

VITAE - CELSO L. MENDES

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E-mail: cmendes@cs.uiuc.edu
URL: <http://charm.cs.uiuc.edu/people/cmendes>
Cellular Phone: (217) 621-2312

1 - PERSONAL DATA:

Place of Birth: Rio de Janeiro, Brazil
Citizenship: Brazilian
Visa Status: US Permanent Resident

2 - CURRENT ADDRESS:

Work: Univ. of Illinois, Dep. Computer Science
201 N. Goodwin Ave., 4218 Siebel Center
Urbana, IL 61801
Phone: +1 (217) 244-9234
Fax: +1 (217) 265-6582
E-mail: cmendes@cs.uiuc.edu

Home: 1002 Brighton Drive
Urbana, IL 61801 - USA
Phone: +1 (217) 367-7355

3 - ACADEMIC EDUCATION:

- Ph.D. in Computer Science, May 1997
University of Illinois at Urbana-Champaign (UIUC)
Urbana, Illinois, USA (<http://www.cs.uiuc.edu>)
Thesis Title: *Performance Scalability Prediction on Multicomputers*
Advisor: Prof. Daniel A. Reed

- Master in Electronics Engineering, December 1988
Technological Institute of Aeronautics (ITA)
Sao José dos Campos, Brazil (<http://www.ita.br>)
Thesis Title: *Parallel SIMD System for Image Processing*
Advisors: Dr. Jairo Panetta (Brazil), Prof. Edward W. Davis (NCSU)
- Electronics Engineer, December 1980
Technological Institute of Aeronautics (ITA)
Sao José dos Campos, Brazil (<http://www.ita.br>)

4 - PROFESSIONAL EXPERIENCE:

- **2000 to present: Research Scientist**
Department of Computer Science, University of Illinois - USA
 - Research on usage of processor virtualization techniques, via Charm++ and Adaptive MPI (AMPI), for scientific applications written in C/C++/Fortran95, with evaluation of resulting computation and communication capabilities (<http://charm.cs.uiuc.edu/people/cmendes>).
 - Research on methods and techniques for performance analysis of large parallel systems and wide-area network environments, using statistical sampling approaches.
 - Design of new features for the SvPablo instrumentation toolkit; creation of extra functionality to acquire communication performance data in the SvPablo library via the MPI profiling interface; overall supervision of tasks related to SvPablo development in the Pablo research group.
 - Application of SvPablo and associated tools to analyze performance of SciDAC scientific applications, executing in parallel systems (Linux clusters and IBM-SP), under the context of the PERC project (<http://perc.nersc.gov/applications.htm>), sponsored by the US Dep.of Energy.
 - Development of low-level performance tools for acquisition of communication performance data from QCD applications; application of toolkits (SvPablo, mpiP) to analyze overall performance of such applications on commodity clusters, in the scope of the SciDAC/QCD project (<http://physics.bu.edu/~brower/SciDAC>), sponsored by the US Dep.of Energy.
 - Development of low-level instrumentation software (using PAPI) and data analysis tools, and supervision of research activities in the creation of performance contracts, for monitoring the performance of scientific applications executing in Grid environments, as part of the GrADS project (<http://www.hipersoft.rice.edu/grads/index.htm>), sponsored by the National Science Foundation.
 - Design, installation and maintenance of an infrastructure with compute nodes for distributed computing, including gatekeepers and the mpich-g communication library, based on the Globus toolkit.

