



From the Editor



Steve McConnell

Y2K Countdown to Certification

2:55 a.m., 31 December 1999, Seattle. Y2K night owls tuned to CNN are watching New Year's Eve celebrations in Christchurch, New Zealand, which is 21 hours ahead of Seattle. Pre-midnight reports in Christchurch focus on women in labor and the critical question of who will deliver the first Y2K baby—a child destined for fame, fortune, and a year's supply of baby food. At 3:01 a.m. Seattle time, CNN cuts away from Christchurch to Auckland due to technical difficulties. A few minutes later, after numerous broadcast problems, CNN replaces live camera coverage from New Zealand with stock photos of a person sitting next to a radio and buzzy audio commentary from a New Zealand ham radio operator.

Y2K watchers throughout Asia and Europe head to gas stations to top off their gas tanks, only to find that runs have already depleted gasoline supplies. In the US, cash machines have been empty for days, in spite of the government's printing \$200 billion extra currency for Y2K hoarding.

At 5 a.m. Seattle time, Sydney, Australia, enters the new millennium. On CNN, Bernard Shaw comments how the clever Aussies have made lights blink throughout the city as midnight approaches, but shortly after midnight much of the city goes dark. Y2K experts aren't surprised, since 75 percent of Australian businesses indicated in early 1999 that they had no intention of doing any Y2K planning.

News of assorted problems trickles in throughout the day. At 4:01 p.m. Seattle time (12:01 a.m. Greenwich Mean Time), engine firmware in long-haul container trucks calculates that 99 years have passed since the engines' last scheduled maintenance and shuts down the engines to avoid safety problems. Thousands of trucks are rendered immobile until they receive servicing. Stalled trucks cause widespread gridlock. Millions of motorists are stranded.

At 11:59 p.m. New York City time, 8:59 p.m. Seattle time, Seattle television watchers see Times Square's fabled ball begin its descent. At the stroke of mid-

night, disappointed television viewers change channels as Times Square experiences a complete power failure. A spokesman for Con Edison assures CNN that it has activated its Y2K backup plan, and that power will be restored quickly. Power is restored within an hour, but intermittent brownouts recur for days.

At 11 p.m. Pacific time, a divide-by-zero error in the national power grid software sends 65,535 times the normal power load to Taos, New Mexico. The power spike amplifies the famous low-frequency "Taos Hum" by several thousand percent, which causes intense harmonic resonance within certain human skulls. Many northern New Mexico residents are left permanently brain damaged.

By the time midnight arrives in Seattle, most millennium celebrations have been cancelled due to widespread traffic gridlock, power outages, and general grumpiness. Honolulu, Hawaii, turns out to be the location of choice. It is three hours later than Seattle and Los Angeles and a full 24 hours later than New Zealand because of New Zealand's daylight savings time. Software in some hotel air conditioning systems fails, but the nighttime temperature is comfortable and the tropical revelers adapt simply by adding more ice to their midnight Mai Tai's.

AFTERMATH

In the weeks following the millennium cutover, the biggest problem turns out to be clearing the roads. Economists estimate that only 1/10 of 1 percent of the world's trucks failed in operation at midnight on 1 January 2000, but that is enough to tie up traffic, impede repairs to the trucks themselves, and delay power and telephone repairs. Repair crews take a week to get the roads back to normal. By 1 February, power, telephone, and financial operations have largely been restored, although intermittent outages continue much more frequently

EDITOR-IN-CHIEF: Steve McConnell • Construx Software • software@construx.com



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than normal for the next year. Loss of power and traffic gridlock in northern climates are blamed for dozens of weather-related deaths.

What at first appears to be a massive Y2K infestation on Windows machines turns out to be a large number of uncoordinated virus attacks propagated via the Internet and activated by the millennium changeover. Isolation of the viruses takes many days as experts struggle to differentiate artificial Y2K virus problems from legitimate Y2K bugs.

