

Vita of Rami G. Melhem  
Department of Computer Science  
The University of Pittsburgh  
(412)-624-8426, melhem@cs.pitt.edu

**EDUCATION:**

1983 Ph.D. Computer Science, University of Pittsburgh  
1981 M.A. Mathematics, University of Pittsburgh  
1981 M.S. Computer Science, University of Pittsburgh  
1978 B.S. Mathematics, Ein-Shams University, Cairo, Egypt  
1976 B.S. Electrical Engineering, Cairo University, Egypt

**PROFESSIONAL EXPERIENCE:**

1995- Professor of Computer Science, University of Pittsburgh  
2000-2009 Chair of the Computer Science Department, University of Pittsburgh  
1993- Associate Professor and Professor of Electrical and Computer Eng., University of Pittsburgh  
1986-1995 Assistant/Associate Professor of Computer Science, University of Pittsburgh  
1985-1986 Visiting Assistant Professor of Mathematics, University of Pittsburgh  
1984-1987 Assistant Professor of Computer Science, Purdue University (on leave 9/85 to 6/87)  
1984 Research Associate, University of Pittsburgh (January-September)

**HONORS:**

Fellow of the Institute for Electrical and Electronic Engineering, IEEE (2000 - ).  
The University of Pittsburgh Provost Award for Excellence in Mentoring (2012).

**CURRENT RESEARCH INTERESTS:**

High Performance Computing and Architecture, Power-aware Computing, Fault-tolerant and Real-time Systems, Optical Interconnection Networks and Wireless and Sensor Networks.

**GRANT AWARDS:**

PITT: *Personalizing Computer Science Courses through Customized Tracks*  
\$9,900, February 2018 – June 2019.

NSF: *SPX: Enabling Scalable Synchronizations for General Purpose GPUs*  
With J. Yang, \$850,000, October 2017 – September 2021.

QNRF: *Scalable Analytics Engine for Big Graphs on the Cloud*  
With M. Hammoud (CMU-Qatar), \$269,395 to U. Pitt, December 2015 – May 2019

DOE: *Lazy Shadowing - An Adaptive, Power-Aware Resiliency Framework for Exascale Computing.*  
With T. Znati, \$964,435, July 2015 – June 2019.

Samsung: *Constructing Scalable, Energy Efficient and Reliable Main Memory with STT-MRAM,*  
With A. Jones, \$276,755, February 2014 – June 2016.

Samsung: *Designing and Optimizing Hybrid Main Memory Architectures.*  
\$123,072, March 2013 – February 2014.

NSF: *Exploratory research on Scalable Resiliency through Shadow Computing and Differential Data Replication.*  
With T. Znati, \$299,800, January 2013 - December 2015.

NSF *Tackling the Variations and Instability of Nanophotonic Interconnection Networks via Architecture Techniques.*  
With J. Yang, \$130,000, August 2012 – July 2014

NSF: *Compiler and Chip Multiprocessor Co-design for Scalable Efficient Data Access and Communication.*  
With A. Jones and S. Cho, \$800,000, March 2011 – March 2017

