

# Kaoutar El Maghraoui

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## EDUCATION      **Rensselaer Polytechnic Institute**, Troy, NY USA

Ph.D. Candidate, Computer Science, August 2002 (expected graduation date: May 2007)  
Dissertation Title: "A Framework for the Dynamic Reconfiguration of Scientific Applications in Grid Environments". GPA: 4.0  
Advisor: Professor Carlos A. Varela

## **Al Akhawayn University**, Ifrane, Morocco

M.S., Computer Networks, May 2001  
Dissertation Title: "Towards Building H.323-Aware Wireless Systems: H.323 Control Loops and Applications Adaptation to Wireless Link Conditions". GPA: 3.98  
Advisor: Professor Tajje-eddine Rachidi

B.S., Software Engineering, December 1999. GPA 4.0

RESEARCH INTERESTS      Systems research, software tools and programming paradigms for distributed and parallel computing, high performance computing, resource management, performance analysis and prediction, fault tolerance, distributed information management, grid computing, autonomic computing, and middleware technologies.

## EXPERIENCE      **Rensselaer Polytechnic Institute**, Department of Computer Science, Troy, NY USA

*Graduate Research Assistant*      **January, 2003 - present**

Includes current Ph.D. research, Ph.D. and Masters level coursework and research projects.  
The goal of my thesis research is to devise grid middleware services that enable distributed applications to adapt to the constantly changing behavior of dynamic environments. Reconfiguration is supported at the entity-level of applications for more flexible adaptation and is based on peer-to-peer protocols to achieve scalable decisions. This dissertation involved:

- Design and implementation of reconfiguration strategies, application-level and resource-level profiling services. All have been implemented as part of the IOS middleware (Internet Operating System).
- Design and implementation of the PCM library (Process Checkpointing and Migration), a library that extends iterative MPI applications with checkpointing, process migration, and split and merge capabilities. The PCM library has been integrated with IOS to enable automatic middleware-triggered reconfiguration for MPI applications in dynamic and heterogeneous environments.

*Teaching Assistant*      **August - December, 2002**

Involved assisting with the course of Network Programming.

**IBM Thomas J. Watson Research Center**, The Internet Infrastructure and Computing Utilities group, Hawthorne, NY USA

*Summer Intern*      **Summers of 2004 and 2005**

Designed and implemented a prototype for the automatic generation of provisioning actions (workflows) in a data center. The approach relied on using the partial-order planning algorithm, POP to infer the partial order of provisioning operations and their inputs to deploy a given application in

a data center. Several heuristics were introduced to improve the performance of POP in the provisioning domain. The prototype has been integrated with IBM's Rainforest project and was capable of generating deployment plans that can be executed using IBM's Tivoli Intelligent Orchestrator's (TIO) provisioning manager. This work is patent-pending and its results have been published in the 7th International Middleware Conference, 2006.

**Al Akhawayn University**, School of Science and Engineering, Ifrane, Morocco

*Lecturer*

**January, 2001 - June, 2002**

Taught Computer Architecture and Assembly Language Programming, Computer Networks, C and Pascal Programming. Duties included teaching, preparing curriculum, class notes, homeworks, and project assignments, and advising students.

*Graduate Research Assistant*

**January, 2000 - May, 2001**

Designed and implemented an algorithm to optimize H.323 control loops for multimedia applications adaptation under wireless Link conditions. Sponsored by Lucent Technologies and Al Akhawayn University.

*Teaching Assistant*

**1997 - 1999**

Served as a teaching assistant for the following courses: Physics, Electrical Circuits, Computer Architecture and Assembly Language Programming, Data Structures, and Databases. Duties included holding office hours, grading, and leading weekly lab sessions.

#### RELEVANT SKILLS

- Programming Languages: C, C++, Java, Pascal, Assembly(x86), PROLOG, LISP.
- Programming Paradigms: Grid Computing, Parallel computing (MPI), Distributed Programming (JAVA RMI, CORBA), Multithreaded programming, Networking TCP/IP.
- Operating Systems: Unix, Solaris, FreeBSD, Linux, Windows.
- Version Control Tools: CVS.

