

Muhammed F. Mudawwar

Computer Science Department
The American University in Cairo
113 Kasr el Aini Street, Cairo, Egypt
Office: +20 2 797-5305

Email: mudawwar@aucegypt.edu

Web: <http://www.cs.aucegypt.edu/~mudawwar>



1. Research Interests

- Processor micro-architecture
- Large-scale multiprocessors and interconnection networks
- Parallel programming environments and compilation techniques

2. Academic Degrees

Ph.D. 1993, Computer Engineering, Syracuse University. GPA 3.92 / 4.0

Area of specialization: Parallel computer architecture.

Minor: Computer and Information Science.

M.S. 1988, Computer Engineering, Syracuse University. GPA 3.80 / 4.0

Area of specialization: Computer Architecture.

B.E. 1986, Electrical Engineering, The American University in Beirut. Grade: 91/100.

3. Teaching Experience (The American University in Cairo)

3.1 Courses Taught

(Teaching load: 3 courses per semester)

Graduate Courses Taught

- CS 530: Contemporary Computer Design (many times)
- CS 532: Parallel Computer Architecture (many times)

Undergraduate Courses Taught

- CS 447: Compiler Design (many times)
- CS 345: Operating Systems (many times)
- CS 210: Data Structures (many times)
- CS 106: Fundamentals of Computer Science (many times)
- CS 485: Special Topics in CS - Digital Systems Design (once)
- CS 110: Structured Programming (twice)
- CS 491: Senior Project I (coordinator) (twice)
- CS 492: Senior Project II (coordinator) (twice)

3.2 Curriculum Development

- Actively participated in the development of the curriculum of the M.Sc. program in Computer Science at AUC.
- Actively participated in the enhancement of the undergraduate program.

3.3 Web Material for Teaching

- Developed web pages for my courses. These web pages include lecture slides, assignments, exams, lab session notes, course syllabi, schedules, plus other related information. My teaching pages can be reached at:
<http://www.cs.aucegypt.edu/~mudawwar/teaching.htm>

3.4 Senior Projects

These projects are carried by groups of 3 to 5 senior graduating students and done over a period of 2 semesters. Here is a sample of the projects that I proposed and closely supervised. These projects led to successful prototypes. Some of these projects were also co-supervised as shown below.

- Mudawwar: *Microprocessor Simulation and Visualization*
- Mudawwar, Sameh, and El-Kadi: *Building a Cluster from Recycled Computers*
- Mudawwar and El-Kassas: *Visual SIMPL*
- Mudawwar and El-Kassas: *A Microkernel-Based Firewall System*
- Mudawwar: *Writing a Compiler for a Sequential Subset of SIMPL*
- Mudawwar: *Visualizing the Internal Architecture of a Microprocessor*
- Mudawwar: *An Experimental Virtual Machine*
- Mudawwar: *Arabic C Programming Language*
- Mudawwar: *Extending C with Parallel Constructs*
- Mudawwar: *Multicode X Windows System*

4. Research (The American University in Cairo)

4.1 Research Activities

- (2003) Introducing iterative instructions at the instruction-set architecture to exploit instruction-level and thread-level parallelism. Also, studying the effect of having parallel primary caches for instructions and data to improve the bandwidth and capacity of primary caches.
- (1999-2003) Proposed a new family of orthogonal multi-dimensional interconnection networks, called k-ary m-way networks, based on the concept of multi-way (shared) channels and two-link routers (or nodes). Wrote a simulation program to assess the performance of the newly proposed k-ary m-way network for a variety of orthogonal topologies, dimensions, routing algorithms, buffer specifications, and traffic. The simulator can produce a variety of statistics on message latency and throughput. Studied wormhole routing and broadcasting in k-ary m-way networks, and a comparative study of k-ary m-way and k-ary n-cube networks has been made. Multicasting in k-ary m-way networks is currently in progress. A router chip has been designed in VHDL.
- (1997-98) Parallel Virtual Machines for thread distribution, scheduling and migration in a distributed environment.
- (1997-1999) Involved in the design and implementation of a new programming language called SIMPL. This language features parameterized types, polymorphic functions, the separation of interfaces from implementation, safe references, garbage collection, and higher-order functions.

