

Profile

Expertise: Stochastic distance measures, correlation measures, compilers, high performance and embedded computing.

- Change Detection in multidimensional time series
 - Vector Sorting algorithms
 - Kernel methods, Compression, Martingale methods, POSET
- Stochastic distance measures and correlation
 - Extension and generalization for the anomaly detection in time series
 - For the comparison of search engines
- Data-mining of web corpora by contents
 - Signature and duplicate detection
- High performance algorithms for linear algebra (e.g., Matrix multiplication)
 - Algorithm engineering
 - Application optimizations
- Compiler analysis tools and compiler optimizations (e.g., static, symbolic and dynamic optimizations) for recursive and non-recursive applications
 - Register allocation and instruction scheduling algorithms
 - Data locality through code reorganization and data layout
- Software and hardware interface for embedded systems for the development of Discrete Signal Processing applications and Discrete Fourier Transform kernels
 - Feedback driven optimizations
 - Code generation and code optimizations for custom architectures

Industrial Experience

Yahoo! Inc. (2007-present)

- Correlation measure for the comparison of search engines
Data mining of web corpora by signature base and by contents
- Anomaly detection tools for time series
- Extension and generalization of information-theoretic measure to one-dimensional distribution function.
- Specification of the PIG language (grammar and front-end)
- Monitoring tools.

Independently and with Yahoo!

- Supervising the research of graduate students (statistics + compilers, algorithm engineering)

Research Experience

Carnegie Mellon University, Department of Electrical and Computer Engineering

- **SPIRAL:** SW/HW generation for DSP algorithms (Post-Doc Fellow, Jun 2005-2007)

University of California at Irvine, Dep. Computer Science (Ph.D.)

- **JuliusC:** Compiler Optimizations for Divide & Conquer Algorithms (2003-2005)
- **ARMR** Adaptive Memory Reconfiguration & Management (2000-2002)

Personal Research

- **FASTMM:** Fast Matrix Multiplication software package. The implementation of fast matrix multiplication algorithms such as Winograd's for multicore multiprocessor systems: The fastest MM.

Teaching Experience

- **Computer Science, University of California at Irvine**
 - **Lecturer**, 2003-2004.
- **Computer Science and Engineering, University of California at San Diego**
 - **Lecturer**, Summer 2003.
- **Tecnopadova and S.E.R.C**
 - **Coordinator/Lecturer**, 1997.

Technical Skills

- **Languages:** C/C++, Java JDK, perl, LaTeX, HTML, XML, FORTRAN, Python, Shell, MySQL, Pig

Education

- Post Doctorate position at Carnegie Mellon University (SPIRAL FFT).
- Ph.D. in Computer Science, University of California at Irvine, 2005
- Dottorato di ricerca, Computer Science, University of Bologna, Italy, 2000
- First modulo of Master in Software Engineering, Tecnopadova and S.E.R.C. Padua, Italy.
- B.S. In Electrical and Computer Engineering, University of Padua, Italy.

Awards and Sponsors

- (2005-2007) DARPA through the Department of Interior grant NBCH1050009
- (2005) Dissertation Fellowship University of California Irvine
- (2000-2002) Research sponsored in part by DARPA/ITO under contract DABT63-98-C-0045.
- Research sponsored in part by NSF under contract ACI-0204028.

Publications

Books

1. P.D'Alberto
The X-Legion Compiler: A Compiler Approach to Write and to Optimize Divide-And-Conquer Algorithms (Paperback)
VDM Verlag (June 26, 2009) [amazon link](#)

Journals

1. P.D'Alberto, M. Bodrato, and A.Nicolau
Exploiting Parallelism in Matrix-Computation Kernels for Symmetric Multiprocessor Systems: Matrix-Multiplication and Matrix-Addition Algorithm Optimizations by Software Pipeline and Threads Allocation
ACM Transaction on Mathematical Software 2011 ([unbridged](#)) [PDF](#)
2. P.D'Alberto and A.Nicolau
Adaptive Winograd's Matrix Multiplications
ACM Transaction on Mathematical Software (accepted) 2008 [PDF](#)
3. P.D'Alberto and A. Nicolau
R-Kleene: A High-Performance Divide-and-Conquer Algorithm for the All-Pair Shortest Path for Densely Connected Networks (2005)
Algorithmica (2007) [PDF](#)
4. P.D'Alberto, A.Nicolau, A. Veidenbaum, and R.Gupta
Line Size Adaptivity Analysis of Parameterized Loop Nests for Direct Mapped Data Cache (2005)
Transactions on Computers, IEEE Society, Feb 2005. [PDF](#)