- NSF: *Planning for an Innovative Dual-Path Computer Architecture Modeling Infrastructure for Highly Productive System Simulation and Emulation*,  
With S. Cho and A. Jones, \$100,000, February 2011 – January 2012
- NSF: *CSR: Large: Storage Class Memory Architecture for Energy Efficient Data Centers*,  
With B. Childers, S. Cho, D. Mosse, J. Yang and Y. Zhang,  
\$1,912,127, July 2010 – June 2016
- NSF: *Tera-PCM: A Low-Power Terabyte Main Memory using Phase Change Memory*,  
With B. Childers and D. Mosse, \$300,000, August 2008 – July 2011.
- Intel: *A Collaborative Compiler/OS Approach to CPU and Memory Power Management*,  
Research Gift. \$120,000, May 2007 – April 2009.
- NSF: *Designing Resilience for Communities at Risk: Decision Support for Collective Action Under Stress*,  
With L. Comfort, T. Znati and D. Mosse. \$734,995, September 2007 – August 2012.
- NSF: *Enabling Circuit Switching with Compiler Analysis for High Performance Systems*,  
With A. K. Jones. \$325,000, May, 2007 – April 2010.
- NSF: *Workshop on Research Challenges in Dynamic Data Driven Application Systems*,  
\$40,000, October 2006 – September 2009.
- DOE: *Innovative Technology for Virtual Leased-Line Services for High-Speed Networks*,  
STTR with T. Znati, \$59,500.00, July 2006 – March 2007.
- NSF: *Fault-Tolerant and Secure Infrastructure for Time-Critical Embedded Systems*,  
With D. Mosse and T. Znati, \$250,006.00, Sept. 2005 - August 2009.
- Lockheed-Martin/DARPA: *Polymorphous Cognitive Agent Architecture*,  
\$250,000. Sept. 2004 – Aug. 2006.
- NSF: *A Secure Critical Information Technology Infrastructure for Disaster Management*,  
With D. Mossé and L. Comfort. \$2,800,000.00. Sept. 2003 - Sept. 2009
- IBM/DARPA: *Productive, Easy-to-use, Reliable Computing Systems - Phase II*,  
1,035,000.00. Aug. 2003 - July 2006.
- NSF: *Power Autonomous Wireless Networks with Rechargeable Capabilities*,  
With Daniel Mossé. \$200,000.00. Oct. 2002 - Aug. 2005
- BAE Systems: *Awareness and Management of Power for Space*,  
\$430,000.00. July 2002 - December 2004
- IBM/DARPA: *Productive, Easy-to-use, Reliable Computing Systems*,  
\$105,000.00. July 2002, - June 2003
- NSF: *Secure Virtually Isolated Networks to Avoid & Tolerate Denial of Service*,  
With D. Mossé. \$300,000.00. Sept. 2001, Sept. 2004
- DARPA: *Power Management for Real-time Systems*,  
With D. Mossé and M. Elnozahi. \$1,604,100.00. Aug. 2000 - June 2004
- Computerm: *Fault Tolerance and Scalability in I/O Communication Systems*,  
With H. Chuang, D. Mossé and T. Znati. \$43,697.00. Jan. 98 - Dec. 98
- DARPA: *Fault Tolerance through Scheduling in Real-Time Systems*,  
With D. Mossé and N. Suri. \$1,637,092.00. Sept. 1996 - August 2000
- NSF: *Time Division Multiplexing of Optical Interconnection Networks*,  
\$187,017.00. September 1996 - August 1999
- NSF: *Travel Support for Minority Faculty and Students to MPPPOI '95*,  
With E. Schenfeld. \$7,680.00. October 1995 - September 1996
- NSF: *Formation of Galaxies and Large-Scale Structures in the Universe*,  
An HPCC Grand Challenge project (Princeton, UIUC, MIT, IU, PSC, PITT).  
The budget for U. of Pittsburgh is \$125,345.00. Nov. 1993 - April 1997
- Mellon Corp: *Applying Massive Parallelism to Large Scientific Programs*,  
\$75,133.00. June 1993 - September 1995
- AFOSR: *Reconfigurable Opto/Electronic Multiprocessor Interconnection Structures*,  
With D. Chiarulli and S. Levitan. \$528,439.00. Nov. 1992 - Nov. 1995
- HP Labs: *Real-time Protocols for Multimedia Applications*,  
With T. Znati and R. Sclabassi. \$28,218.00. May 1992 - Sept. 1993
- NSF: *CISE Research Instrumentation grant for the acquisition of an Intel Hypercube*,  
With M.L. Soffa and T. Znati. \$124,300.00. March 1990 - March 1991
- AFOSR: *Coincident Pulse Techniques for Hybrid Optical-Electronic Computer Systems*,

- With D. Chiarulli and S. Levitan. \$479,511.00. August 1989 to July 1992  
 NSF: *Optical Technology in Network Based Multiprocessors*,  
 With D. Chiarulli and S. Levitan. \$49,983.00. July 1989 - June 1990  
 NSF: *Bi-level Reconfigurations of Fault Tolerant Arrays in Bi-modal Environments*,  
 \$61,547.00. September 1989 - August 1991  
 AFOSR: *Parallel Memory Addressing Using Coincident Optical Pulses*,  
 With D. Chiarulli and S. Levitan. \$50,132.00. July 1988 - July 1989  
 ONR: *Application of Computational Networks and Systolic Arrays to Scientific Computation*,  
 With W. C. Rheinboldt. \$233,402.00. June 1985 – Sept. 1988  
 AFOSR: *Computational Fluid Dynamics at the Institute for Comp. Math & Applications*,  
 Investigator (C. Hall and T. Porsching, PIs). \$587,858.00. June 1984 - June 1987

#### **PATENTS:**

- “An Optical Selector Switch,” Co-inventors: D. Chiarulli and S. Levitan. Patent # 4,883,334 (1989).  
 “Recursively Determined Invertible Set Approach to Correct Multiple Stuck-at Faults in Rewritable Memory,” Co-inventor S. Cho. Patent # 9235465 (2016).

