The main limitations of the proposed binary decision machine are that

- the highest number of instructions is \(2^8 = 256\) (ADR = ADR\(7:0\)),
- the highest number of branch variables is \(2^4 = 16\) (i = i\(3:0\)), and the highest number of output registers is also \(2^4 = 16\) (j = j\(3:0\)), and
- the highest number of nested subprograms is four, because of the four levels of the controller stack (Figure 8).

All these limitations are of a technological nature, and the first two can obviously be overcome by choosing a larger address bus and a larger memory word. More difficult to overcome is the stack limitation, which is dependent upon the sequencer design.

The structuring of a low-level language is normally done to obtain correct, readable, and easy-to-transform programs. However, our primary motivation here has been to propose a low-level language with a very close relationship to a high-level, and structured, language such as Pascal or a subset of Pascal. With such a close relationship, the translation of a HLL program (the source program) into an LLL-equivalent program (the object program), i.e., the compilation, is much easier. Describing the high-level language, the rules of compilation into the above low-level language, and a microprogrammed realization of the compilation algorithm will be the subject of Part II.

References


Daniel A. Mange was appointed a professor at the Swiss Federal Institute of Technology, Lausanne (Ecole Polytechnique Fédérale de Lausanne—EPFL), in 1969. He directs the EPFL switching theory laboratory, which is currently carrying out a comparative study of high-wired switching systems and of microprogrammed systems. This research is being conducted in close association with the Centre Suisse d'Electronique et de Microtechnique, Neuchâtel, Switzerland, and its aim is to design and build microprogrammed processors using CMOS technology.

Mange holds an MS and a PhD from EPFL. He is a member of the IEEE.

Questions about this article can be directed to Mange at EPFL, 16 Chemin de Bellerive, CH-1007 Lausanne, Switzerland.

Reader Interest Survey

Indicate your interest in this article by circling the appropriate number on the Reader Interest Card.

High 156 Medium 157 Low 158