- Participation in the creation of research proposals and periodic reports for federal research funding agencies (DoE, NSF).
 - Continuous supervision of routine activities of group staff members and graduate students, and contacts with external collaborators.
- **1998 to 2000: Senior Technologist**
Lab. of Applied Computing, National Inst. of Space Research - INPE, Brazil
 - Research on high performance computing: performance analysis and tuning of scientific applications, in the areas of Physics, Meteorology and Remote Sensing, written in C/C++/Fortran/Fortran90/HPF/MPI, executing on vector and parallel computers (NEC SX/3 and SX/4, IBM SP-2, Beowulf-type clusters), using both traditional software instrumentation techniques (event tracing) as well as hardware monitoring facilities inside modern processors.
 - Coordination of a research project, funded by FAPESP/Brazil, on performance analysis, instrumentation and optimization of scientific applications on high performance parallel systems; the project's activities included participation of two graduate students, who obtained the title of Master of Science.
 - Consulting, for Elebra Systems (Brazil), on instrumentation and detailed performance evaluation of a parallel MPI-based meteorological application (RAMS) executing on a 16-processor PC cluster under Linux.
 - Design, development, deployment and management of a dial-up structure to connect researchers from home to INPE's network, using a USRobotics TotalControl access server and a Radius authentication server under FreeBSD.
 - Development of the basic steps in the creation of a video server infrastructure, intended to distribute INPE's products, using Microsoft's Netshow (examples at <http://www.lac.inpe.br/~celso/video>)
- **1982 to 1997: Development Engineer**
Image Processing Division, National Inst. of Space Research - INPE, Brazil
 - Design and development of hardware to interface a variety of peripherals to PDP/11 computers and to IBM-PC microcomputers.
 - Development of software (assembly, C and Fortran) for image processing systems, comprising low-level software (device-drivers) and high-level applications for the processing of remotely sensed data.
 - Research on the accessibility of brazilian WWW servers, in terms of their response times to clients in Brazil and in the US; technical report available at http://www.lac.inpe.br/~celso/docs/artigo_web.ps.Z
 - Design, development and administration of a dial-up structure to connect researchers from home to INPE's network, using a Cisco-2511 acces server and a Tacacs authentication server under Solaris
 - Development of WWW sites and creation of HTML pages, configuration of WWW servers (CERN, Apache) and construction of CGI scripts.

- **1981 to 1982: Auxiliary Researcher
Institute of Advanced Studies - IEAv/CTA, Brazil**
 - Development of hardware and basic software, in assembly, for digital systems based on microprocessors: Intel-8080/8085, Zilog-Z80.

5 - ACADEMIC ACTIVITIES:

- **Tutorials presented:**
 - Adaptive MPI
5th Charm++ Workshop, Urbana, April 2007
(<http://charm.cs.uiuc.edu/charmWorkshop/slides.html>)
 - 4th Charm++ Workshop, Urbana, October 2005
(<http://charm.cs.uiuc.edu/workshops/charmWorkshop2005/slides.html>)
 - PERC Tools for Performance Data Gathering and Analysis
Tutorial M07, Supercomputing'2003, Phoenix, November 2003
(http://www.sc-conference.org/sc2003/tech_tutorials.php)
 - Tools and Methods for Performance Modeling and Prediction
Tutorial S2, Supercomputing'2002, Baltimore, November 2002
(http://www.sc-2002.org/program_tut.html# , co-presenter)
- **Courses lectured:**
(all materials are online at <http://www.lac.inpe.br/~celso/classes.html>)
 - Parallel Processing (CAP-334/315), graduate level, INPE, 1997/1998/1999
 - Computer Architecture (EA-266), graduate level, ITA, 1998/1999
 - Linux Operating System, undergraduate level, Univap, 1999
- **Other presentations:**
 - SvPablo: A Toolkit for Scalable Performance Analysis
Linux Cluster Institute, NCSA, Champaign, March 2003
 - The SvPablo Performance Analysis Tool
Parallel Tools Consortium - 2002 Annual Meeting, Knoxville, Sep. 2002
 - SvPablo: A Toolkit for Performance Analysis of Parallel Systems
PACI-Alliance All-Hands Meeting, NCSA, Champaign, May 2002
- **Participation in Program Committees:**
 - Intern. Conference on Parallel Processing (IPCC): China, Sep. 2007
 - Grid and Pervasive Computing (GPC): Taiwan, May 2006; France, May 2007
 - IEEE Intern. Parallel & Distributed Processing Symposium (IPDPS): Denver, CO, April 2005; Greece, April 2006; Long Beach, CA, March 2007
 - Grid'2005: Seattle, WA, November 2005
 - Supercomputing'2004: Pittsburgh, PA, November 2004
 - LACSI Symposium (Santa Fe, NM): Oct.2001, Oct.2002, Oct.2003, Oct.2004
 - SBAC Symposium (Brazil): Sep.2001, Oct.2002, Nov.2003, Oct.2004, Oct.2005, Oct.2006, Oct.2007