#### PUBLICATIONS

##### Articles in Journals or Book Chapters

1. Travis Desell, Kaoutar El Maghraoui, and Carlos Varela. **Malleable Applications for Scalable High Performance Computing**. Under review for the *Cluster Computing Journal*. Invited for a special issue with the best papers from (HPC-GECO/CompFrame 2006).
2. Kaoutar El Maghraoui, Travis J. Desell, Boleslaw K. Szymanski, and Carlos A. Varela. **The Internet Operating System: Middleware for Adaptive Distributed Computing**. *International Journal of High Performance Computing Applications (IJHPCA), Special Issue on Scheduling Techniques for Large-Scale Distributed Platforms*, 2006.
3. Kaoutar El Maghraoui, Travis Desell, Boleslaw K. Szymanski, James D. Teresco, and Carlos A. Varela. **Towards a Middleware Framework for Dynamically Reconfigurable Scientific Computing**. In *L. Grandinetti, editor, Grid Computing and New Frontiers of High Performance Processing, volume 14 of Advances in Parallel Computing*, pages 275-301. Elsevier, 2005.

##### Conference Articles

1. Kaoutar El Maghraoui, Travis J. Desell, Boleslaw K. Szymanski, and Carlos A. Varela. **Dynamic Malleability in Iterative MPI Applications**. In *Seventh IEEE International Symposium on Cluster Computing and the Grid (CCGrid 2007)*, May 2007. To appear.
2. Kaoutar El Maghraoui, Alok Meghranjani, Tamar Eilam, Michael Kalantar, and Alexander V. Konstantinou. **Model Driven Provisioning: Bridging the Gap Between Declarative Object Models and Procedural Provisioning Tools**. In *Proceedings of Middleware*

2006, ACM/IFIP/USENIX, 7th International Middleware Conference, Melbourne, Australia, November 2006. (**Acceptance rate: 17%**)

3. Wei-Jen Wang, Kaoutar El Maghraoui, John Cummings, Jim Napolitano, Boleslaw K. Szymanski, and Carlos A. Varela. **A Middleware Framework for Maximum Likelihood Evaluation over Dynamic Grids**. In *Second IEEE International Conference on e-Science and Grid Computing*, Amsterdam, Netherlands, December 2006.
4. Travis Desell, Kaoutar El Maghraoui, and Carlos Varela. **Malleable Components for Scalable High Performance Computing**. In *Proceedings of the HPDC'15 Workshop on HPC Grid programming Environments and Components (HPC-GECO/CompFrame)*, Paris, France, pages 37-44, June 2006. IEEE Computer Society.
5. Kaoutar El Maghraoui, Boleslaw Szymanski, and Carlos Varela. **An Architecture for Reconfigurable Iterative MPI Applications in Dynamic Environments**. In R. Wyrzykowski, J. Dongarra, N. Meyer, and J. Wasniewski, editors, *Proc. of the Sixth International Conference on Parallel Processing and Applied Mathematics (PPAM'2005)*, number 3911 of LNCS, Poznan, Poland, pages 258-271, September 2005.
6. T. Desell, K. El Maghraoui, and C. Varela. **Load Balancing of Autonomous Actors over Dynamic Networks**. In *Proceedings of the Hawaii International Conference on System Sciences, HICSS-37 Software Technology Track*, pages 1-10, January 2004.
7. K. El Maghraoui, J. Flaherty, B. Szymanski, J. Teresco, and C. Varela. **Adaptive Computation over Dynamic and Heterogeneous Networks**. In *Proc. of the Fifth International Conference on Parallel Processing and Applied Mathematics (PPAM'2003)*, number 3019 of LNCS, Czestochowa, Poland, pages 1083-1090, September 2003.
8. K. El Maghraoui, and T. Rachidi, **Towards Building H.323-Aware Wireless Systems: H.323 Control Loops and Applications Adaptation to Wireless Link Conditions**, In *Proceedings of The 5th World Multiconference on Systemics, Cybernetics and Informatics (SCI 2001)*, Volume XVI, Pages 106-113, Orlando, Florida, 2001.