#### **STUDENT ADVISING:**

**Ms. degrees:** Hani Salib(2014), Ahmed Abousamra(2012), Michel Hanna(2009), Sameh Gobrial(2007), Jianguo Huo(2007), Ruibin Xu(2007), Cosmin Rusu(2006), Sherif Khattab(2004), Nevine Aboughazaleh (2003), Dakai Zhu(2001), Jing Chen(2000), Shu Li(2000), Jin Qian(2000), Deepika Balakrishna(1999), Frank Liberato(1999), Kannan Narayanan(1999), Jun Yang(1999), Abhi Abhishek(1998), Zhixiong Chen(1997), Joydeep Sen Sarma(1997), Chiming Chang(1996), Bohr He(1995), Xin Yuan(1995), Adefemi Sunmonu(1994), Sunondo Ghosh(1993), Steven Lu(1993), Chun Gong(1992), Wei-ming Lin(1991), Robert Beck (1989), Nimish Shrivastava(1989), John Ramirez(1989), Saurabh Gupta(1988), Foster Provost(1988), Padma Venkataraman(1988), Joseph Villani(1988), John Davis(1987), Xioli Zang(1987).

**Ph. D. degrees:** SeyedMohammad SeyedzadehDelcheh(2018), Jiwei Liu(2018), Xialong Cui(2017), Juyoung Jung(2016), Rakan Maddah(2015), Yu Du(2015), Miao Zhu(2015), Michael Moeng(2015), Ahmed Abousamra(2013), Michel Hanna (2013), Yong Li(2012), Shuyi Shao(2010), Mahmoud Elhaddad(2010), Mohamed Hammoud(2010), Ruibin Xu(2010), Sherif Khattab(2008), Nevine AbouGhazaleh(2008), Sameh Gobrial(2008), Cosmin Rusu(2006), Dakai Zhu(2004), Hakan Aydin(2001), Libin Dong(2001), Sylvain Lauzac(2000), Charles Salisbury(1998), Xin Yuan(1998), Nimish Shrivastava(1997), Sunondo Ghosh(1996), Chun Gong(1995), John Ramirez(1995), Chunming Qiao(1993), Sultan Alam(1991), Zincheng Guo(1991).

#### **PROFESSIONAL ACTIVITIES:**

- Editor: IEEE Transactions on Sustainable Computing (2016 - )  
 IEEE Transactions on Computers (1991 - 1996 and 2011 - 2014)  
 Sustainable Computing, Informatics and Systems (2010 - 2015)  
 Journal of Parallel and Distributed Computing (2003 - 2011)  
 Computer Architecture Letters (2001 - 2010)  
 The International Journal of Embedded Systems (2004 - 2009)  
 IEEE Transactions on Parallel and Distributed Systems (1998 - 2002)  
 Springer Book Series in Computer Science (1997 - 2009)  
 Conference Chair: Int. Conf. on Massively Parallel Proc. Using Optical Interconnections (MPPOI) - 1996  
 Program Committee Chair: Int. Conf. on Parallel and Distributed Comp. & Sys. - 1992  
 Program Committee Member:  
 Int. Conf. on Distributed Computing Systems (ICDCS) – 1997, 2010, 2018, 2019  
 The International Green and Sustainable Computing Conference (IGSC) – 2015, 16, 18  
 IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA) 2017

