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Seymour Cray,
Visionary Pioneer Of Supercomputing,
Is Dead at 71

by John Markoff, New York Times

Seymour R. Cray, a computer industry pioneer and the father of the supercomputer, died October 5, at a hospital near his home in Colorado Springs. He was 71 and had been in the hospital since an automobile wreck two weeks ago.

Officials at Penrose Community Hospital said the cause was the severe head injuries Cray had received in the accident.

Cray, who as a young electrical engineer at Control Data Corp. in the late 1950s led the design of the world's first transistor-based computer, went on to develop a string of supercomputing machines that were known for their elegance and simplicity, but most of all for their blazing speed.

Used first by military weapons designers and in intelligence agencies, Cray's first supercomputers, notably the Control Data 6600, 7600 and the Cray 1, permitted researchers to simulate nuclear weapons explosions and crack enemy codes. They were soon turned to tasks like weather prediction and oil exploration.

Known as an idiosyncratic and quirky computer wizard, Cray had a remarkable ability to focus on a single challenge: the need to extract more and more speed from each new machine he designed.

"He had a profound effect on the computer industry," said John Rollwagen, a business executive who worked with Cray for many years at Cray Research Inc. "He was always on the leading edge."

Danny Hillis, a supercomputer designer who early in his career adopted Cray as his role model, said: "You rarely see someone who knows their calling so precisely. He knew every transistor and every wire in his computers."

Cray's legacy of scientific computer designs stretches as far back as the Univac 1103, which he began working on in the mid-1950s.

During the 1970s and 1980s, Cray was instrumental in creating a constant stream of design advances and innovative technologies that were later adopted by the rest of the computer industry.

In the late 1970s, Cray Research, the company he founded in 1972 after leaving Control Data, became

the world's leading maker of supercomputers, which were increasingly viewed as a measure of national technological prowess and economic com-petitiveness. That led many governments to invest in supercomputing technologies as a way of creating or protecting a national advantage, whether military or commercial.

Cray left Cray Research in 1989 to form Cray Computer Corp., which ended in bank-ruptcy in 1995. In August, Cray announced that he had formed a new company, SRC Computers, where he was planning to begin the design of the Cray 5 supercomputer.

Perhaps Cray's most significant contribution was an approach to solving the daunting scientific and engineering problems known as "vector processing," which involved chaining together long series of calculations in specialized hardware to expedite solutions.

He was also widely seen as a genius at the art of the dense packaging of the components that make up a computer, a design approach that slashes the time it takes electrical signals to travel between circuits.

Cray was perhaps the most remarkable of an elite group of computer designers who were able to build elegant systems by assembling simple components in clever ways.

The Control Data 6600 was the first computer to be cooled with Freon, the same fluid used in air-conditioners. To bring its components closer together, the Cray 1 was folded in on itself like a giant "C."

The Cray 2 supercomputer used an even more exotic fluid, Flourinert, in which its circuit cards were immersed to draw away excess heat.

The son of a civil engineer, Cray was born Sept. 28, 1925, in Chippewa Falls, Wis., where he attended school, displaying an early fascination with radio, electric motors and electrical circuits.

After graduating from high school in 1943, Cray went into the Army, joining an infantry communications platoon. Arriving in Europe after D-Day, he participated in the Battle of the Bulge and then "tramped" across Europe to meet the Russians. He then went to the Philippines, where he was involved in supporting the Filipino guerrilla army.

Cray experimented with electronics in college but did not learn about digital computers until after graduation from the University of Minnesota in 1951, having received a bachelor's in electrical engineering and a master's in mathematics.

"I was fortunate in having an instructor at the University of Minnesota who was looking after me in the sense that when I said, 'What's next?' he said, 'If I were you, I'd just go down the street here to Engineering Research Associates, and I'd think you'd like what they're doing there," he said in a Smithsonian interview. The Minneapolis company was doing contract work for the Navy in cryptography.

Cray said that while he was at Engineering Research Associates, he met John von Neumann, the mathematician who is the father of the modern computer.

Located in a converted wooden glider factory, Engineering Research Associates was in the forefront of developing digital computers. During his years at ERA, Cray began to develop his solitary working style and his philosophy of simplicity in computer design.

Indeed, while credit is given to IBM for inventing Reduced Instruction Set Computing, or RISC, during the 1970s -- a now popular design approach that calls for simplifying computer hardware to gain speed -- computer historians note that Cray's computers were always designed along RISC lines.

It was also at ERA that Cray's legendary impatience with corporate bureaucracies and management began to take shape. When a series of mergers brought the company first under the control of Remington Rand, the typewriter company, and later Sperry Rand, Cray decided to leave to join William C. Norris, ERA's founder, who had started a new company, Control Data.

There Cray was freed to pursue his vision of building large scientific computers. Shunning committees, he felt that the best computers were the ones where a single architect offered a unified vision.