4.2 Publications

- Amer I., Badawy W., and Mudawwar M., Towards Low-Power Synthesis: A Common Subexpression Extraction Algorithm Under Delay Constraints, in *Proceedings of the 46th IEEE Midwest Symposium on Circuits and Systems*, December 27 – 30, 2003, Cairo, Egypt.
- Haddad H. and Mudawwar M., Corner-First Tree-Based Region Broadcasting in Mesh Networks, in *Proceedings of the 21st IASTED International Conference on Parallel and Distributed Computing and Networks*, February 10-13, 2003, Innsbruck, Austria, pages 615-620.
- Mudawwar M. and Saad A., The k-ary n-cube Network and its Dual: a Comparative Study, in *Proceedings of the 13th IASTED International Conference on Parallel and Distributed Computing and Systems*, August 21-24, 2001, Anaheim, California, pages 254-259.
- Mudawwar M., k-ary m-way Networks: the Dual of k-ary n-cubes, in *Proceedings of the 12th IASTED International Conference on Parallel and Distributed Computing and Systems*, November 6-9, 2000, Las Vegas, Nevada.
- Mudawwar M. and Mameesh R., Region Broadcasting in k-ary m-way Networks, in *Proceedings of the ISCA 13th International Conference on Parallel and Distributed Computing Systems*, August 8-10, 2000, Las Vegas, Nevada, pages 268-274.
- Mudawwar M., A Switch-Free Router for k-ary m-way Networks, in *Proceedings of the 2000 International Conference on Parallel and Distributed Processing Techniques and Applications*, June 26-29 2000, Las Vegas, Nevada, pages 977-983.
- Mudawwar M., Thread Programming in SIMPL, in *Proceedings of the 8th International Conference on AI Applications*, February 3-6, 2000, Cairo, Egypt, pages 373-383.
- Mudawwar M., Parameterized Types and Polymorphic Functions in SIMPL, in *Proceedings of the 8th International Conference on AI Applications*, February 3-6, 2000, Cairo, Egypt, pages 385-396.
- Mudawwar M., Multiway Channels in Interconnection Networks, in *Proceedings of the 12th ISCA International Conference on Parallel and Distributed Computing Systems*, Fort Lauderdale, Florida, August 1999, pages 506-513.
- Abdel-Radi T. and Mudawwar M., "XTPVM: Extended Threaded Parallel Virtual Machine", in *proceedings of the 11th international conference on parallel and distributed computing systems*, August 2-4, 1998, pages 105-112.
- Mudawwar M., "Multicode: A Truly Multilingual Approach to Text Encoding", *IEEE Computer*, April 1997, pages 37-43.
- Mudawwar M., "SIMPL: a Semi-Imperative Parallel Language", in *proceedings of the AUC Symposium on Sciences and Engineering Education*, April 1995.
- Mudawwar M. and Roger Chen C.Y., "The Signal Flow Model: A Novel Data Driven Approach to Parallel Processing", in *proceedings of the 1992 international conference on parallel processing*, August 17-21, 1992.
- Bogucz E.A. and Mudawwar M., "A Symbolic Manipulation Toolkit for Asymptotic Analysis of Viscous Flows", in *29th Aerospace Sciences Meeting*, January 7-10, 1991.

4.3 Thesis Supervision

- Ihab Mostafa Amin Amer, “Synthesis and Optimization of Digital Systems for Low Power at Logical Level of Abstraction”, Master Thesis, Computer Science Department, AUC, May 2003.
- Hadeel Youssef Samaan Haddad, “Tree-Based Regional Broadcasting in Mesh Directed Networks”, Master Thesis, Computer Science Department, AUC, December 2002.
- Aya Hassan Saad, “Associating Nodes with Routers in k-ary m-way Interconnection Networks”, Master Thesis, Computer Science Department, AUC, January 2001.
- Rania Mameesh, "Region Broadcasting in Multiway Channel Networks", Master Thesis, Computer Science Department, AUC, January 2000.
- Soha Zaghoul, "Backtracking in Wormhole-Routed Interconnection Networks", Master Thesis, Computer Science Department, AUC, January 1999.
- Soumaia Ahmed Al-Ayyat, “Parametric Polymorphism in the SIMPL Language”, Master Thesis, Computer Science Department, AUC, November 1998.
- Tarek Hafez Mohammed Abdel-Radi, “XTPVM: A Transparent Thread Scheduling and Migrating Machine”, Master Thesis, Computer Science Department, AUC, April 1998.

5. Activities

- Serving as a member of the IASTED Technical Committee on Networks for the period 2001-2004. This Committee is responsible for the planning and the organization of IASTED activities such as conferences, meetings, and publications.
- Refereed journal papers for the Journals of Parallel and Distributed Computing and Software Practice and Experience.
- Participated in 14 international conferences over the past 7 years, most of which were in the united states.
- Refereed conference papers for many conferences.
- Chaired and co-chaired sessions in various conferences.
- Professional membership in the IEEE, ACM, ISCA, IASTED, and ACM Special Interest Group on Computer Architecture (SIGARCH).
- (March 2001) Taught a 36-hour compiler design course for graduate students at the Regional Information Technology Institute (RITI). This course is part of a master program given in Egypt, in collaboration with Louisville University.

6. Services to the American University in Cairo

- Developed the Computer Science Department web pages at the American University in Cairo. These web pages can be reached at <http://www.cs.aucegypt.edu>.
- Hardware committee: Planned, selected, and followed-up computer and electronic equipment purchases for the Computer Science department at AUC.
- Software committee: Planned, selected, and followed-up software purchases for the Computer Science department.
- Research committee: Reviewed, evaluated, and ranked research and conference applications submitted by faculty members within the Computer Science department.

- School Research Committee: Reviewed, evaluated, and ranked research and conference proposals submitted by faculty members within the School of Engineering and Sciences.
- Academic Honesty Committee: Reviewed cases on plagiarism reported by faculty members at the university level.
- Library Collections Committee: Requested many Computer journals and books to be added to the library requisitions.

7. Previous Work Experience

- Worked at Prime Computer, Framingham, Massachusetts, on the parallelization of sequential FORTRAN code to make it run efficiently on a parallel supercomputer (MXCL 5). Also worked on porting X-applications to the Prime 50-series. The X-Windows system was still newly being developed at MIT at that time.

8. Contribution to Student Life and Extra Curricular Activities

- Advised many students to pursue their graduate studies. Wrote recommendation letters to students applying for studies abroad. Many of my former students continued their graduate studies in the United States and Canada. Others have worked for major companies, either in Egypt or in the United States and Canada.
- (1998-1999) Represented the Computer Science department in the Parent Association meetings.