Jean-Noël Quintin

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Birthday: January 30th, 1985

Doctor/Engineer in parallel programming.

Education

2008–2011 **Ph.D. in Computer Science**, INRIA-LIG, Grenoble.
Research theme: *Dynamic load-balancing on hierarchical platforms.*
PhD advisers : Denis Trystram and Frédéric Wagner.

2007–2008 **M.Sc in Computer Science**, Grenoble University, France.
Master thesis on work-stealing on distributed platforms, advised by Frédéric Wagner.

2005-2008 **Engineering Degree in Computer Science**, Ensimag, Grenoble Institute of Technology France, Among highest ranking French educational institution in computer science and applied mathematics. Pass with high honors.

Teaching

2010-2011 **Teaching Fellow**, Polytech, Grenoble.
≈ 40h of lectures on introduction to networks.
Acquired skills: Communication and improve network skills

2008-2010 **Teaching Fellow**, Ensimag, Grenoble.
≈ 20h of lectures on operating and distributed systems,
≈ 50h of labs on introduction to operating systems.

Experience

2012–present **Post-doctoral position in exascale computing**, University College Dublin (UCD).
In collaboration with IBM

2010-2011 **Development in DSMake**, A distributed make program.
Acquired skills: Design and conception of applications from scratch, Perl language.

2007-2009 **Development in KAAPI**, Middle-ware for parallel applications.
Acquired skills: Parallel and distributed programming, C++ language, Experiments on GRID5000.

Computer skills

Languages	C, C++, Perl, Java, Shell, VHDL	Parallel Programming	Pthread, Cilk, TBB, MPI, OpenMP
Operating Systems	Mac OS X, Linux	mathematics software	R, Maple, Sage

Languages and interests

French	mother tongue	Sport	cycling (mountain road), volley-ball.
English	fluent	Photography	animals, landscape.

Research Work

Subject **Dynamic load-balancing on hierarchical platform**

PhD Advisers Denis Trystram and Frédéric Wagner

Context We consider an application described by a Data Flow Graph. The aim is to schedule the application on a platform to obtain the smallest execution time. We try to schedule dynamically the application with the work-stealing algorithm. This algorithm is efficient although it doesn't take into account the data transfers. We want to minimize the communication impact on the execution time for this algorithm.

Contributions

- I have developed two new hierarchical heuristics (PWS and HWS), to minimize the communication impact on a hierarchical platform. These heuristics aim to improve data locality. I have validated these heuristics experimentally and theoretically. This work was published in [1, 2]
- On some applications, the amount of data transfers can be high. To minimize the amount of data transfers during the execution, I have developed an algorithm called WSCOM which uses the DAG structure of the application. For each steal request, the work-stealing algorithm tries to balance the load between the thief and the stolen processor. Thus, WSCOM tries to divide the stolen processor's work into two parts with a small number of edges between the two parts. This cutting is done with a negligible overhead at each steal request. This algorithm has been implemented in a tool called DSMake. This tool executes the set of tasks described by a Makefile on a distributed platform. In addition, I have developed a simulator to validate algorithm performance and its behavior. We compared WSCOM and severals static list-scheduling algorithms. The comparison shows that WSCOM outperforms list-scheduling algorithms, on clusters with some network congestion. This work has been presented in two workshops [3, 4].
- I have also participated to some experiments in:
  – a large platform with some heterogeneous resources [5].
  – an analysis of the scheduling algorithm sensitivity on some disruptions on input DAG [6].

Research project My PhD work was principally applied to distributed platforms. The developed heuristics could be applied to shared memory platforms. In the opposite to distributed platforms, the data management is generally done automatically by the operating system without any informations about the applications. I think that we can improve the data management inside the kernel by adding some informations provided by the application or the middle ware. After having a such possibility, the problem is to obtain the best performance on NUMA platforms.

Working Groups I participate weekly in working groups on scheduling algorithms and on programming issues.

Other Research activities

Frejus workshop organization I helped on the workshop organization called "New Challenges in Scheduling Theory" in Frejus.

Paper review I reviewed about ten papers for IPDPS, ICS, simutools ...

Publications and Presentations

[1] Jean-Noël Quintin and Frédéric Wagner. Hierarchical work-stealing. In Pasqua D'Ambra, Mario Guarracino, and Domenico Talia, editors, *Euro-Par 2010 - Parallel Processing*, volume 6271 of *Lecture Notes in Computer Science*, pages 217–229. 2010.

[2] Jean-Noël Quintin and Frédéric Wagner. HWS, vol de travail hiérarchique. In *Proceedings of Renpar'19*, Toulouse, France, sept 2009.

[3] Jean-Noël Quintin and Frédéric Wagner. Scheduling dag of tasks with communications on large scale machines. *Workshop New Challenges in Scheduling Theory FREJUS*, 2010.

[4] Jean-Noël Quintin and Frédéric Wagner. Scheduling data-intensive applications on large scale platforms. *Workshop Aussois*, 2011.

[5] Jean-Noël Quintin and Frédéric Wagner. Scheduling : Experimentation on hierarchical and heterogeneous platform. *Summer school grid'5000*, 2009.

[6] Jean-Noël Quintin and Perranau Swann. Sensiblité des algorithmes d'ordonnancement. In *Proceedings of Renpar'20*, Saint Malo, France, May 2011.

[7] Jean-Noel Quintin and Frédéric Wagner. WSCOM: Online task scheduling with data transfers (to be appear). In *12th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing, CCGrid 2012, Ottawa, Canada May 13-16, 2012*. IEEE, 2012.