

Automatic Loop Transformation Selection with the Aid of Kohonen's Self-Organizing Maps for Parallelizing Compilers

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Abstract

Determine the appropriate loop transformations is an essential process in the automatic parallelization field. The sequence of loop transformation to be applied also must be considered. Selection of loop transformations faces many challenges, it is needed an experienced. In this paper, An Intelligent Loop Transformation Selector (ILTS); as a part of parallelizing tool project, was developed to overcome on these challenges and imitate an experienced. A Kohonen's Self-Organizing Map (SOM) neural network is used to select the appropriate loop transformation or sequence of them. Neural Networks offer intelligent transformations selection to reduce or eliminate the dependencies and maximize the parallelization in the sequential code. The experimental results show that ILTS chooses loop transformations successfully in most cases. This tool can be integrated with any parallelizing compiler to enhance loop transformation selection process.

Keywords: *Automatic code parallelization, Dependence Analysis, Loop Transformation, Neural Networks, Kohonen Network.*

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Developing an Intelligent Layer for Automatic Parallel Detection Implemented on Different High Performance Computing Platform

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Abstract

In this paper, an automatic parallelization tool for C code, named Intelligent Automatic Parallel Detection Layer (IAPDL), is presented. It generates parallelized MPI code, and OpenMp code from the sequential code; at the loop level, to be executed on a cluster platform and multicore platform respectively. In addition to, a tool that uses a new approach to choosing loop transformations, called Intelligent Loop Transformation Selector (ILTS), is developed. It is designed as an integrated part in IAPDL. The selection process of appropriate loop transformation was accomplished intelligently; a Kohonen's Self-Organizing Map (SOM) neural network is used to select the appropriate loop transformation or sequence of them.

Keywords: *Automatic parallelization, Cluster of Workstations, Multicore Processor, Dependence Analysis, Loop Transformation, Neural Networks.*

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