Laboratoire de l'Informatique du Parallélisme (LIP) École Normale Supérieure de Lyon 46 Allée d'Italie 69364 Lyon Cedex 07 - France +39-349-7703864 buttari@cs.utk.edu http://graal.ens-lyon.fr/~abuttari/

Objective

Obtain a position utilizing his abilities to:

- Collaborate and advise on research projects in areas of expertise;
- Employ critical thinking to develop innovative solutions;
- Use knowledge of cultures and languages to facilitate collaboration in international working environments;
- Continue the ongoing pursuit of knowledge.

Research

INRIA Rhône-Alpes

Post-doctoral

- He is involved in the ANR Solstice project (ANR-06-CIS-010) whose objective is to design and develop high-performance parallel linear solvers that will be efficient to solve complex multiphysics and multi-scale problems of very large size. Most of his research activity revolves around the MUMPS project which aims at developing a parallel, multifrontal sparse solver for massively parallel architectures. Specifically he is in charge of the development of a parallel analysis phase for such solver. His research focuses large-scale simulations, high-performance computing and applied sparse and dense linear algebra.

University of Tennessee Knoxville

- Research Associate III
 - Research Associate III in the Innovative Computing Laboratory of Prof. Jack Dongarra at the University of Tennessee Knoxville. His research is focused on High Performance Computing, Computational Linear Algebra, parallel programming and computer architectures. He is working at the development of parallel programming models for the implementation of Linear Algebra algorithms on modern multicore systems.
 - He is also involved in the development and maintainance of the LAPACK and ScaLAPACK software libraries.
 - He is involved in the development and maintainance of the PSBLAS (Parallel Sparse Basic Linear Algebra Subroutines) software package which contains MPI parallel implementations of preconditioned Krylov iterative solvers for sparse linear systems.

Education

University of Rome "Tor Vergata"

• PhD "Computer Science and Control Engineering"

Rome, Italy November 2002 - March 2006

Lyon, France January 2008 - Present

Knoxville, Tennessee March 2006 - January 2008

- PhD student at the Computer Science Engineering department of the University of Rome "Tor Vergata". His main interests are in High Performance Computing, Numerical Linear Algebra, parallel and distributed calculus. Namely he is involved in the PSBLAS (Parallel Sparse Basic Linear Algebra Subroutines) project that aims at developing a software package for the implementation of iterative preconditioned solvers for Sparse Linear Algebra in a parallel computing environment. During this period he has gained deep knowledge of parallel and distributed programming techniques and tools, high performance software development methods and basic knowledge of iterative solvers theory.
- During his PhD he spends ten months (March 2004 December 2004) at the University of Tennessee Knoxville in the Innovative Computing Laboratory of Prof. Jack Dongarra doing research on autoadaptive techniques and blocked storage formats for Sparse Linear Algebra kernels.
- PhD thesis title "Software Tool for Sparse Linear Algebra Computations" [PDF]. Thesis advisor Dr. Salvatore Filippone.

University of NaplesVico Equense, ItalyInternational Summer School on Grid ComputingJuly 2005

– Introductory course on Grid related technologies.

University of Rome "Tor Vergata"

- Master Degree in Computer Science
 - Thesis title "Data Structures for Sparse Linear Algebra with applications to Computational Fluid Dynamics".

Skills

Languages: advanced knowledge of C/C++, Fortran90/95 and Fortran77. Basic knowledge of Python.

- **Operating Systems:** advanced knowledge of Linux/UNIX and UNIX-like operating systems. Basic knowledge of Windows 95/98/NT/2000/XP.
- **Applications/software packages:** developer's level knowledge of the **PSBLAS** software package. Developer's level knowledge of the **LAPACK** and **ScaLAPACK** software packages. Developer's level knowledge of the MUMPS software package. User's level knowledge of the Matlab software. User's level knowledge of the PETSc and Trilinos software packages.
- **Parallel programming:** advanced knowledge of MPI, OpenMP and pThreads. Expert knowledge of vector programming techniques.

Miscellaneous: expert knowledge of the LATEX typesetting language and of bash shell scripting.