- **Technical meeting organization:**
 - Co-Chair of Tutorials for CCGrid'2007, Rio de Janeiro, Brazil, May 2007
 - Co-Organizer of the Terascale Performance Analysis Workshop, during the ICCS'2003 conference, Melbourne, Australia, June 2003

- **Recently submitted research proposals** (acting as Senior Personnel):
 - HPC-Colony II (with Lawrence Livermore Nat. Lab and IBM) – submitted to the U.S. Dep. of Energy on June 2007, pending.
 - Leadership Class Scientific and Engineering Computing: Breaking through the Limits (lead by NCSA) – submitted to NSF on Feb.2007, pending.
 - SDCI HPC Improvement: Charm++/AMPI Suite for Performance Tuning, Fault Tolerance and Debugging – submitted to NSF on Jan. 2007, pending.
 - CSR-SMA: BigSim: Performance Prediction for Petascale Machines and Applications – submitted to NSF on Jan.2007, partially approved.

- **Academic projects conducted:**
 - Ph.D. Thesis at UIUC: Research on the scalability of data parallel programs on multicomputers. Development of a methodology to characterize the execution time of a data parallel program as a function of P (number of processors in the system) and N (size of the problem). Construction of this model at compile-time, by using a data parallel compiler (Fortran-D compiler, from Rice), a symbolic manipulator (Mathematica) and the instrumentation infrastructure of the Pablo toolkit. Application of that methodology to predict execution times and track performance bottlenecks of scientific programs on the Intel-Paragon, IBM-SP/2 and SGI-PowerChallenge parallel systems, under variations of {P,N}.

 - Research project at UIUC: Development of the DLXVSIM simulator, a simulator of DLXV, the vector extension of the RISC processor presented in the book by Hennessy and Patterson. This simulator has been available at the site of the book publishers, as support material.

 - Master's Thesis at ITA: Design and simulation of a SIMD system for image processing, based on the GAPP bit-serial processor. This system was designed as a co-processor for an IBM-PC computer. Construction of software tools for the system (assembler, linker and simulator). Simulation of typical image processing functions, like filtering, classification and domain transformation.

6 - MAJOR PUBLICATIONS (last 10 years):

- Kale,L.V., Bohm,E., **Mendes,C.L.**, Wilmarth,T. & Zheng,G. 'Programming Petascale Applications with Charm++ ', Chapter in Bader,D. 'Petascale Computing', CRC Press, 2007 (accepted for publication).