Proceedings and Posters

1. R. Cammarota, A. Kejariwal, P. D'Alberto, S. Panigrahi, A. Veidenbaum, and A.Nicolau
Pruning Hardware Evaluation Space via Causality-Driven Application Similarity Analysis
ACM International Conference on Computer Frontiers (2011) [PDF](#)
2. A. Dasdan , P.D'Alberto, S.Kolay, and C. Drome
Automatic Retrieval of Similar Content Using Search Engine Query Interface
The 18th ACM Conference on Information and Knowledge Management (2009) [PDF](#)
3. P.D'Alberto and A. Dasdan
Non-Parametric Information-Theoretic Measures of One-Dimensional Distribution Functions from Continuous Series
The 2009 SIAM International Conference on Data Mining SDM 2009 (accepted -- extended version) [PDF](#)
[Poster](#) and [Teaser](#)
4. F.Franchetti, Y.Voronenko, P.Milder, S.Chellappa, M.Telgarsky, H.Shen, P.D'Alberto, F.de Mesmay, J.Hoe, J.Moura, and M.Puschel
Domain-Specific Library Generation for Parallel Software and Hardware Platforms
NSFNGS 2008 [PDF](#)

5. S.Kolay, P.D'Alberto, A.Dasdan, and A.Bhattacharjee
A Larger Scale Study of Robots.txt
(Poster) WWW 2008 [PDF](#)
6. P.D'Alberto and A.Nicolau
Adaptive Strassen's Matrix Multiplication (2007)
The 21th International Conference on Supercomputing [PDF](#)
7. P.D'Alberto, P.Milder, A.Sandryhaila, F.Franchetti, J.Hoe, J.Johnson, J.Moura, and M.Pueschel
Generating FPGA-Accelerated DFT Libraries (2007)
The Field-Programmable Custom Computing Machines IEEE Symposium (FCCM) 2007 [PDF](#)
8. P.D'Alberto, F.Franchetti, and M.Pueschel
Performance/Energy Optimization of DSP Transforms on the Scale Processor (2007)
The 2007 International Conference on High Performance Embedded Architectures & Compilers [PDF](#)
9. P.D'Alberto, P.Milder, F.Franchetti, J.C.Hoe, M.Pueschel and J.Moura
Discrete Fourier Transform Compiler for FPGA and CPU/FPGA Partitioned Implementations (2006)
The 10th Workshop High performance Embedded Computing [PDF](#)
- 10.P.D'Alberto and A. Nicolau
Adaptive Strassen and ATLAS's DGEMM: A Fast Square-Matrix Multiply for Modern High-Performance Systems (2005)
The 8th International Conference on High Performance Computing in Asia Pacific Region (HPC asia) [PDF](#) [Presentation](#)
- 11.P.D'Alberto and A. Nicolau
Using Recursion to Boost ATLAS's Performance (2005)
The Sixth International Symposium on High Performance Computing (ISHPC-VI) [PDF](#)
- 12.A.Kejariwal, P.D'Alberto, A.Nicolau, and C.D.Polychronopoulos
A Geometric Approach for Partitioning N-Dimensional Non-Rectangular Iteration Space (2004)
LCPC 2004: The 17th International Workshop on Languages and Compilers for Parallel Computing [PDF](#)
- 13.P.D'Alberto and A.Nicolau
JuliusC: A Practical Approach for the Analysis of Divide-And-Conquer Algorithms (2004)
LCPC 2004: The 17th International Workshop on Languages and Compilers for Parallel Computing [PS](#)
- 14.P.D'Alberto, A.Nicolau, and A.Veidenbaum
A Data Cache with Dynamic Mapping (2003)
LCPC 2003: The 16th International Workshop on Languages and Compilers for Parallel Computing [PDF](#) [PS](#)
- 15.P.D'Alberto, A.Veidembaum, A.Nicolau, and R.Gupta
Static Analysis of Parameterized Loop Nests for Energy Efficient Use of Data Caches

(2001)

COLP 2001 [PDF](#)[PS](#)[Presentation](#)

16. G. Bilardi, P. D'Alberto, and A. Nicolau

Fractal Matrix Multiplication: a Case Study on Portability of Cache Performance (2001)

WAE 2001 [PDF](#) | [PS](#) | [presentation](#)

17. G. Bilardi, A. Pietracaprina, and P. D'Alberto

On the space and access complexity of computation DAGs

Workshop on Graph-Theoretic Concepts in Computer Science [PS](#)

Technical Reports and Theses

1. P. D'Alberto

X- Legion: a compiler-approach to exploit locality and portability of divide-and-conquer algorithms (2005)

Ph.D. Thesis [PDF](#)

2. H. Du, P. D'Alberto, R. Gupta, A. Nicolau, and A. Veidenbaum

A quantitative evaluation of adaptive memory hierarchy (2002)

Technical Report [PDF](#) [PS](#)

3. P. D'Alberto

MIPS R12000 Processor Performance Evaluation by SPEC2000 Benchmarks and Performance Counters

[PDF](#)

4. P. D'Alberto, G. Bilardi, and A. Nicolau

Fractal LU-decomposition with partial pivoting

technical report [PDF](#) | [PS](#)

5. P. D'Alberto

Performance Evaluation of Data Locality Exploitation (2000)

Thesis Dottorato di ricerca in Computer Science Bologna-Padua-Venice

[PDF](#) | [PS](#)

All publications are available in electronic format at
<http://www.ics.uci.edu/~paolo/Reference/reference.html>

Professional Memberships and Activities

- SIAM Member since 2006.
- Reviewer for a few international journals and conferences