IEEE Symposium on High-Performance Interconnects (HOTi) - 2006,07,08,09,10,11,12,13,14,15,16,17  
 IEEE Int. Symposium on Parallel and Distributed Processing with Applications (ISPA) – 2016, 17  
 IEEE International Conference on High Performance Computing (HiPC) – 2009, 12, 14, 15, 16  
 The Design Automation Conference (DAC) – 2016  
 The IEEE International Conference on Big Data and Cloud Computing (BDCloud) – 2014, 15  
 The Int. Conf. on Parallel Architectures and Compilation Techniques (PACT) – 2014, 15  
 The IEEE Int. Conf. on Parallel and Distributed Systems (ICPADS) – 2014, 15  
 The International Parallel and Distributed Processing Symposium (IPDPS) – 2001, 13, 14  
 The International Green Computing Conference (IGCC) – 2010, 11, 13, 14  
 The Int. conference on Supercomputing (SC) – 2004, 07, 08, 13  
 The International Conference on Cloud and Green Computing (CGC) – 2011, 12  
 The International Conference on Parallel Processing (ICPP) – 1997, 98, 2000, 06, 08, 11, 12  
 The GLOBECOM Optical Networking and Systems Symposium – 2002, 07, 10, 11  
 The International Conference on Data Communication Networking (DCNET) – 2010, 11  
 The International Forum on Next Generation Multicore/Manycore Technologies (IFMT) - 2010  
 The International Conference on High-Performance Clustered Computing (LCI) - 2010  
 IEEE Int. Workshop on Time Critical Applications (IWTCA) - 2009  
 BROADNETS Optical Networking Symposium – 2004, 05, 06, 07, 08, 09  
 The ACM Conference on Embedded Systems Software (EMSOFT) - 2008  
 The International Conference on Principles of Distributed Systems (OPODIS) - 2007  
 Int. Workshop on Service, Security and Data management for Ubiquitous Computing, 2007  
 IEEE Int. Symposium on High Performance Computer Architecture (HPCA) – 1997, 2007  
 Int. Conf. on Self-Organization and Autonomic Systems in Comp. and Comm. (SOAS) - 2006  
 The 2nd IEEE Symposium on Dependable Autonomic and Secure Computing (DASC) – 2006  
 The International Conference on Autonomic Computing (ICAC) – 2006  
 IFIP Workshop on Trusted and Autonomic Ubiquitous and Embedded Systems - 2005  
 The International Conference on Dependable Systems and Networks (DSN) - 2004  
 The International Workshop on Methodologies in Low Power Design (MLPD '04) - 2004  
 The Real-time Systems Symposium (RTSS) - 2004  
 The Int. Conference on Communications (ICC) Optical Networking Symposium - 2003  
 The Optical Networking and Communications Conference (OptiComm) - 2003  
 The 6th International Conference on Computer Science and Informatics (CS&I) - 2002  
 The International Conference on Communications in Computing (CIC) - 2001 and 02  
 ICPP workshop on Optical Networks - 2001 and 2002  
 IEEE International Symposium on Network Computing and Applications (NCA) – 2001  
 IEEE International Symposium on Signal Processing and Information Technology - 2001  
 IPPS/IPDPS Workshop on Optics and Computer Science (WOCS) - 2001, 1999, 98, 97  
 Real-Time Application Symposium (RTAS) - 2001  
 International Conf. on Parallel Interconnections - 2000  
 IPPS/IPDPS Workshop on Advances in Parallel & Dist. Computational Models - 2000  
 10th International Conference on Computing and Information (ICCI) - 2000  
 Comm. Networks and Dist. Sys. Modeling and Simulation Conf. – 2000, 1999, 97  
 ISPAN Workshop on Advances in Parallel Computing Models - 1999  
 International Conf. on Computer Comm. and Networks (IC3N) - 1998  
 Int. Conf. on Parallel and Dist. Comp. Sys. - 1998, 97, 96, 95, 94, 93, 91  
 SRDS Workshop on Advances in Parallel and Distributed Systems - 1998  
 Int. Conf. on Application Specific Array Processors – 1995, 94, 93, 91  
 Int. Conf. on Massively Parallel Proc. Using Optical Interconnects (MPPOI) - 1995  
 Int. Workshop on Defect/Fault Tolerance in VLSI - 1995, 93, 92  
 Int. Symp. On High Performance Distributed Computing - 1993  
 Advisory Committee Member:  
 IASTED Conf. on Parallel and Dist. Comp. and Sys. (PDCS '99)  
 IEEE Technical Committee on Computer Architecture (1994 -2006)  
 The Microelectronic System Research Center at West Virginia University (1993-97)  
 IEEE Technical Committee on Parallel Processing (1993 - 96)  
 The CS&E Department at Hong Kong U. of Science and Technology (2009-2013)  
 Executive Committee Member: IEEE Parallel Processing Technical Committee (1999 -2005)

