Australian Chemical Engineering History

The First Digital Computer in an Australian Chemical Engineering Department

Digital computing was first introduced as an elective course into the undergraduate Chemical Engineering program at the University of Sydney by Dr Charles Sinclair in 1958 using the Physics Department's SILLIAC computer. From 1959 it became a core course, closely coupled with the then developing course in Instrumentation and Process Control. Final year student Michael Brisk in 1959 completed what is believed to have been the first undergraduate thesis in Chemical Engineering in Australia to use a digital computer: "The Application of a Non-Linear Element to an Otherwise Linear Control System" using the SILLIAC assembler code.

Prof Rolf Prince (then Senior Lecturer Dr R G H Prince) joined the Department in 1961, and negotiated with IBM Australia for the Department to acquire (at a significantly discounted cost) an IBM 1620 Model I digital computer. To the best of my knowledge this was the first digital computer in any university department in Australia.

The machine was somewhat unique in that it was a decimal, rather than a binary computer, with 20k of decimal magnetic core memory with a memory cycle time of 20µs (50kHz, a snail's speed by modern standards). It did not have a conventional arithmetic unit, using table lookup in core memory for its arithmetic, which prevented it from ever being a very fast machine. Input and output was on a 10 character per second console typewriter, and 8-channel punched paper tape.

The IBM 1620 in Chemical Engineering in 1962

With Prince's encouragement several staff and postgrads attended a course run by IBM in the Department on an early version of FORTRAN, and in time the machine was used by undergraduates for problems related to a small number of courses. In addition to teaching an undergraduate FORTRAN programming course, I had management responsibility for the computer, and, with hindsight, very foolishly wrote a program to manage the Department's finances using a combination of machine and assembler code. It worked, but was a very high maintenance activity. An interesting application of the 1620 was undertaken by Ross Blunden, Foundation Professor of Traffic Engineering at the University of NSW, who arranged to use the machine to run his traffic flow simulations using a Monte Carlo technique in long, overnight sessions. His results nicely predicted the "expansion and contraction" effect that all of us have experienced when travelling on congested motorways.

After the Department moved into its new premises in Darlington in 1964, the machine was replaced by a 1620 Model II with card input-output, and later with a PDP-11 time sharing system, before the Department came to rely on the large central University networked computing facilities.

Emeritus Professor Michael Brisk