NASA Center for Climate Simulation Success Story

Hal Domchick: From Data Technician to Facilities Mastermind

April 7, 2016

Big computers can be temperamental beasts, as Hal Domchick knows all too well. He recalled a time when NASA Goddard Space Flight Center's IBM 3081 mainframe was being upgraded to an IBM 3083. "A guy who looked like Einstein, with hair everywhere, came in to fix a memory problem. He dialed in addresses to see where things were misfiring," Domchick said. "Out of his hair he pulled a pick and put it on one of the wires. Then he pulled it out and re-plugged the connection. When he rebooted the system, it worked again."

This incident showed the value of being hands-on and precise, a philosophy Domchick took to heart when managing facilities for Goddard organizations including the NASA Center for Climate Simulation (NCCS)—the capstone of his almost half-century NASA career. Domchick retired on February 4, 2016, practically 47 years to the day he started at Goddard.

Although born in Hazelton, Pennsylvania, Domchick mostly grew up down the road from Goddard in Greenbelt, Maryland. His father played saxophone in the U.S. Army Field Band at nearby Fort Meade, a profession that took the family to the U.S. Military Academy in West Point, New York, during the late 1950s. After returning to Maryland, Domchick graduated from Beltsville's High Point High School in 1964. Two years later he followed his father into the Army, where he served primarily as a heavy equipment operator but also as a truck driver for one of the field bands.

Among the many projects Hal Domchick oversaw at NASA Goddard Space Flight Center was the construction of a second floor addition to Building 28, home to the NASA Center for Climate Simulation (NCCS). Photo by Jarrett Cohen.

Post-Army veterans' benefits funded a 6-month stint at the International Tabulating Institute in Washington, DC. Newly acquired programming and board wiring skills served Domchick well when he joined Goddard in February 1969.

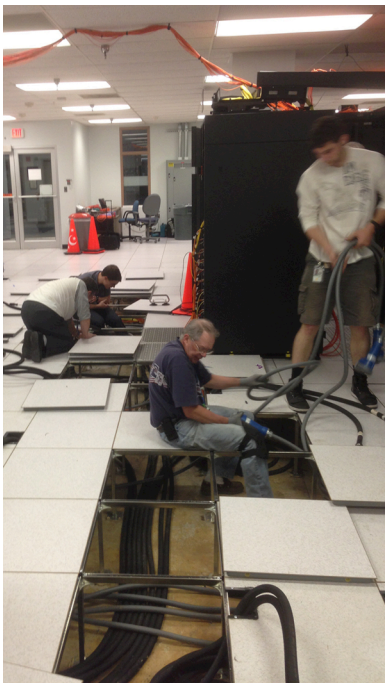
Like the friend who had encouraged him to apply, Domchick started as a contractor with Computer Sciences Corp. (CSC). He was a data technician on the Interplanetary Monitoring Platform data processing team. In his first experience with a big computer, "we received and converted raw analog ground station data into digitized data tapes running on a Univac 1108," Domchick said. "The digitized data was sent to each experimenter team for analysis."

After 6 years of increasing responsibility Domchick joined the civil service in 1975 to run the data processing for the Laboratory for High Energy Astrophysics. The Lab supported now-legendary NASA missions such as Pioneer 10 and 11 and Voyager 1 and 2. Domchick traveled to NASA's Ames Research Center and Jet Propulsion Laboratory (JPL) to witness planetary fly-bys and worked with prominent scientists such as Lab Chief Frank McDonald and JPL's Ed Stone.

With NASA launching more and more missions, Goddard, as the Agency's leading science center, had to grow to serve them. Building additions and brand new buildings went up to house an expanding workforce, as well as more capable computing facilities. This wave swept Domchick over to the Science and Applications Computing Center (SACC) in 1983. SACC leaders "wanted me to run the operations side because I was organized," Domchick said. "Facilities were a natural extension of that."

Domchick's first big computer installation was an IBM 3081 mainframe, which required building an addition to the basement of Building 1. In managing the project Domchick drew on years of home improvement projects with his father-in-law. "I had engineers designing systems and gave FMD [the Facilities Management Division] conceptual things," he said. "I would tell them what I wanted and where I wanted it." From this job onwards, Domchick's facilities layouts specified where to place computing equipment, power units, and cooling infrastructure.

In 1984, the SACC combined with the Building 22 Vector Processing Facility to form the NASA Space and Earth Sciences Computing Center (NSESCC). They started placing equipment in the newer Building 28 designed to house computers. "That's why there were originally no windows and no heating system; the heat was generated by the computer room," Domchick said. Space and weight constraints sometimes led to novel arrangements. One had heavy cables hanging down through the ceiling—in the middle of the room—to connect the storage system upstairs to the IBM 3090 mainframe downstairs.



Hal Domchick (center) works with NCCS staff members on installing infrastructure for a new unit of the Discover supercomputer. Photo by Bruce Pfaff.

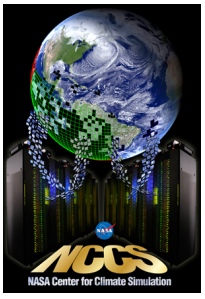
Mainframes gave way to supercomputers, and in 1990 the NSECC became the NASA Center for Computational Sciences (the original NCCS name) to take advantage of these new machines. NCCS supercomputer installations followed broader industry trends. The 1990s were the era of Cray supercomputers using a relatively small number of powerful "vector" processors. The 2000s saw a transition to supercomputers using hundreds of commodity microprocessors, with offerings from Cray, SGI, and HP/Compaq. In 2006, the NCCS inaugurated the modular Discover supercomputer that has combined "scalable units" from vendors as diverse as Linux Networx, IBM, Dell, and SGI (with nearly 80,000 processor cores as of this writing).

Domchick planned and oversaw facility changes for all of these installations and more. "Supercomputers are getting smaller and heavier and faster, and they take much more power," he said. The IBM 3081 of the early 1980s needed only 23 kilowatts of power in a facility with one 208-volt power feed. Today the NCCS has 1,600 kilowatts and multiple 480-volt feeds.

All that power requires daily attention. Domchick's routines included electronic and physical monitoring of the facilities. On one walk-through he was feeling the circuit breakers with his fingers and noticed something quite out of the ordinary. Closer inspection with an FMD engineer revealed a hot power distribution panel, and NCCS staff shut down the supercomputer racks connected to it before any damage occurred. After this and similar events, NCCS system administrators developed scripts for shutting down Discover faster to protect the computers and storage from rapid power loss. That software solution works in tandem with uninterruptible power supplies that Domchick installed for unexpected power outages and surges. Memorably, a June 2012 derecho windstorm knocked out the entire building. "But we were preparing for it and turned everything off," Domchick said. "We then waited for things to be repaired elsewhere before re-energizing."

In October 2012 Domchick officially retired from the Civil Service but returned to his roots as a CSC contractor to lend his expertise for several more years. To those who would follow in his footsteps, Domchick noted that colleges have started programs for computer facilities. "They are humongous and complex places," he said. "You have to have good engineers."

Jarrett Cohen, NASA Goddard Space Flight Center



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