Most businesses are disrupted to some extent, if not by their own Y2K problems, by Y2K problems in the businesses they depend on. Many companies are forced to revert to manual processes. Older workers come out of retirement for several weeks to train younger workers on the manual processes. Once computer systems are working again, 10 to 15 percent of business computer systems are never reactivated. Company spokesmen are quoted as saying, "We realized that computer automation had actually interfered with our ability to serve our customers."

At the community level, in response to the adversity, entire neighborhoods band together to share water, food, and heat. Forced to spend time away from modern amenities, people discover that playing Yahtzee and Scrabble with their families is more enjoyable than watching syndicated reruns of *Married With Children*. Many software developers use the computer downtime to catch up on their back issues of *IEEE Software*.

By mid-March, most serious Y2K problems have been resolved, but they have hardly been forgotten, and public attention turns to assigning blame for the problems. Programmers make an easy target. The public is outraged when it learns that thousands of software developers made fortunes performing Y2K fixes that didn't actually work. It insists that "something be done about these opportunistic bit twiddlers."

In testimony before the US Congress, a representative from the National Cosmetology Association points out that software development is the only

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10662 LOS VAQUEROS CIRCLE
LOS ALAMITOS, CA 90720-1314
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trade that has as much potential impact on the public welfare and has no certification requirements whatsoever. She points out that cosmetologists, doctors, nurses, lawyers, veterinarians, engineers, architects, public school teachers, accountants, actuaries, pilots, truck drivers, taxi drivers, general contractors, financial advisers, stock brokers, and food handlers are all required to have some kind of license that assures they pose a minimal risk to the public's safety. A resolution to require licensing of software developers passes by a wide margin, the only dissenting votes coming from the states of California, Massachusetts, Utah, and Washington.

Shortly thereafter, Congress discovers that the State of Texas already has a law that requires licensing of professional software engineers. A blue ribbon panel from the ACM and IEEE Computer Society endorses Texas's program. Consensus quickly forms to require other states to license software engineers in the same way. Congress passes a law that withholds 10 percent of a state's crime prevention funding until the state adopts a licensing program for software engineers. With strong public support, by the end of 2000 more than 40 states have passed legislation based on Texas's model.

CERTIFICATION

In 2001, following states' adoption of certification laws, widespread confusion about the laws prevails. State laws are quickly revised to describe the kinds of software that must be signed off by a licensed professional engineer. Software packages sold commercially or included in hardware that is sold commercially must be signed off, as must software work for which one company charges another. Systems developed by companies with their own programmers for in-house use are not required to be signed off, unless they are safety critical.

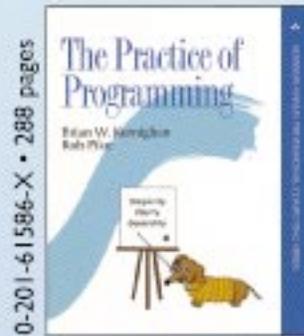
Realizing that only a handful of universities in North America offer undergraduate software engineering programs, laws are also revised to allow a ten-year phase-in period. During that time, land grant colleges are required to develop and offer accredited software engineering programs. The President of the United States declares a national state of emergency and conscripts leading software experts into two-year tours of duty in Pullman, Washington; Bozeman, Montana; College Station, Texas; Ames, Iowa; Ithaca, New York; and other land grant college towns. As the ten-year phase-in period draws to a close, corporations compete fervidly for these programs' first graduating classes.

Outside the universities, some old-time software developers pass rigorous grandfather certification criteria based on the Texas program—at least 16 years of experience performing engineering work and references from nine people, five of whom must be professional engineers. Many old-timers don't bother with certification. In practice, most organizations need only a handful of professional engineers to meet regulatory requirements, and the market value of a "PE." or "PEng." turns out to be about \$5,000 per year.

CODA

In memory of lives lost during the Y2K cutover, US universities adopt a program modeled on a Canadian program for engineers. Software engineers who graduate from accredited universities in the US are given a small ring worn on the left pinky finger. These rings are ostensibly made of steel recycled from computers that failed at midnight, 31 December 1999, and remind software engineers of the serious responsibility they carry as members of the software engineering profession ❖

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