Are Computers Important?

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THANK YOU Mr. Chairman, for your generous introduction which is clearly designed to ensure me, up to this moment, some measure of respect. You were too polite to suspect that what I really need is your sympathy: yesterday afternoon tea and sympathy (preferably from my dear friend, Deborah Kerr), and today luncheon and sympathy from E. J. C. C. It is a terrible thing to be the only confused person among 2,500 philosophic philosophers busily propogating their electric poetry through electric plumbing.

Yesterday, my wandering ions of thought were deflected towards that Dark Age which preceded the Electronic Age; that Dark Age when we did not have the sense to know how happy we were. Then, the first electrons were just being deflected from their straight and narrow path in the first cathode-ray tube, while my schoolboy steps were being deflected from the goal of the higher journalism, through a brief encounter with heavy electrical engineering, towards becoming “Assistant to the Professor of Natural Philosophy.” At a neighboring university a distinguished professor of natural history had just set an essay subject to his students. They were to write about “The Petrel,” a bird which he failed to identify unambiguously by its hackneyed prefix “stormy.” You will be aware that in Great Britain, that citadel of colonialism (of the old-fashioned, simple-minded, well-intentioned colonialism), the barbarous natives call gasoline by a name of six letters “fueL” As for speed, we are well on its asymptotic approach to Orwell’s 1984; and this in turn made me think that it Sky” to this other “Ode to a Skylark.”

It is your sympathy: yesterday afternoon we have already the assurance of an immediate forward jump in speed, compactness, durability, cheapness. In particular, all these three last-mentioned qualities improve much more than linearly with the reduction in the complexity of the individual component and its “fuel.” As for speed, we are well on the way to avoiding, among other defects, the sluggish transport or our vital pulses over the relatively long, unplanned, delay lines which are necessary for connecting together our conventional, but obsolescent, bulky components.

Serviceability has taken a correspondingly big forward leap, but this does not discharge us from the need for removing all possible excuses for the neglect of easy preventive maintenance. This means that, more than before, we must lay great stress on accessibility and easy replacement, even though this latter

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will be required less frequently than before.

We have gained a factor of ten or a hundred times in internal speed, but over the greater part of our field of application this merely accentuates the already great mismatch between the intrinsic speed of the computer, in the narrow sense, and of the input-output devices without which it is a computer only in the abstract.

No less remarkable than those at which I have thus superficially glanced are the advances in very high-speed, short access-time, large-capacity memories. Indeed I am not sure that 1956 will not be remembered primarily as the year of memories. I may have nostalgic regrets, from my 45 years of affectionate intimacy with cathode-ray tubes, that the magnetic core has killed (by superior speed and superior reliability) the electrostatic storage tube with which my colleague of 20 years ago, F. C. Williams, revolutionized the storage problem of 10 years ago. I have fewer regrets that the core should have killed also the metallic planned-delay line. Both these casualties began life as products from a common stem, the radar laboratories, from which electronic computers in general grew as another and rich main crop.

If my first bite noir in the semantics of our somewhat loose vocabulary is an adjectivally nude "computer," my biggest black beast is that deformed and shapeless (if that be semantically possible!) monster the random-access memory.

Physically the answer has reduced to a very rapid-access (and still, most frequently, a serial-access) device, but philosophically, in the end it need not, and practically it should not, do so.

I have no semantic "Beauty" to oppose to my semantic "Beast." Beauties are defined set apart from random access. But as something to live with meanwhile, I suggest the poor but honest, if unbeautiful term "Parallel partial-identifier search," to describe the beautiful operation which the client seeks to have at his disposal. Up to date we have offered him rather poor half-meaures, wasteful use of storage accommodation, cumbersome directory look-up, statistical condensations, and so on. It may be that tomorrow Mr. Slade will be uncovering for us the first practical satisfaction of an ideal which in common with others my colleagues have sought for several years now. He is promising us a "system which is interrogated by comparing a new word with the entire catalog (by which I assume he means 'with each word in the entire catalog') simultaneously." We are, in any case to have some half-dozen new devices for multiple parallel search described to us in the appropriate session.

But why, apart from this problem of the internal composition of our computer system, do we submit quietly to the prospect of going about the world festooned with miles of paper tape or loaded with stacks of stiff paper rectangles counted in megacards? There is basically one reason for cards, that they are not inconvenient for manual use. There is basically only one reason for filing, to wit, subsequent retrieval. It is a semantic danger to concentrate on the passive and limited concept "file" when what we really want is assured timely individual retrieval by selection, preferably by parallel interrogation of the system's "memory." Joanna West's culinary injunction "First cage your hare, then cook it" still holds, but we can cage it more elegantly than by tying it up with tape or by enveloping it in cardboard. All she prescribes in essence is "First find your entry, then read it"; the finding is a mere accessory, a regrettable preliminary, to the essential reading. The bibliographer, the lawyer, the librarian, are among the hosts of impatient clients who are clamoring for a system which gives them not exact coincidence (which would deny them the compilation of relevant, related but not identical references), but partial coincidence, entries with a key-part in common but containing supplementary, non-coincident data which are the "literature" of the specific "subject" which is used as an identifier.

All this talk is a preamble to a charity appeal. I am begging for a still better cooperative effort than has yet been made, to build up an accepted glossary of terms into which the specification of the potentials users' problems can be dissected. This is quite other than the "common machine language" towards which we should also be working. It is not merely quite other, it is vastly more difficult because it is vastly more diverse and disparate. It is so for the same reasons that make me treat the "computer" per se as relatively unimportant, the input-output and storage devices which must be gathered round the computer-kernel as being extremely important, and embarrassingly less tractable.

Any mathematician in the civilized, or in the uncivilized world, (I need not remind you that Russians are good at mathematics) can debate with any other mathematician in a common language. Until we can achieve the corresponding result at the aesthetically lower economically higher level of the office, the store and the production plant, we shall be shackled against our efforts to do, in the way he wants, the things that your client wants.

I have one other, but a brief, appeal. Two weeks ago I spoke, in this city at a luncheon not dissimilar to this one, under the subtitle Matching the Machine to the Man. I was dealing with cases where there had been no time in which to match the man to the machine. But if the big scale deliveries are indeed to come in 1960 and after, we have at least some time in the high schools, the colleges, in the offices and in the plants, to do something towards matching the man and the woman to the machine. In the end we shall all benefit by the introduction of "Automation," but only if we plan and act now can we save grave hardships for some of the displaced persons of the second Industrial Revolution.

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