Avezzano, February 17, 2008

Alfredo Buttari Alfredo Bundar

Rome, Italy

September 1997 - November 2002

Journal papers

- [1] Gino Bella, Francesco del Citto, Salvatore Filippone, Alfredo Buttari, and Alessandro de Maio. FAST-EVP: Parallel high performance computing in engine applications. *International Journal of Computational Science and Engineering (IJCSE)*, 2006. To appear. [PDF].
- [2] Alfredo Buttari, Pasqua D'Ambra, Daniela di Serafino, and Salvatore Filippone. 2LEV-D2P4: a package of high-performance preconditioners for scientific and engineering applications. *Appl. Algebra Eng.*, *Commun. Comput.*, 18(3):223–239, 2007. [doi:10.1007/s00200-007-0035-z].
- [3] Alfredo Buttari, Jack Dongarra, Julie Langou, Julien Langou, Piotr Luszczek, and Jakub Kurzak. Mixed precision iterative refinement techniques for the solution of dense linear systems. Int. J. High Perform. Comput. Appl., 21(4):457–466, 2007. [doi:10.1177/1094342007084026].
- [4] Alfredo Buttari, Victor Eijkhout, Julien Langou, and Salvatore Filippone. Performance optimization and modeling of blocked sparse kernels. Int. J. High Perform. Comput. Appl., 21(4):467–484, 2007.
 [doi:10.1177/1094342007083801].
- [5] Alfredo Buttari, Julien Langou, Jakub Kurzak, and Jack Dongarra. Parallel Tiled QR Factorization for Multicore Architectures. *Concurrency and Computation: Practice and Experience*, 2007. To appear. LAPACK Working Note 190. [PDF].
- [6] Jakub Kurzak, Alfredo Buttari, and Jack Dongarra. Solving Systems of Linear Equations on the CELL Processor Using Cholesky Factorization. *IEEE Transactions on Parallel and Distributed Systems*, 2007. To appear. LAPACK Working Note 184. [PDF], [doi:10.1109/TPDS.2007.70813].
- [7] Alfredo Buttari, Jack Dongarra, Jakub Kurzak, Piotr Luszczek, and Stanimire Tomov. Using mixed precision for sparse matrix computations to enhance the performance while achieving 64-bit accuracy. *ACM Transactions on Mathematical Software*, 34(4), 2008. [PDF].

Journal papers (under review)

[8] Alfredo Buttari, Julien Langou, Jakub Kurzak, and Jack Dongarra. A class of parallel tiled linear algebra algorithms for multicore architectures. Technical Report UT-CS-07-600, Innovative Computing Laboratory, University of Tennessee Knoxville, September 2007. Submitted to Parallel Computing journal. LAPACK Working Note 191. [PDF].

Conference papers

- [9] G. Bella, A. Buttari, A. De Maio, F. Del Citto, S. Filippone, and F. Gasperini. FAST-EVP: an engine simulation tool. In Springer, editor, *High Perfromance Computing and Communications. First International Conference, HPCC 2005, Proceedings*, volume 3726 of *Lecture Notes in Computer Science*, pages 976–986, September 2005. [doi:10.1007/11557654_108].
- [10] A. Buttari, P. D'Ambra, D. di Serafino, and S. Filippone. Extending PSBLAS to Build Parallel Schwarz Preconditioners. In Springer, editor, Applied Parallel Computing. State of the Art in Scientific Computing: 7th International Conference, PARA 2004, Lyngby, Denmark, June 20-23, 2004., volume 3732 of Lecture Notes in Computer Science, pages 593–602, February 2006. [doi:10.1007/11558958_71].

