Anecdotes

Editor: Dave Walden

Notes on Canadian Computing, 1950s

In 1954 I began my computing career with Computing Devices of Canada Limited, a small electronics firm based in Ottawa, under the tutelage of Ted Codd. Herein, I describe some of the early work with electronic computers in Canada and Ted's influence on it.

Computing Devices of Canada was founded in 1948 by two Polish immigrants to Canada, George Glinski and Joe Norton. The company got its start by manufacturing the Position and Homing Indicator (PHI), a device developed at the National Research Council that kept track of an aircraft's position and indicated its return route to base. One large contract that had a significant influence on the company's growth was for the Kicksorter, a digital-pulse counter designed for the Atomic Energy of Canada Laboratories in Chalk River. If the Kicksorter had been slightly modified to do simple arithmetic operations, it would have been a rudimentary computer. AECL purchased a large number of these devices between 1957 and 1963, when they were replaced by one of the early computers in the PDP series manufactured by the Digital Equipment Corporation (DEC). Another contract was to design and construct a large digital simulator for the Royal Canadian Navy that was never completed.

Computing Devices began its operations in a small building on the western edge of downtown Ottawa. A few years later, the company moved further west to the suburb of Westboro, where it occupied the upper floors of a building above the Charles Ogilvy department store. Around 1956, it moved to new buildings at Bell's Corners a few miles west of the city. In the late 1950s, the company became affiliated with Bendix, and when this company was acquired by Control Data Corporation, it became a division of Control Data Canada. At a later date, it became a wholly owned subsidiary of Ceridian. The company, now called Computing Devices Canada, has been described as an ''Ottawa-based defence electronics company.''

Editor's Note

Anecdotes articles are often about a system or advance in technology. The two anecdotes in this issue each give a flavor for a time and place in computing history.

—Dave Walden

NRC 102 computers

Computing Devices also handled the Canadian sales of the NCR 102-A, a digital computer manufactured by the National Cash Register Company of Dayton, Ohio. Sixteen 102-A computers were produced altogether and two were installed in Canada. The first was at A.V. Roe (Canada), an aircraft company in Malton, Ontario, adjacent to what is now Pearson Airport, and the second was at the Royal Canadian Air Force Station (now called Canadian Forces Base) in Cold Lake, Alberta. (The only other computer in Canada at the time was the Ferranti computer Ferut at the University of Toronto.) The 102-A system consisted of the ''computer proper''—as it was termed in the programming manual—and a console with a Flexowriter, which was a modified electric typewriter with a paper-tape reader and punch for input and output. There was also a small control panel on the console. (A magnetic-tape unit and a card reader and punch were optional.)

The basic system occupied 250 square feet of floor space, weighed 2,700 pounds, and had 400 tubes of 12 different types and 8,000 crystal diodes. It required air conditioning and a separate power supply. The cost was $82,000, which in today's currency would be more than $600,000. The magnetic-drum memory had a capacity of 1,024 42-bit words and an additional ''high-speed'' memory of eight words. The internal number system was binary, and I/O was in octal, or in decimal if appropriate conversion routines were written. Addition and subtraction times varied from 7 to 20 milliseconds, and multiplication and division from 25 to approximately 40 milliseconds depending on drum access times.

Figure 1 shows the 102-A at Cold Lake. The plastic case on top of the drawers beside the console contains the program library (on punched tape) while the loose-leaf binder on which it is sitting contains printed copies of the programs and operating instructions for their use.

A decimal version of the 102, called the 102-D, was also produced by the National Cash Register Company. A 102-D was installed in Computing Devices shortly before the company moved to Bell's Corners. The order code was similar, but it provided the great convenience of not requiring I/O conversion between decimal and binary.

All the programming for both the 102-A and 102-D was in machine language using a three-address instruction code with 27 instructions. The only documentation for either machine was a 100-page manual giving the ''functional specifications.'' There was no accompanying software; the term software did not even come into use until the early 1960s. Much of the

programmer's time was spent writing decimal-binary conversion programs (for the 102-A), floating-point simulators, monitor and trace programs, and programs to help document the programs.

Applications programming was a difficult task requiring professional programmers, and all programs had to be accommodated—squeezed would be a better word—into the 1,024-word memory. As an example, one demonstration program written for a meeting of applied statisticians in Ottawa gave an analysis-of-variance table for data arranged in a Latin square. The output, with no identifying labels, was given as four columns of mostly nine-digit numbers without decimal points for the sums of squares, degrees of freedom, mean squares, and F-ratios.

Ted Codd and Computing Devices

During the 1950s, Canada was involved in building and testing an air-to-air guided missile called Velvet Glove.[1] Much of the development work was done at the Canadian Armament Research Establishment in Valcartier, Quebec, while testing was done at the RCAF Station in Cold Lake. Computing Devices was involved in this work both in Ottawa as well as in Valcartier and Cold Lake. Most of the computational work was for the determination of missile trajectories and orientations as well as velocities and accelerations, and for a simulation of the missile's aerodynamic properties.