**PUBLICATIONS IN ARCHIVED JOURNALS:**

- 1) J. Zhang, D. Kline, L. Fang, R. Melhem and A. Jones, "Yielding Optimized Dependability Assurance through Bit Inversion", *Integration, the VLSI Journal*, vol. 64, no. 1, pp. 105-113 (2019).
- 2) D. Kline, R. Melhem and A. Jones, "Counter Advance for Reliable Encryption in Phase Change Memory", *IEEE Computer Architecture Letters*, vol. 17, no. 2, pp. 209-212 (2018).
- 3) J. Zhang, D. Kline, L. Fang, R. Melhem and A. Jones, "Data Block Partitioning Methods to Mitigate Stuck-at Faults in Limited Endurance Memories". *IEEE Transactions on VLSI*, vol. 26, no. 11, pp. 2358-2371 (2018).
- 4) J. Zhang, D. Kline, L. Fang, R. Melhem and A. Jones, "RETROFIT: Fault-aware Wear Leveling", *IEEE Computer Architecture Letters*, vol. 17, no. 2, pp. 167-170 (2018).
- 5) D. Kline, H. Xu, R. Melhem and A. Jones, "Racetrack Queues for Extremely Low-Energy FIFOs", *IEEE Transactions on VLSI*, vol. 26, no. 6, pp. 1531-1544 (2018)
- 6) Y. Xu, J. Yang and R. Melhem, "A Process Variation-Tolerant Method for Nano-photonic On-chip Networks," *ACM J. on Emerging Technologies in Computing Systems*, vol. 9, no. 4, Article 39 (2018).
- 7) S. Seyedzadeh, A. Jones and R. Melhem "Counter-Based Tree Structure for Row Hammering Mitigation in DRAM", *IEEE Computer Architecture Letters*, vol. 16, no. 1, pp. 18-21 (2017)
- 8) S. Seyedzadeh, R. Maddah, D. Kline, A. Jones and R. Melhem, "Improving Bit Flip Reduction for Biased and Random Data." *IEEE Transactions on Computers*, vol.65, no. 11, pp. 3345-3356 (2016).
- 9) Z. Wang, J. Yang, R. Melhem, B. Childers, Y. Zhang and M. Guo, "Simultaneous Multikernel: Fine-grained Sharing of GPUs." *IEEE Computer Architecture Letters*, vol. 15, no. 2, pp. 113-116 (2016).
- 10) H. Xu, Y. Alkabani, R. Melhem and A. Jones, "FusedCache: A Naturally Inclusive, Racetrack Memory, Dual-Level Private Cache", *IEEE Transactions on Multi-scale Computing Systems*, vol. 2, no. 2, pp. 69-82 (2016).
- 11) M. Moeng, A.K. Jones and R. Melhem, "Weighted-Tuple: Fast and Accurate Synchronization for Parallel Architecture Simulators." *IEEE Transactions on Parallel and Distributed Systems*, vol 27, no. 8, pp. 2462-2474 (2016).
- 12) R. Maddah, S. Cho and R. Melhem, "Symbol Shifting: Tolerating More Faults in PCM Blocks." *IEEE Transaction on Computers*, vol. 65, no 7, pp. 2270-2283 (2016).
- 13) M. Zhou, Y. Du, B. Childers, D. Mosse and R. Melhem, "Symmetry-agnostic Coordinated Management of Memory Hierarchy in Multi-core Systems." *The ACM's Transactions on Architecture and Code Optimization*, vol. 12, no. 4, pp. 61:1-61:26 (2016).
- 14) M. Moeng, H. Xu, R. Melhem and A. Jones, "ContextPreRF: Enhancing the Performance and Energy of GPUs with Non-Uniform Register Access (NURA)." *IEEE Transactions on VLSI*, vol. 24, no. 1, pp. 343-347 (2016).
- 15) V. Petrucci, O. Loques, D. Mosse, R. Melhem, N. AbouGazala and S. Gobriel, "Energy-efficient thread assignment optimization in heterogeneous multi-core systems", *ACM Transactions on Embedded Computing*, vol. 14, no. 1, pp. 15.1–15.26 (2015).
- 16) R. Maddah, R. Melhem and S. Cho, "RDIS: Tolerating Many Stuck-At Faults in Resistive Memory", *IEEE Transactions on Computers*, vol. 64, no. 3, pp. 847-861 (2015).
- 17) X. Cui, B. Mills, T. Znati and R. Melhem, "Shadow Replication: An Energy-Aware, Fault-Tolerant Computational Model for Green Cloud Computing", *Energies*, vol. 7, no. 8, pp. 5151-5176 (2014).
- 18) S. Baek, S. Cho and R. Melhem, "Refresh Now and Then", *IEEE Transactions on Computers*, vol. 63, no. 12, pp. 3114-3126 (2014).
- 19) Y. Li, R. Melhem and A.K. Jones, "A Practical Data Classification Framework for Scalable and High Performance Chip-Multiprocessors", *IEEE Transactions on Computers*. vol. 63, no. 12, pp. 2905-2918 (2014).
- 20) A. Abousamra, A.K. Jones and R. Melhem, "Ordering Circuit Establishment in Multiplane NoCs", *ACM Transactions on Design Automation of Electronic Systems*, vol. 18, no. 4, pp. 49:1-39 (2013).
- 21) A. Benoit, R. Melhem, P. Renaud-Goud and Y. Robert, "Assessing the performance of energy-aware mappings", *Parallel Processing Letters*, vol. 23, no. 2, 17 pages (2013).
- 22) R. Maddah, S. Cho and R. Melhem, "Data Dependent Sparring to Manage Better-Than-Bad Blocks", *IEEE Computer Architecture Letter*, vol. 12, no. 2, pp. 43-46 (2013).
- 23) Y. Du, M. Zhou, B. Childers, R. Melhem and D. Mosse, "Delta-compressed Caching for Overcoming the Write Bandwidth Limitation of Hybrid Main Memory", *ACM's Transactions on Architecture and Code Optimization (TACO)*, vol. 9, no. 4, pp. 55:1 – 55:20 (2013). Also presented at *Hipeac '13 – Berlin, Germany (Jan. 2013)*.