- [11] Alfredo Buttari, Jack Dongarra, Jakub Kurzak, Julien Langou, Piotr Luszczek, and Stanimire Tomov. The impact of multicore on math software. In *PARA*, pages 1–10, 2006. [doi:10.1007/978-3-540-75755-9_1].
- [12] James W. Demmel, Jack Dongarra, Beresford Parlett, W. Kahan, Ming Gu, David Bindel, Yozo Hida, Xiaoye S. Li, Osni A. Marques, E. Jason Riedy, Christof Vmel, Julien Langou, Piotr Luszczek, Jakub Kurzak, Alfredo Buttari, Julie Langou, and Stanimire Tomov. Prospectus for the next lapack and scalapack libraries. In *PARA'06: State-of-the-Art in Scientific and Parallel Computing*, Umeå, Sweden, June 2006. High Performance Computing Center North (HPC2N) and the Department of Computing Science, UmeåUniversity, Springer. [doi:10.1007/978-3-540-75755-9_2].
- [13] Julie Langou, Julien Langou, Piotr Luszczek, Jakub Kurzak, Alfredo Buttari, and Jack Dongarra. Exploiting the performance of 32 bit floating point arithmetic in obtaining 64 bit accuracy (revisiting iterative refinement for linear systems). In SC '06: Proceedings of the 2006 ACM/IEEE conference on Supercomputing, page 113, New York, NY, USA, 2006. ACM. [doi:10.1145/1188455.1188573].
- [14] Alfredo Buttari, Jack Dongarra, Parry Husbands, Jakub Kurzak, and Katherine Yelick. Multithreading for synchronization tolerance in matrix factorization. In *Proceedings of the SciDAC 2007 Conference*, Boston, Massachusetts, 2007. Journal of Physics: Conference Series. [doi:10.1088/1742-6596/78/1/012028].

PhD Thesis

[15] Alfredo Buttari. Software Tools for Sparse Linear Algebra Computations. PhD thesis, University of Rome Tor Vergata, 2006. [PDF].

Book Chapters

- [16] *High Performance Computing and Grids in Action*, chapter Exploiting Mixed Precision Floating Point Hardware in Scientific Computations. 2007. [PDF].
- [17] J. Demmel et al. Handbook of Parallel Computing: Models, Algorithms and Applications, volume 17 of Chapman & HallCRC Computer & Information Science, chapter Prospectus for a Linear Algebra Software Library for Dense Matrix Problems. CRC Press, 1 edition, December 2007. ISBN: 9781584886235.

Technical Reports

- [18] Alfredo Buttari, Jakub Kurzak, and Jack Dongarra. Limitations of the PlayStation 3 for High Performance Cluster Computing. Technical Report UT-CS-07-597, Innovative Computing Laboratory, University of Tennessee Knoxville, April 2007. LAPACK Working Note 185. [PDF].
- [19] Alfredo Buttari, Piotr Luszczek, Jakub Kurzak, Jack Dongarra, and George Bosilca. SCOP3: A rough guide to scientific computing on the PlayStation 3. version 0.1. Technical Report UT-CS-07-595, Innovative Computing Laboratory, University of Tennessee Knoxville, April 2007. [PDF].
- [20] A. Buttari and S. Filippone. PSBLAS-2.0 User's Manual. University of Rome Tor Vergata, 2005.

Popular science magazines

[21] Jaku Kurzak, Alfredo Buttari, Piotr Luszczek, and Jack Dongarra. The playstation 3 for high performance scientific computing. to appear in Computing in Science and Engineering.

Jack Dongarra

Innovative Computing Laboratory, University of Tennessee Knoxville

web: http://www.netlib.org/utk/people/JackDongarra/

email: dongarra@cs.utk.edu

phone: +1-865-974-8295

address: Department of Computer Science, University of Tennessee Knoxville 1122 Volunteer Blvd University of Tennessee Knoxville, TN 37996-3450

Salvatore Filippone

University of Rome "Tor Vergata"

web: http://www.ce.uniroma2.it/people/filippone.html

email: salvatore.filippone@uniroma2.it

phone: +39-062026017

address: Department of Mechanical Engineering Universit di Roma "Tor Vergata" Via del Politecnico 1, 00133 Roma, Italy

Julien Langou

The University of Colorado at Denver and Health Sciences Center

web: http://www.math.cudenver.edu/ langou

email: Julien.Langou@cudenver.edu

phone: +1-303-556-3919

address : Dept. of Mathematical Sciences and Health Sciences Center The University of Colorado at Denver 1250, 14th Street - Room 646 Denver, Colorado 80202