- Chakravorty,S., **Mendes,C.L.** & Kale,L.V., 'Proactive Fault Tolerance in MPI Applications via Task Migration', Proceedings of the International Conference on High Performance Computing - HiPC, Bangalore-India, December 2006.
- Gioachin,F., Sharma,A., Chakravorty,S., **Mendes,C.L.**, Kale,L.V. & Quinn,T., 'Scalable Cosmological Simulations on Parallel Machines', Proceedings of VECPAR, Rio de Janeiro-Brazil, July 2006.
- Chakravorty,S., **Mendes,C.L.** et al 'HPC-Colony: Services and Interfaces for Very Large Systems', Operating Systems Review, Vol.40, No.2, April 2006, pp.43-49.
- Reed,D.A., Lu,C. & **Mendes,C.L.** 'Reliability Challenges in Large Systems', Future Generation Computer Systems, Vol.29, No.3, February 2006, pp.293-302.
- Berman,F., **Mendes,C.L.** et al 'New Grid Scheduling and Rescheduling Methods in the GrADS Project', International Journal of Parallel Programming, Vol.33, No.2-3, June 2005, pp.209-229.
- Reed,D.A. & **Mendes,C.L.** 'Intelligent Monitoring for Adaptation in Grid Applications', Proceedings of the IEEE, Vol. 93, No.2, February 2005, pp.426-435.
- Chakravorty,S., **Mendes,C.L.** & Kale,L.V. 'Proactive Fault Tolerance in Large Systems', 1st Workshop on High Performance Computing Reliability Issues (HPCRI), San Francisco, CA, February 2005.
- **Mendes,C.L.** & Reed,D.A. 'Monitoring Large Systems via Statistical Sampling', International Journal of High Performance Computing Applications, Vol.18, No.2, Summer 2004, pp.267-277.
- Gardner,M., Deng,W., Markham,T.S., **Mendes,C.L.**, Feng,W. & Reed,D.A. 'A High-Fidelity Software Oscilloscope for Globus', GlobusWorld2004, San Francisco/CA, January 2004.
- Reed,D.A., **Mendes,C.L.** & Lu,C. 'Application Tuning and Adaptation'. Chapter in Foster & Kesselman 'The Grid: Blueprint for a New Computing Infrastructure', Second Edition, Morgan Kaufmann, November 2003.
- Reed,D.A., Lu,C. & **Mendes,C.L.** 'Big Systems and Big Reliability Challenges'. Proceedings of ParComp2003, Germany, September 2003.
- Vraalsen,F., Aydt,R.A., **Mendes,C.L.** & Reed,D.A. 'Performance Contracts: Predicting and Monitoring Grid Application Behavior'. 2nd IEEE/ACM International Workshop on Grid Computing (GRID2001), Denver/CO, USA, November 2001.
- Fernandes,S.F., Monteiro,A.M.V. & **Mendes,C.L.** 'Parallelism and Images: A Parallelization Experiment for Image Segmentation with an Application for Automatic Classification of Scenes Obtained from Orbital Platforms', XIII Brazilian Symposium on Computer Graphics and Image Processing, Gramado, Brazil, October 2000, pp.342.
- Stephany, S., Correa, R.V., **Mendes, C.L.** & Preto, A.J. 'Identifying Performance Bottlenecks in a Radiative Transfer Application'. 6th International Conference on Applications of High-Performance Computers in Engineering, Maui/Hawaii, USA, January 2000.

- **Mendes,C.L.** & Panetta,J. 'Selecting Directions for Parallel RAMS Performance Optimization'. XI Symposium on Computer Architecture and High Performance Computing – SBAC-PAD, Natal, Brazil, September 1999, pp.85-92.
- **Mendes,C.L.** & Reed,D.A. 'Integrated Compilation and Scalability Analysis for Parallel Systems'. The 1998 International Conference on Parallel Architectures and Compilation Techniques -- PACT, Paris, France, October 1998, pp.385-392.

7 - AFFILIATION TO SOCIETIES:

- IEEE Computer Society (member # 01537711, since 1981)
- Association for Computing Machinery - ACM (member # 3660255, since 1990)
- Brazilian Computer Society (member # 6064, since 1987)

8 - HONORS AND PATENT:

- October 1989: Relevant Services Medal
INPE / EOSAT , Brazil
- December 1980: Honors, Division of Electronics Engineering
Technological Institute of Aeronautics (ITA), Brazil
- 1986: Patent, granted by INPI / Brazil - National Institute of Industrial Property (<http://www.inpi.gov.br>), process number PI8606069-4.
Co-inventor of the first brazilian system for image processing (SITIM)

9 - PROFICIENCY IN LANGUAGES:

- Portuguese: native language
- English: fluent
- French and Spanish: reading ability

10 - SOURCES OF REFERENCE:

- Prof. Laxmikant (Sanjay) Kale (kale@cs.uiuc.edu, phone# 217-244-0094)
Research supervisor at UIUC, August 2004~present
- Prof. Daniel A. Reed (Dan_Reed@unc.edu, phone# 919-445-9641)
PhD thesis advisor at UIUC, 1991~1997; research supervisor at UIUC, 2000~2004
- Dr. Jairo Panetta (panetta@cptec.inpe.br, phone# 55-12-3917-4621)
Master's thesis co-advisor at ITA, 1986~1988; research collaborator, 1997~present
- Prof. Michael Heath (heath@cs.uiuc.edu, phone# 217-333-6268)
Professor at UIUC, 1991; member of PhD thesis committee at UIUC, 1995~1997
- Dr. Flavio R. D. Velasco (fvelasco@ptc.com)
Research supervisor at INPE, 1986~1989