#### Technical Reports

1. Kaoutar El Maghraoui, Travis J. Desell, and Carlos A. Varela. **Network Sensitive Reconfiguration of Distributed Applications**. *Technical report 05-03, Rensselaer Polytechnic Institute Department of Computer Science*, 2005.
2. Kaoutar El Maghraoui, Carlos Varela, Boleslaw K. Szymanski, Joseph E. Flaherty, and James D. Teresco. **A Middleware Framework for Dynamically Reconfigurable MPI Applications**. *Technical report CS-04-09, Williams College Department of Computer Science*, 2004.

#### Work in Progress

1. Travis J. Desell, Kaoutar El Maghraoui, and Carlos A. Varela. **Malleable Applications for Dynamic and Heterogeneous Environments**. Submitted to ICDCS 2007.
2. Kaoutar El Maghraoui, Boleslaw Szymanski, and Carlos Varela. **A Middleware-centric Approach for Adapting Iterative MPI Applications in Dynamic Environments**. To be submitted to the Journal of Grid Computing.

#### POSTER PRESENTATIONS

K. El Maghraoui, J. Chabarek, C. Varela, B. Szymanski, and J. Teresco, **SALSA\_MPI: A Framework for Dynamically Reconfigurable MPI Applications**, *Workshop on Pervasive Computing and Networking (CPCN04)*, RPI, Troy, NY, April 2004.

T. Desell, K. El Maghraoui, C. Varela, and B. Szymanski, **IOS: A Middleware for Autonomous Worldwide Computing**, *Workshop on Pervasive Computing and Networking (CPCN04)*, RPI, Troy, NY, April 2004.

K. El Maghraoui, C. Varela, B. Szymanski, and J. Teresco, **Adaptive Parallel Computation over Dynamic and Heterogeneous Networks**, *Conference on Adaptive Methods for Partial Differential Equations and Large Scale Computation (ADAPT03)*, Troy, NY, October 2003.

#### PUBLIC TALKS

**The Internet Operating System: Middleware for Adaptive Distributed Computing.** Center for Pervasive Computing and Networking, RPI, Troy, NY, December 6th, 2006.

**A Framework for the Dynamic Reconfiguration of Scientific Applications in Grid Environments.** Ph.D. Forum, Grace Hopper Celebration of Women in Computing (GHC06), San Diego, CA, October 2006.

**An Architecture for Reconfiguring Iterative MPI Applications in Dynamic and Heterogeneous Environments.** SIAM Conference on Parallel Processing for Scientific Computing (PP06), San Francisco, CA, February 2006.

#### HONORS AND AWARDS

- NSF scholarship to participate in the Grace Hopper Celebration of Women in Computing conference, October, 2006.
- RPI Computer Science Student Service Award, 2005.
- Patent Pending: **System, method, and product for identifying provisioning operations via planning methods**, IBM Research, 2005.
- RPI scholarship to participate in the Grace Hopper Celebration of Women in Computing conference, October 8th, 2004.
- American Association of University Women fellowship for the academic year 02/03
- President's List: Alakhawayn University (10 Semesters)
- First Place: African ACM Collegiate Programming Contest, 11/98;

#### PROFESSIONAL ACTIVITIES

- RPI Computer Science Graduate Curriculum Committee, Graduate Student Representative (Fall 2005-Spring 2006).
- Student Volunteer at Super Computing 2005 (SC 05).
- Reviewer for: DOA 2003 International Symposium on Distributed Objects and Applications, IC-SOC03 International Conference on Service Oriented Computing, TEDCO3 and TEDCO5, 1st and 3rd IEEE International Workshop on Technology for Education in Developing Countries, Euro-Par 2005, the Scientific Programming Journal, winter 2005, Coordination 2006, Simulation: Transactions of The Society for Modeling and Simulation International 2006, and the Sixteenth International Heterogeneity in Computing Workshop (HCW) 2007.
- ACM Programming contest Judge: ACM Collegiate Programming Contest, 9/99 and 11/00.
- Student Government Association Member, 8/98-6/99.
- Memberships: IEEE, ACM, SWE.

#### REFERENCES

Joseph E. Flaherty. Ph.D.  
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