

*Survey of Research Topics on Software Automatic Tuning*  
*--- Broad scope of Automatic-Tuning technology in network*  
*and hardware systems ---*

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Abstract

In this work, we survey the technology trends and the possibility of “Automatic Tuning (AT)” from the viewpoint of the systems being applied such as a microprocessor, a computer system, and the environment of the whole system. We study the potential and the effectiveness of the AT technology and discuss more general issues by expanding the scope of the system from a single processor unit to a parallel computer, the distributed system, and the network environment, etc. The application should not be limited to the scientific numerical computation. In a broad sense, various computer environments on which wide applications run can be thought as a target system of AT. In this survey, the multicore processor (including Cell and GPU) and the cluster system are basically assumed to be a priority concerning technology trends of the system by the page limitation. However, the system that assumes the network to be a key issue is also important for AT like the Grid computing, the Web system, a ubiquitous network and the sensor network, etc. In addition, embedded systems and FPGA (Field Programmable Gate Array) are expected as new target systems of AT. When we imagine the innovation of the AT technology in future, “network and hardware systems” offer a lot of research topics. Some topics yielded from Peta-scale computing and low-energy computing are also big issues.

Keywords: multicore processor, Cell, GPU, cluster system, network-based computing, supercomputer system, low-energy computing