- 24) Y. Li, R. Melhem and A. Jones, "PS-TLB: Leveraging Page Classification Information for Fast, Scalable and Efficient Translation for Future CMPs", *ACM's Transactions on Architecture and Code Optimization (TACO)*, vol. 9, no. 4, pp. 28:1 – 28:21 (2013). Also presented at *Hipeac '13 – Berlin, Germany (Jan. 2013)*.
- 25) Y. Li, R. Melhem and A. Jones, "Leveraging Sharing in Second Level Translation-Lookaside Buffers for Chip Multiprocessors", *IEEE Computer Architecture Letters*, vol. 11, no. 2, pp. 49-52 (2012).
- 26) Y. Li, A. Abousamra, R. Melhem and A. Jones, "Compiler-assisted Data Distribution and Network Configuration for Chip Multiprocessors", *The IEEE Transactions on Parallel and Distributed Systems*, vol. 23 no. 11, pp. 2058-2066 (2012).
- 27) M. Zhou, Y. Du, B. Childers, R. Melhem and D. Mosse, "Writeback-aware Partitioning and Replacement in Last-Level Cache of Phase Change Main Memory System", *The ACM's Transactions on Architecture and Code Optimization (TACO)*, vol 8, issue 4, article 53 (2012).
- 28) A. Abousamra, A. Jones and R. Melhem, "Co-Design of NoC and Cache Organization for Reducing Access Latency in Chip Multiprocessors", *The IEEE Transactions on Parallel and Distributed Systems*, vol. 23 no. 6, pp. 1038-1046 (2012).
- 29) D. Zhu, X. Qi, D. Mosse and R. Melhem, "An Optimal Boundary-Fair Scheduling Algorithm for Multiprocessor Real-Time Systems", *The Journal of Parallel and Distributed Computing*, vol. 71, no. 10, pp. 1411-1425 (2011).
- 30) M. Hammoud, S. Cho and R. Melhem, "C-AMTE: A Location Mechanism for Flexible Cache Management in Chip Multiprocessors". *The Journal of Parallel and Distributed Computing*, vol. 71, no. 6, pp. 889-896 (2011).
- 31) M. Hanna, S. Demetriades, S. Cho, R. Melhem, "Advanced Hashing Schemes for Packet Forwarding Using Set Associative Memory Architectures", *The Journal of Parallel and Distributed Computing*, vol. 71, no. 1, pp. 1-15 (2011).
- 32) M. Hammoud, S. Cho and R. Melhem, "A Dynamic Pressure-Aware Associative Placement Strategy for Large Scale Chip Multiprocessors", *IEEE Computer Architecture Letters*, vol 9, no 1, pp. 29-32 (2010).
- 33) S. Cho and R. Melhem, "On the Interplay of Parallelization, Program Performance, and Energy Consumption", *IEEE Transactions on Parallel and Distributed Systems*, vol 21, no 3, pp. 342-353 (2010).
- 34) X. Yuan, W. Nienaber, Z. Duan and R. Melhem, "Oblivious Routing in Fat-Tree Based System Area Networks with Uncertain Traffic Demands", *IEEE Transactions on Networking*, vol 17, no 5, pp. 1439-1452 (2009).
- 35) D. Zhu, R. Melhem and D. Mosse, "Energy Efficient Redundant Configurations for Real-Time Parallel Reliable Servers", *Real-Time Systems*, vol 41, no 3, pp. 195-221 (2009).
- 36) S. Shao, A. K. Jones and R. Melhem, "Compiler Techniques for Efficient Communications in Circuit Switched Networks for Multiprocessor Systems", *IEEE Transactions on Parallel and Distributed Systems*, vol 20, no 3, pp. 331-345 (2009).
- 37) S. Shao, Y. Zhang, A. K. Jones and R. Melhem, "Symbolic Expression Analysis for Compiled Communication", *Parallel Processing Letters*, vol 18, no 4, pp.567-587 (2008).
- 38) S. Cho and R. Melhem, "Corollaries to Amdahl's Law for Energy", *IEEE Computer Architecture Letters*, vol 7, no 1, pp. 25-28 (2008).
- 39) R. Xu, D. Mosse and R. Melhem, "Minimizing Expected Energy Consumption in Real-Time Systems through Dynamic Voltage Scaling", *ACM Transactions on Computer Systems*, vol 25, no 4, article 9, (2007)
- 40) N. AbouGhazaleh, B. Childers, D. Mossé, R. Melhem, "Power Management in External Memory using PA-CDRAM", *The International Journal for Embedded Systems (IJES)*, vol 3, no 1, pp. 65-72 (2007).
- 41) N. AbouGhazaleh, B. Childers, D. Mosse and R. Melhem, "Energy Conservation using Power Aware Cached-DRAM", *IEEE Transactions on Computers*, vol 56, no 11, pp. 1441-1455 (2007).
- 42) R. Melhem, "Low Diameter Interconnects for Routing in High Performance Parallel Systems", *IEEE Transactions on Computers*, vol 56, no 4, pp. 502-510 (2007).
- 43) M. Elhaddad, R. Melhem and T. Znati, "Analysis of a Transmission Scheduling Algorithm for Supporting Bandwidth Guarantees in Bufferless Networks", *ACM Performance Evaluation Reviews*, vol 34, no 3, pp. 48-63 (2006).
- 44) S. Gobriel, R. Melhem and D. Mosse, "A Unified Interference/Collision Model for Optimal MAC Transmission Power in Adhoc Networks", *The International Journal of Wireless and Mobile Computing*, vol 1, no 3, pp. 179-190 (2006).

