



Séminaire Informatique Haute Performance @ Campus Teratec

Séminaire n°54 du Jeudi 09 Février 2017, 10h, Ter@tec.

Rewriting System for Profile-Guided Data Layout Transformations on Binaries

Jeudi 09 Février 2017, Christopher Haine, Doctorant à l'INRIA Bordeaux Sud-Ouest, nous présentera ses travaux sur le profilage d'applications pour une restructuration efficace des données.

Voici le résumé de cette présentation qui aura lieu dans la salle Paul Gauguin à Ter@tec, à 10h

Rewriting System for Profile-Guided Data Layout Transformations on Binaries

Careful data layout design is crucial for achieving high performance, as nowadays processors waste a considerable amount of time being stalled by memory transactions, and in particular spatial and temporal locality have to be optimized. However, data layout transformations is an area left largely unexplored by state-of-the-art compilers, due to the difficulty to evaluate the possible performance gains of transformations. Moreover, optimizing data layout is time-consuming, error-prone, and layout transformations are too numerous to be experimented by hand in hope to discover a high performance version.

We propose to guide application programmers through data layout restructuring with an extensive feedback, firstly by providing a comprehensive multidimensional description of the initial layout, built via analysis of memory traces collected from the application binary in fine aiming at pinpointing problematic strides at the instruction level, independently of the input language. We choose to focus on layout transformation, translatable to C-formalism to aid user understanding, that we apply and assess on case study composed of two representative multithreaded real-life applications, a cardiac wave simulation and lattice QCD simulation, with different inputs and parameters. The performance prediction of different transformations matches (within 5%) with hand-optimized layout code and the speed-up obtained are as high as 28x (for cardiac wave simulation) and 2.5x for Lattice QCD, when combined with SIMDization.

Après un Master Informatique Haute Performance (MIHPS) à l'Université de Versailles/Ecole Centrale Paris, **Christopher Haine** a travaillé sur des méthodes de résolution parallèles de problèmes de valeur propres lors d'un stage au LBNL (Berkeley Lab). Il a ensuite réalisé un stage à l'Inria Bordeaux Sud-Ouest sur de la modélisation de performances de noyaux de calcul. Il est actuellement en thèse de doctorat à l'Inria Bordeaux Sud-ouest, portant sur la restructuration automatisée de noyaux de calcul.