After the machine had been delivered, it was then appropriate, Cray felt, to listen to feedback from customers and, if necessary, start over from "a clean sheet of paper."

At Control Data, Cray led the design of the CDC 1604, the first commercial computer to replace large vacuum tubes with individual transistors that he had bought at a local electronics store. In the scientific computing market, the 1604 competed against machines from the more powerful IBM.

The new company grew rapidly as large corporations began to adopt mainframe computing. However, Cray's disdain for management had followed him to Control Data, which soon became too big for his comfort. He persuaded Norris to permit him to relocate his laboratory 100 miles from Minneapolis, back to his hometown of Chippewa Falls.

Indeed, Cray had so little patience for traditional corporate activities, Norris once recalled, that when he asked Cray to write a five-year plan for CDC, his response was: "Five-year goal: Build the biggest computer in the world. One-year goal: Achieve one-fifth of the above."

The move to Chippewa Falls turned out to be a remarkably important one for Control Data. Cray's small team designed the CDC 6600.

Introduced in August 1963, it had a speed of three million instructions per second, dramatically faster than the market leader at the time, IBM's 7094 computer.

Frustrated, IBM chairman Thomas J. Watson Jr. wrote a memo to his staff noting that the 6600 team totaled only 34 people, "including the janitor," and asked how IBM had let such a small team offer the world's most powerful computer.

Five years later, the CDC 7600 furthered Control Data's lead in the scientific computing market. However, in 1972 Norris delayed Cray's next project, the 8600, in favor of a competing design.

Cray left Control Data with a small team and founded Cray Research. Four years later, the Cray 1 unseated Control Data as the world's fastest computer.

Surviving with venture capital investments of about $8 million during the development period, Cray took the company public in 1976, raising $10 million only a month before the company sold its first Cray 1 computer to the Los Alamos National Laboratory for $8.8 million.

In 1975, while he was developing the Cray 1, Cray was divorced from his first wife, Verene. A year later, he met Geri M. Harrand, whom he later married. He began to do more things outside his work regimen.

He learned to ski and began windsurfing and traveling widely.

As Cray Research grew rapidly, Cray continued to focus on the technical challenges of building a supercomputer, increasingly turning over the responsibility of running the company to Rollwagen, who became chief executive in 1980 and chairman in 1981.

During his career, Cray also had both technical and business disappointments. For example, the Cray 2 was initially supposed to use an ultrafast semiconductor material, gallium arsenide, but gallium arsenide proved a vexing material for chips, and Cray ultimately returned to silicon chips and finished the machine in 1985.

Although it provided a tenfold performance increase above the Cray 1, it was late to market. To keep the company alive while Cray attempted to complete the Cray 2, Rollwagen had turned to a young computer designer, Steve S. Chen, to design a faster version of the Cray 1.

That machine, the Cray X-MP, succeeded better than anyone had expected and saved the company.

That began a rivalry between Cray and Chen that was to last until Rollwagen was forced to choose between the two designers and went with Chen. Cray left Cray Research in 1989 to found Cray Computer Corp., basing it in Colorado Springs.

After finishing the design of the Cray 2, Cray had begun working on the Cray 3, still focusing his attention on the possibilities of gallium arsenide processing chips. The project required special robots to assemble the processing units, and costs soared. By 1989, the Cray 3 development project had already cost $120 million with no working computer on the horizon.

Rollwagen was forced to spin off the Cray 3 project, keeping a 10 percent investment in the new company.

Three years later, Cray Computer had consumed more than $300 million, and Cray had fallen victim to the rising power of cheap microprocessor chips. More than a dozen start-up companies had emerged to cobble together massively parallel supercomputers, using the new chips and building systems at a far lower cost than Cray's ambitious gallium arsenide-based systems.

Cray began work on the follow-on to the Cray 3, the Cray 4, a machine that would have 64 processors.

However, he was never able to complete the Cray 4. In a bitter final chapter signifying the decline of the supercomputer industry, Cray Computer sought Chapter 11 bankruptcy protection in March 1995 after failing to raise an additional $20 million.

Cray's venture was undermined by the twin transformation of the computing world in the 1990s. First, the arrival of cheap and powerful microprocessor chips had dramatically undercut the multimillion-dollar "big iron" systems that were Cray's hallmark.

Moreover, the end of the Cold War meant declining government budgets for purchasing machines that were once the mainstay of the nation's weapons labs and at the heart of the Strategic Defense Initiative, called "Star Wars."

In a letter to his employees, he pointed to larger changes in the world that had prevented his company from selling even one system in its six years of existence.

"Our problem is basically one of timing," he wrote. "The business world and our government are in a cost-cutting mode. They do not want to take any risks at the moment. Longer-term investment for the future is not popular."

In addition to his wife, Cray is survived by two daughters, Susan Borman of Eau Claire, Wis., and Carolyn Arnold of Minneapolis; a son, Steven, of Chippewa Falls; a sister, Carol Kersten of Rochester, Minn., and five grandchildren.