- 45) N. AbouGhazaleh, D. Mossé, B. Childers, R. Melhem , “Collaborative Operating System and Compiler Power Management for Real-Time Applications”, *The ACM Transactions on Embedded Computer Systems*, vol 5, no 1, pp. 82-115 (2006).
- 46) S. Khattab, R. Melhem, D. Mosse', and T. Znati, ``Honeypot Back-propagation for Mitigating Spoofing Distributed Denial-of-Service Attacks'', *The Journal of Parallel and Distributed Computing*, vol 66, pp. 1152-1164 (2006).
- 47) R. Hoare, Z. Ding, S. Tung, R. Melhem and A. Jones, "A Framework for the Design, Synthesis and Cycle-Accurate Simulation of Multiprocessor Networks,” *The Journal of Parallel and Distributed Computing*. vol 65, no 10, pp. 1237-1252 (2005).
- 48) C. Rusu, R. Melhem, and D. Mossé, "Multi-version Scheduling in Rechargeable Energy-aware Real-time Systems,” *The Journal of Embedded Computing*, vol. 1, no. 3 (2004).
- 49) S. Li, R. Melhem and T. Znati, "An Efficient Algorithm for Constructing Delay Bounded Minimum Cost Multicast Trees,” *The Journal of Parallel and Distributed Computing*. vol. 64, no. 12, pp. 1399-1413 (2004).
- 50) T. Znati and R. Melhem, "Node Delay Assignment Strategies to Support End-to-end Delay Requirements in Heterogeneous Networks,” *ACM/IEEE Transactions on Networks*, vol. 12, no. 5, pp. 879-892 (2004).
- 51) H. Aydin, R. Melhem, D. Mossé and P. Mejia Alvarez, "Power-Aware Scheduling for Periodic Real-Time Tasks,” *IEEE Transactions on Computers*, vol. 53, no. 5, pp. 584-600 (2004).
- 52) R. Melhem, D. Mossé and E. Elnozahi, "The Interplay of Power Management and Fault Recovery in Real-Time Systems,” *IEEE Transactions on Computers*, vol. 53, no. 2, pp. 217-231 (2004).
- 53) C. Sangpachatanaruk, S. Khattab, T. Znati, R. Melhem, and D. Mossé, "Design and Analysis of a Replicated Elusive Server Scheme for Mitigating Denial of Service Attacks,” *Journal of Systems and Software*, vol. 73, no. 1, pp. 15-29 (2004).
- 54) D. Zhu, D. Mossé and R. Melhem, "Power Aware Scheduling for AND/OR Graphs in Real-Time Systems,” *IEEE Transactions on Parallel and Distributed Systems*, vol. 15, no. 9, pp. 849-864 (2004).
- 55) S. Lauzac, R. Melhem, D. Mossé, "An Improved Rate-Monotonic Admission Control and its Applications,” *IEEE Transactions on Computers*, vol. 52, no. 3, pp. 337-350 (2003).
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#### **PUBLICATIONS IN REFERRED CONFERENCE PROCEEDINGS:**

