International Research Conference on History of Computing

Los Alamos, June 10-15, 1976

by J. Howlett

This was a specialized meeting with attendance by invitation only. The idea originated with Nick Metropolis and Jack Worlton of Los Alamos Scientific Laboratory (LASL); the laboratory did all the organizing and NSF provided financial support. The conference occupied four very full days and one half-day; there were about 35 speakers in a linear string—no parallel sessions—and about 150 attendees, including the speakers, from 10 countries. Regrettably a last-minute message was received saying that Ershov and Dorodnicyn from the USSR would not be able to come.

Let me say at once that the conference was a tremendous success. Everyone agreed on this, everyone was conscious of taking part in a unique and, it would perhaps be not too much to say, historic event; but no one was solemn about or overawed by this thought. The whole occasion was immensely enjoyable and highly informal.

What motivated Metropolis and Worlton to embark upon the considerable task of organizing this meeting (so far as I understand from conversations with them) was a feeling which surely many will share: that the computer is one of man's greatest inventions; its speed of development over the past 25-30 years has been fantastic; many—but, sadly, not all—of the pioneers are still alive and active and we shall fail in our obligations both to posterity and to these pioneers if we allow the record of this extraordinary development to disappear beyond recall before it gets written down. Donald Knuth began his paper on the history of programming languages with the statement that "it is interesting and instructive to study the history of a subject not only because it helps us to understand how the important ideas were born—and to see how the 'human element' entered into each development—but also because it helps us to appreciate the amount of progress that has been made." I would add my personal view that every member of any profession should have some knowledge of and feeling for its history—what were the great ideas, who were the great names.

After an apt and elegant welcome by Dr. Harold Agnew, director of the Los Alamos Laboratory, the conference opened with a paper by K.O. May (Toronto) on "Historiography —A Perspective for Computer Scientists" in which he enunciated three principles: (1) the history of X is not the same thing as X; (2) chronology is not history; the first is raw data, the second is data which has been processed and interpreted in some way; (3) we must beware of making the error of describing an early event in terms of what we know now.

In keeping with (2) it seems reasonable to assert that a mere list of the contents of the papers is not a report of a conference, so let me attempt a structured summary.

The papers fell into these broad groups:

I. *Historic names.* It was striking, if not unexpected, how often the names of von Neumann and Turing kept recurring throughout the meeting. With no lessening of acknowledgment of the importance of the many others who contributed so much, these surely were the real pioneers, the ones who knew what it was all about. The work of Zuse on both machine design and the specification of programming languages was described by F.L. Bauer (Munich) and by Zuse himself, and surprised many by its comprehensiveness and advanced ideas for such an early date.

II. *Historic machines.* It has often been stated that ENIAC started the this machine added to the importance of its construction as an historic event. It was good to have John Mauchly himself to tell us about its origin; Presper Eckert also was to have been there but finally was not able to come. ENIAC showed that the electronic computer was possible; the shape of things to come was shown more by the Institute for Advanced Study computer in which the fundamental ideas of von Neumann were realized in hardware and programming, and in its derivatives such as AVIDAC at Argonne, ILLIAC-1 at Urbana, MANIAC-1 and -2 at Los Alamos and ORACLE at Oak Ridge, all of which were described; by EDSAC at Cambridge (in Cambridgeshire, as Maurice Wilkes put it succinctly); by the ACE project at the National Physical Laboratory at Teddington; and by the Manchester University machines starting with the Mark 1 around 1950. The impressive Whirlwind at MIT (1951) was something of a *tour de force* of electronic engineering; and the National Bureau of Standards machines SEAC and SWAC played important roles in the early application of computers to scientific problems. There were accounts also of the important precursors of the stored program computer, including the differential analyzer of Bush at MIT (1930), the various punched card calculators of the 1930's and 1940's and the huge electromechanical engines (no other name is adequate): the Automatic Sequence Controlled Calculator of Aiken, better known as the Harvard Mark I, and the Selective Sequence Electronic Calculator (SSEC) built by IBM.

III. "*Country Perspectives.*" There were broad surveys of the developments in various countries outside the USA. Gotlieb (Toronto) dealt with Canada, Dreyfus (Paris) with France, van Wijngaarden (Amsterdam) with Holland, Bauer (Munich) with Central Europe, and Suekan (Kofu) with Japan. Ershov was to have surveyed Russian work, and has promised to send a paper. The British work was described by

Booth (London, now in Ontario), Lavington (Manchester), Wilkes (Cambridge), and Wilkinson (NPL). Another paper on British work by Randell (Newcastle-on-Tyne) was on a very special subject which I shall come to later.

IV. *Pre-history.* The meeting was concerned mainly with the events around 1930-1955. Babbage was mentioned frequently and his foresight and intellectual achievements were recognized, although there was no paper devoted specifically to him. He is perhaps best classified as pre-history. Two papers on very pre-history, so to say, were given at an evening session. Luebbert (Dartmouth) gave what he called an audio-visual presentation (slides + tape) on "the management information system of the Inca empire": a very intriguing account of a most elaborate system set up by a people with an advanced and sophisticated social organization but no written language, in which a vast amount of numerical information on their resources was coded on knotted strings. Speaker von Freytag Loringhoff (Tübingen) described the calculating machine made by Wilhelm Shickard in 1623, when he was professor of almost everything at Tübingen; this had remained almost completely unknown until von Freytag Loringhoff reconstructed it from original sketches in 1960. Zemanek (Vienna) gave a delightful account of many of the fantastic and beautiful automata built to entertain the Central European aristocracy in the Baroque period.

V. *Software.* This cropped up on a fair number of occasions, although the main emphasis was squarely on hardware. Three papers dealt specifically with software. Knuth (Stanford) took us for a tremendous gallop through 21 programming languages —by no means all of which were ever implemented on any machine—from Zuse's Plankalkül of 1945 to Algol 58. Fortran first appeared as No. 11 in 1954, in its most primitive form. Risking a charge of hindsight, one could see excellent reasons why many remained on the shelf. Wells (LASL) discussed the criteria for a successful language and the extent to which a number of actual languages met these. He ventured the view that ideas on this subject are converging and that a universally accepted language is now a real possibility. Backus (IBM) spoke on software work at IBM, in particular on Fortran and on the origin and development of BNF. It is probable that many in the audience would have liked to hear more about early work on Fortran than he had time to give.

The paper by Randell was decidedly an event. It was on the COLOSSUS machines built by the British during the last war for code-cracking. All this has been kept under the strictest secrecy and even now very little has been revealed; with great perseverance Randell has succeeded in getting a small chink opened in the security armor and was able to give some factual information about what was indeed an historic undertaking—and even to show some photographs. One must admit that he was not able to say a great deal, but the hope was generally expressed that more will be released, not only by Britain.

The record of the conference resides in the authors' manuscripts, written or taped contributions made on the spot, and a full videotape recording of the entire proceedings, including the discussions; this provides the raw material from which an authoritative history of the digital computer could be written. Publication in some form or other is intended but clearly presents problems; Dr. Metropolis tells me that announcements will be made through AFIPS.

As I said at the start, the event was a great success and exceedingly enjoyable. The organization was first class, effective and efficient, and friendly; and by special arrangement with the Weather Bureau the sun shone all day and every day from a cloudless blue sky but the mountain air was dry and invigorating. To my mind it emphasized the value of the specialized meeting with an attendance large enough to give plenty of variety of views but small enough to make informal contacts easy.