 p.m., Shields Microcomputer Room, *LibraryClass@ucdavis.edu* or 752-4381.

20 **Basic Melvyl Searching - Use the new Web interface to find books and journal articles**: Library Instruction Programs, 10-10:50 a.m., Shields Library Microcomputer Room; *LibraryClass@ucdavis.edu* or 752-4381.

CAIT Event: Presentation on Web-Database Connectivity Using Tango and FileMaker Pro, 1:00 - 2:00 p.m., at the CAIT, Shields Library.

21 **CAIT Event**: Demo on "Thin Clients": Network Computers and Connectivity Issues, 11:00 a.m. - 12:00 p.m., at the CAIT, Shields Library.

26 **Information Provider Series: Advanced Electronic Mailing List Administration**: Information Technology, 9:30-11:30 a.m., 14 Hutchison; *learnit@ucdavis.edu* or 754-8091.

Information Provider Series: Simple Image Manipulation Techniques: Information Technology, 1:30-4:30 p.m., 14 Hutchison; *learnit@ucdavis.edu* or 754-8091.

CAIT Event: Presentation on Web-Database Connectivity Using Microsoft Access, 1:00 - 2:00 p.m., at the CAIT, Shields Library.

SEPTEMBER

9 **Information Provider Series: Introduction to Electronic Mailing List Administration**: Information Technology, 8:30-11:30 a.m., 14 Hutchison; *learnit@ucdavis.edu* or 754-8091.

11 **How to Create a Class Electronic Mailing List (Brown Bag Presentation)**: Information Technology, Noon-1 p.m., Cabernet Room, Silo.

BROWN BAG SERIES

17 **Expo '97**: Leadership, Creativity and New Ways to Work. Staff Development, 9 a.m. - 3 p.m., Buehler Alumni Center.

Design Students Win Award

Three design students were awarded prizes in the 1997 Computer Integrated Textile Design Association Scholarship competition. This was the first year that UC Davis students entered the competition.

Undergraduates Lisette de Berry and Meriweather Engstrom and graduate student Johanna Escalante (MFA '97) created their contest entries in Emily DuBois' Computer Integrated Textile Design course. DuBois is a visiting assistant professor in the Department of Environmental Design.

De Berry and Engstrom worked together to design three related fabrics for a tropical hotel, creating a colorful storyboard that won second place in the Hotel Lobby category. The two received $1,000 and a travel stipend to the CAD Expo Conference, held in New York this month. Escalante received Honorable Mention and $500 for her fabric designs inspired by pre-Columbian motifs.

Participating schools included the Rhode Island School of Design, Parsons School of Design, North Carolina State University and others with top design programs. The winning fabrics will be exhibited at the awards ceremony at CAD Expo, as well as at a later conference in North Carolina.

Administrative Information Systems Move From A11

The A11 mainframe, which for years has hosted a number of campus administrative functions, will semi-retire in July and will be permanently decommissioned in February 1998. Functions supported by the A11 have included general ledger, accounts payable, salary-roll cost, equipment inventory, permanent budget, staffing list, and grounds and buildings. Many of these functions will be replaced by DaFIS. [See the chart below for a list of major administrative systems and their replacements.]

In preparation for the A11 decommission, the Information Technology Data Center will contact all account users to find out the length of time they will need accounts and disk files. Users will also have the opportunity to determine the disposition of their A11 tapes. A list of each user's assigned tapes will be included with the letter.

The following is the overall sequence of steps being taken to complete the A11 96/97 fiscal year administrative processes and decommission the A11.

- All administrative functions and transactions for June 1997 will be completed in early July.
- Administrative functions of many of the A11 systems will be moved to replacement systems in early July.
- Fiscal closing processes for A11 administrative systems will be completed in July and August.
- System clean-up will be performed on the A11 between September 1997 and January 1998. Production accounts will be deactivated, unneeded disk files will be removed, and A11 tapes will be archived or disposed of based on consultation with users.
- The A11 will be decommissioned on February 28, 1998.

The Data Center and application support staff welcome your comments, suggestions, and questions during the A11 deactivation process. For account deactivation or disk storage needs, contact Kent Fugazi (754-8309; *krfugazi@ucdavis.edu*); for tape archival and disposal information, contact Carol Mitchell (754-9950; *cmitchell@ucdavis.edu*); for employee database (EDB) information, contact Linda Honzik (757-8772; *ljhonzik@ucdavis.edu*); and for questions regarding information system transition, contact Ray Reveles (757-8794; *rreveles@ucdavis.edu*).

CURRENT SYSTEM	REPLACEMENT SYSTEM	UNIT RESPONSIBLE FOR REPLACEMENT SYSTEM
General Ledger	DaFIS	Accounting and Financial Services (AFS)
Accounts Payable	DaFIS	AFS
PTRS (Payroll Time Reporting System	OPTRS (UCOP Time Reporting System)	AFS Payroll Division
Salary-Cost Roll System	Committed Salaries (UCOP System)	AFS Payroll Division
Equipment Inventory	CAMS (Capital Asset Management System)	Material Management Equipment Inventory
Grounds & Buildings	Departmental Billing System	Facilities Services
Permanent Budget	DaFIS (Base Budget Adjustment)	Planning and Budget
EDB (Employee Database)	Payroll/Personnel Data Warehouse	AFS Payroll/Human Resources