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WOPPLOT 86 Parallel Processing: Logic, Organization, and Technology

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PREFACE

"Where else can you listen to a philosopher and a cyberneticist discussing the nature of time?" exclaimed enthusiastically one of the participants to WOPPLOT 86. His reaction characterizes best the spirit of the workshop. Three years after WOPPLOT 83 (which was published as Vol. 196 of Springer Lecture Notes in Physics) we decided to hold another workshop. Our aim was to collect some current work as well as some future perspectives of parallel processing in order to get some feeling for the necessary technological developments.

Silicon technology, in particular in connection with molecular beam epitaxy, could provide for more local memory and more connections in the course of the next years, even if many problems have still to be solved. A possible competitor is molecular electronics; but with structures in silicon getting smaller and smaller it might be difficult for molecular electronics to catch up.

One of the basic questions of parallel processing is that of the organizational structure, which - up to now - is more dictated by technology than by needs. However, since the invention of structured design and object-oriented programming it has become clear that there ought to be an intimate relationship between problem structure, logical structure, and organizational structure.

A structure that occurs frequently is hierarchical organization ("pyramid architecture"). It is also the only one for which a closed, consistent theory exists, at least in the case of equilibrium.

Whereas the state of the art concerning SIMD machines is quite satisfactory, a general concept for MIMD machines is still missing. That such machines should exist is suggested at least by considering the brain. Mental representations are therefore of interest also for parallel processing. Furthermore, the above-mentioned connection between structure and logics may suggest that we cannot expect MIMD machines to work in the framework of Boolean logics.

In spite of many open questions (including that of parallelizability) parallel computation is already being applied to many practical problems, mainly in physics and in image processing.

Some of the papers have been modified after the workshop. For this and also for some technical reasons there has been some delay in the publishing of the proceedings. We should like to thank the editors of LNCS and the Springer-Verlag for their patience and cooperation.

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