Foreword to the Special Issue on Supercomputing in Japan

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Recently, the very high speed numerical calculation machines, namely supercomputers, have been getting popular among the users, who have a large amount of computational jobs. They have been used in the universities, large research laboratories, and now many large companies began to use for varios applications. Supercomputers are getting essential tools for designing automobils, airplanes, electronic devices, etc. as well as for scientific research areas.

The three major computer manufacturers in Japan have been actively marketting their products since they succesively came into this market in 1983–1985; Fujitsu (VP series), Hitachi (S-810/820 series), and NEC (SX series). The fundamental architectures are based on the vector pipeline method, which they inherited from CRAY-1, but various innovative extensions have been made in order to attain high computation speed for the variety of applications.

These architectural chracteristics pose new issues mainly on the software side. The vector machine performance is very sensitive to the vetorization factor, that is, how effectively the vector arithmetic can be utilized is a key to the supercomputer performance. This means that automatic vectorization technology optimized for the vector machines and different algorithms suitable to the architecture should be explored more intensively.

It is the purpose of this special issue to investigate the state-of-the-art software technologies for fully utilizing the supercomputer power. Six excellent articles have been selected, covering major software issues.

The article written by Masaaki Shimasaki, Kyoto University, discusses about the techiniques in vectorizing compiler. Current status of compiling techniques and related problems are described. The language issues are also discussed succesive two papers featuring DEQSOL (Differential Equation Solver Language) and a FORTRAN 77/HAP compiler both by the Hitachi people. The DEQSOL language is designed to describe partial differentil equation problems in quite a natural way.

Three supercomputing algorithm issues follow. Yoshio Oyanagi, University of Tsukuba, discusses comparison results of the hyperplane and 16- color vectorization of imcomplete LU preconditioning for the Wilson Fermion on the lattice. Shun Doi and Norio Harada, NEC Corporation, present comparison of algorithms on the SX-2 supercomputer. Supercomputer applications for large-scale finite element analysis are discussed in the last article by Toshio Kobayashi, Haruo Naito and Takashi Nishino of Fujitsu.

There are many other activities related to supercomputing which are not included in this issue. Some other papers will be found in the regular issues of The Journal of Information Processing.

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