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#### EDITED BOOK:

*Power Aware Computing*, editors: R. Graybill and R. Melhem, Kluwer/Plenum Publishers (2002).

#### COURSES TAUGHT

At Purdue University (1984 - 1985):

CS 430: Advanced Information Processing, UG.

CS 614: Numerical Solution of PDE, G.

## At the University of Pittsburgh:

- CoE1502: Advanced Digital Design UG (F'06)
- CS 3410: Advanced topics in Computer Architecture UG (F'05)
- CS 1645: Introduction to High Performance Computing Systems UG (F'04, F'07, F'09, S'12)
- CS 2410: Computer Architecture, G (F'99, F'00, F'03, F'12, F'13, F'14, F'15)
- CS 2001: Research Topics in Computer Science, G (F'00, F'01, F'02, F'03)
- CS 2002: Research Experience in Computer Science, G (S'01, S'01, S'02, S'03, S'04)
- CS 3530: Advanced Topics in Distributed and Real-time Systems, G (S'02)
- CS 1541: Introduction to Computer Architecture, UG (F'98, S'99, F'99, S'00, F'00, F'01, F'02, F'10, S'11, F'12, S'13, F'13, S'14, S'15, F'16, F'17, S'18)
- CS 2450: Intro. To Parallel Computing, G (S'89, S'91, S'93, S'95, S'97, S'99, F'08)
- CS 0447: Computer Organization and Assembly Language Programming, UG (F'97, S'98)
- CS 3420: Fault Tolerant, Parallel and Distributed Systems, G (F'97)
- CS 3580: Advanced Topics in Parallel Computing, G (S'11)
- EE 1159: Senior Design Course, UG (S'97)
- CS 0445: Introduction to Information Structures, UG (F'94, F'95, S'96)
- CS 1550: Introduction to Operating Systems, UG (F'96)
- CS 2170: Coding and Fault Tolerant Theory, G (F'91, F'93, F'95)
- CS 1512: Boolean algebra and Computer Logic, UG. (S'87, F'88, F'89, F'94)
- CS 0441: Discrete Mathematics, UG (F'91)
- CS 1657: Computer Organization, UG (F'87, F'90, F'92)
- CS 3580: Advanced Topics on Parallel Computing, G (S'88, S'90, F'17)
- CS 1515: Scientific Computing, UG (F'86, F'90)
- CS 201: Topics in Computer Science, G (S'90)
- CS 123: Artificial Intelligence Programming, UG (F'88, F'89)