On the principles of large scale computing machines.


This nostalgic fragment reached the reviewer, appropriately, on Christmas Eve. It is a hitherto unpublished note, written by the Goldstine-von Neumann team in 1946. Although the title suggests that the paper is concerned with the design of large-scale computing machines, the contents are exclusively directed at the justification for such devices. The authors first point out that such things as wind tunnels are really large-scale analog computers. They then go on to suggest that numerical analysis may contribute significantly to the understanding of difficult problems in pure mathematics. The examples cited are nonlinear ones and, in particular, nonlinear partial differential equations.

While physical machine structures are not mentioned in the paper, it may be interesting to recollect that the von Neumann, Princeton machine was to have an internal store for 4096 words of 32 bit length. Most modern analysts would regard such a capacity as useless but it must be remembered that all programming was then done in machine language and did not carry the overburden imposed by modern high-level compilers. An example of this occurred to the reviewer in the past few weeks where a standard compiler produced a pixel plotting function which required 17 kilo-bytes of code. The same objective was attained by the reviewer in 9 bytes of assembler!

This is an enjoyable paper, the predictions in which have been amply validated by 45 years of history.

{For the collection containing this paper see MR1067743}

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