Ted Codd came to Computing Devices around 1953 to set up a Data Processing Department to handle the numerical, as opposed to the engineering, aspects of this work. His career prior to arriving in Canada may be stated briefly as follows:

> Edgar ''Ted'' Codd was born in Portland, Dorset, in 1923 . . . served in the RAF during the Second World War, when he underwent flight training in the United States . . . then read Mathematics and Chemistry at Exeter College, Oxford. In 1948 he moved to the United States, where following a brief spell as a mathematics instructor at the University of Tennessee, he joined IBM.[2]

At IBM, Ted had been a mathematical programmer using IBM's Selective Sequence Electronic Calculator.[3]

I was the second programmer to join Ted's staff in October 1954, the first being Charlie Mackenzie. We were soon joined by Frank Howley. The three of us were immediately put to work writing, under Ted's supervision,

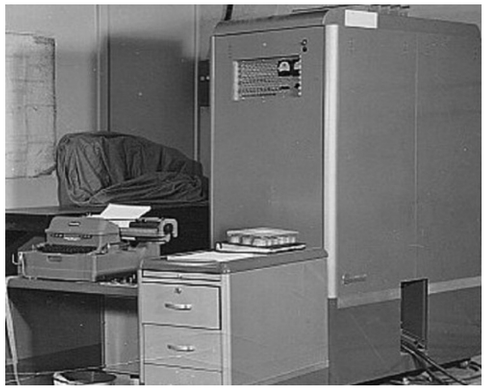

Figure 1. The NCR 102-A system installation at the Royal Canadian Air Force Station (now called Canadian Forces Base) in Cold Lake, Alberta.

a large program involving the numerical solution of differential equations in connection with the Velvet Glove.

Charlie and I had a short break from this work when we accompanied Ted to Toronto to use the 102-A at A.V. Roe to debug a matrix inversion program that Ted had written in connection with another project. This gave me my first hands-on experience with computers. I soon found that computing could be a strenuous physical experience involving changing tape reels, moving from one physical device to another, and continuous standing. I can still remember being awakened in the motel during the night with severe leg cramps.

Because Computing Devices did not then have its own computer, the intention was to write as much of the program as possible in Ottawa and then make a ''short'' visit to Cold Lake for debugging and production purposes. In January 1955, Charlie and I went to Cold Lake to work on the Velvet Glove program. Charlie and I were probably selected to work at Cold Lake because we were both single at the time, and any extended absences from Ottawa would present relatively few disruptions to our personal lives. I can't recall how long Charlie stayed, but my visit lasted, with brief return trips to Ottawa, for a year and a half. As I required some assistance, we hired a student for the summer of 1955, and then in the autumn we hired Bill Adams, who had recently emigrated from Scotland and was then working for the Alberta provincial government in Edmonton.

In addition to the Velvet Glove work, the Data Processing Department undertook whatever other computational work it could obtain, both from other departments within

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the company and from outside sources, mostly the federal government in Ottawa. One project I can still remember was a one- or possibly two-week programming course I gave to a group of RCAF officers. I still have a copy of the 100-page accompanying programming manual we used for the course. Reading the outline of the course 50 years later I am surprised, and a little amused, by what we considered to be appropriate material to cover in a nonacademic introduction to computer programming. The outline included these topics: Historical remarks, Main features of electronic digital computers, Number systems, Coding for a typical computer, Computer operation, Practical elementary programming, Programming techniques, Scaling, Preparation of a problem for a computer, Types of machine codes, and Survey of present-day digital computers. How times have changed!

Diaspora

Toward the end of the 1950s, the group of mathematicians and programmers at Computing Devices broke up partly because of the uncertainty in getting contracts, but more importantly I believe, because the company had little experience in employing professional staff who were not hardware engineers. Also, some of the engineering staff left the company at about the same time, one of whom was one of the company's founders George Glinski, who went to the University of Ottawa as head of the Department of Electrical Engineering. (A small avenue on the campus is named in his memory.)

Although the Data Processing Department that Ted established did not last too long, it served as an excellent training ground for those entering the fledging computer profession in Canada and in other countries. Charlie Mackenzie, Frank Howley, and Ed Lowry went to IBM in the US, I believe to Poughkeepsie where they were involved with the Stretch computer. Jim Howland went to the University of Ottawa, as did Cormac Smith, who after a few years went to the University of Windsor. Bill Jenkins went to Kingston, where he worked as a private consultant. Peter Sefton left for a position with IBM in Sydney, Australia, and subsequently moved to Perth, where he became a mathematics teacher. Bill Adams went to the University of Alberta to complete a degree he had begun at the University of Edinburgh. I left in 1959 to join the Statistical Research Service of the Research Branch of the Canada Department of Agriculture (now Agriculture and Agri-Food Canada) and then to the Bureau of Statistics. In 1963, I joined Bill Adams at the University of Alberta, where he had just been appointed an assistant professor. Bill and I retired from the University of Alberta in 1992, and we still keep in touch.

Ted Codd had a distinguished career after he returned to the US and IBM in 1957 following his brief sojourn in Canada.[3–5] Those of us who knew him in Canada followed his career with great interest. More importantly, however, we remembered him as a pleasant and hard-working individual who had high standards for his staff and treated them fairly. We are grateful for Ted Codd's early contributions to computing in Canada and to our own individual careers.

References and notes

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3. J.R. Yost, ''Edgar F. Codd,'' *Encyclopedia of Computers and Computer History,* Raul Rojas, ed., Fitzroy Dearborn Publishers, 2001, pp. 161–162.
4. C.J. Date, ''Edgar F. Codd: A Tribute and Personal Memoir,'' *Sigmod Record,* vol. 32, no. 4, 2003, pp. 4–13.

5. One account of Ted's life and work that appeared on the Web shortly after his death contained the minor error of stating that he was a captain in the Royal Air Force during World War II. Although he was in the RAF, in Coastal Command I believe, he probably held the equivalent rank of flight lieutenant because there was no such rank as captain. The same account stated—under the title ''Trivia''—that Ted was a fellow of the British Computer Society, an IBM fellow, and a recipient of the ACM Turing Award. Trivia indeed!

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Remembering the Digital Computer Association

Arguably the modern computer era started in the late 1940s when Northrop pioneered the Card Programmed Calculator (CPC) and IBM turned it into a product.[1] When IBM produced the 701,[2] big aerospace (Douglas, Lockheed, and North American) each installed one or two, and the mainframe era was born.

There was a backlog of scientific and engineering calculations awaiting solution and too few programmers. Several 701 users, led by North American and Rand, got together and produced the Project for the Advancement of Coding Techniques (PACT), the first program to help develop programs (e.g. software).[3] When I got to Los Angeles with the Computer Sciences Corporation in 1959, it was commonly thought that 10 percent of the computers in the world were in the Los Angeles area.

Most of the programmers were either naturals or self-taught; few were formal products of universities, colleges, or trade schools. They were about 80 percent male; in their late 20s or early 30s; and used to working hard, playing hard, and changing employers as contracts moved around. To keep up with the field (and job prospects), many of us attended the monthly meetings of the Digital Computer Association (DCA).

The DCA was informally organized, held monthly meetings, published a newsletter, and held an annual bash. A revolving committee of activists ran the organization and the president was selected annually by popular acclaim. Once selected, the incoming president had no recourse but to serve or move out of the Los Angeles area.

The Digital Computer Association (DCA) attendees were all ''computer people,'' when computing was still a relatively new field.

The monthly dinner meetings were always held at a bar. Notes, ideas, and resumes were exchanged before the meal, and a noteworthy speaker was invited to address the group over dessert. The DCA attendees were all ''computer people,'' when computing was still a relatively new field. There were some diehards who attended every meeting as well as a cast of hundreds who came according to how exhausted they were and what the technical topic was. Coders aspiring to be programmers, programmers, managers, salesmen, and an occasional boss attended the meetings. We all drank a lot and enjoyed each other's company.

At one meeting, Lou Gatt, a senior programmer and early Fortran expert,[4] had come back to Los Angeles from spending a year at Los Alamos, and we welcomed him like a hero. He had some early experience with Fortran I that we wished to hear, so he was our monthly speaker. We had a big turnout.

The restaurant where we met had an odd-shaped back room. There was an alcove that held a stage that was raised about 16 inches off the floor. The stage was too small for the alcove so there was a space all the way around between the stage and the wall. Since Los Alamos is 7,355-feet high, Lou maintained that since he was acclimated to that altitude he couldn't get drunk at sea level. Several of us undertook to test that theory, and Lou had several drinks before he got up to speak. During his speech, he got too close to the edge and fell in the crack between the stage and the wall. The audience was greatly amused at the abrupt disappearance of the speaker. It took several of us to extract poor old Lou since he was wedged in pretty tight.

We adjourned the meeting and took Lou back to the bar.

At another DCA meeting, Bob Bemer of ASCII fame[5] arrived with a goat's bag full of red wine. We didn't hear the speaker that night since we were mesmerized by Bob's ability to squeeze the goat bag with his arm like a bagpiper and squirt wine directly into his mouth without getting any on his face.

Another DCA meeting of note was held in a meeting room at the Schlitz brewery. The speaker was H.R.J. Grosh, computer raconteur. When he was invited, Herb was told to keep it light because the crowd would be in no shape for a serious talk. Despite the warning, Herb brought a serious talk. Several members of the committee tried, without success, to get Herb to lighten up. The committee then acquired several rolls of toilet paper from the men's room and wrapped Herb as he held forth. When he finished, he looked like a bearded mummy and no one had heard a word he said.

One notorious annual bash was held on a paddle-wheeled party boat cruising Long Beach Harbor. There were lots of people, a lot of food, and too much to drink. We cruised for about four hours, and surprisingly, not a single programmer fell overboard.

As the field matured and more people became involved with computers, much of the camaraderie was lost. The DCA succumbed to competition from monthly ACM and DPMA[6] meetings.

References and notes

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