Curriculum Vitæ

Matthew Might

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Contact

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Education

- Ph.D., Computer Science.   Fall 2003–Summer 2007.
  Georgia Institute of Technology.   Atlanta, Georgia, U.S.A.
  Advisor: Olin Shivers.   GPA: 4.00
  Minor: Economics.

- Visiting scholar.   Summer 2006.
  Northeastern University.   Boston, Massachusetts, U.S.A.
  Host: Mitchell Wand.

- Visiting researcher.   Fall 2004.
  BRICS, University of Århus.   Århus, Denmark.
  Host: Olivier Danvy.

- M.S., Computer Science.   Fall 2002–Spring 2003.
  Georgia Institute of Technology.   Atlanta, Georgia, U.S.A.
  Specialization: Information security.   GPA: 4.00

- B.S., Computer Science.   Fall 1999–Fall 2001.
  Georgia Institute of Technology.   Atlanta, Georgia, U.S.A.
  Specialization: Systems.   GPA: 3.94
  Minor: Economics.

Research interests

- Static analyses for (1) security, (2) parallelism, and (3) optimization.
- Improving static analyses in (1) power, (2) precision and (3) speed.
- Mechanized logic, reasoning and theorem proving.

Professional experience

- University of Utah.   Salt Lake City, Utah, U.S.A.
  Assistant Professor, Tenure-Track.   Fall 2008–Present.

- Diagis, LLC.   Atlanta, Georgia, U.S.A.
  Chief Research Officer.   Fall 2006–Present.

  - Cofounded company to commercialize static analysis research.
  - Developing software to find vulnerabilities at compile time.
  - Managing team of five researchers/developers.
  - Raised $50,000 from GRA (G1).
  - Raised $100,000 from NSF (G2).
  - Software: S3.
  - Publications: J2, U1, U3, U4, U5, U6.

- Yaplet, LLC.   Atlanta, Georgia, U.S.A.
  Chief Technology Officer.   Spring 2006–Present.

  - Cofounded company to deliver web chat service without
    installation or registration.
  - Built high-scalability server and client to power thousands of
    simultaneous chatters.
  - Raised $47,500 in cash and services from Georgia Tech Business
    Plan Competition.
  - Manage server farm handling thousands of chat sessions per day.

Publications

Peer-reviewed full conference papers.

C1. Matthew Might. "Logic-flow analysis of higher-order programs." *Proceedings of the 34th Annual ACM Symposium on the Principles of Programming Languages* (POPL 2007). Long paper category. Nice, France. January, 2007. pages 185–198.

[18% acceptance rate. 36 accepted. 200 submitted.]

C2. Matthew Might, Benjamin Chambers and Olin Shivers. "Model Checking via ΓCFA." *Proceedings of the 8th International Conference on Verification, Model Checking and Abstract Interpretation* (VMCAI 2007). Nice, France. January, 2007. pages 59–73.

[24% acceptance rate. 21 accepted. 85 submitted. Primary authorship.]

C3. Matthew Might and Olin Shivers. "Improving flow analyses via ΓCFA: Abstract garbage collection and counting." *Proceedings of the 11th ACM International Conference on Functional Programming* (ICFP 2006). Portland, Oregon. September, 2006. pages 13–25.

[31% acceptance rate. 24 accepted. 76 submitted. Invited for submission to special issue of *Journal of Functional Programming*: Best Papers of ICFP 2006. Primary authorship.]

C4. Olin Shivers and Matthew Might. "Continuations and transducer composition." *Proceedings of the 27th Conference on Programming Language Design and Implementation* (PLDI 2006). Ottawa, Canada. pages 295–307. June, 2006.

[21% acceptance rate. 36 accepted. 169 submitted. Secondary authorship.]

C5. Matthew Might and Olin Shivers. "Environment analysis via ΔCFA." *Proceedings of the 33rd Annual ACM Symposium on the Principles of Programming Languages* (POPL 2006). Charleston, South Carolina. January, 2006. pages 127–140.

[19% acceptance rate. 33 accepted. 167 submitted. Primary authorship.]

Peer-reviewed journal papers.

J1. Matthew Might and Olin Shivers. "Analyzing environment structure of higher-order languages using frame strings." *Journal of Theoretical Computer Science.* 2007. To appear.

[Invited for special *Festschrift* issue in honor of John Reynolds. Primary authorship.]

J2. Matthew Might and Olin Shivers. "Exploiting reachability and cardinality in higher-order flow analysis." *Journal of Functional Programming*. 2007. To appear.

[Extended report invited as a Best Paper of ICFP 2006. Primary authorship.]

Papers currently awaiting submission.[1]

U1. Matthew Might and Panagiotis Manolios. "The polyvariance completeness theorem: Enabling precision-sensitive analysis."

U2. Matthew Might. "Automatic parallelization via dependency analysis of continuation marks."

U3. Matthew Might. "Abstract ignorance is bliss."

U4. Matthew Might, Olin Shivers, Ben Chambers and T. Stephen Strickland. "Abstract interpretation of imperative programs using garbage-collectable pointer arithmetic."

U5. Matthew Might. "Reconciling recency and reachability via anodizing semantics."

U6. Matthew Might, Olin Shivers and Eric Knauel. "Generalizing escape analysis in the presence of continuations."

Patents

L1. Matthew B. Might, Mark A. Ferderer, Gary F. Bowser. "Cryptographic container security system." Pending. October 24, 2005. 20070248212.

[Primary inventorship.]

L2. Matthew B. Might, Mark A. Ferderer, Gary F. Bowser. "Non-intrusive container inspection system using forward-scattered radiation." Pending. November 14, 2005. 20060256914.

[Primary inventorship.]

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[1]Unpublished work available on request.

L3. Matthew B. Might, Mark A. Ferderer, Gary F. Bowser. "Angled-beam detection system for container inspection." Pending. October 24, 2005. 20060233302.

[Primary inventorship.]

Grants

G1. $50,000. Georgia Research Alliance, Phase I.   August 2006.

- Principal investigator: Matthew Might.
- For investigation into commercial potential of ΓCFA for security-vulnerability scanning.

G2. $100,000. National Science Foundation, Phase I SBIR. January 2007.

- Principal investigator: Matthew Might.
- For construction of ΓCFA-based prototype for security-vulnerability scanning.

Dissertation

- Title: "Environment analysis of higher-order languages."

- Summary: My dissertation develops computable analyses that simultaneously recover the control, data and environment structure of higher-order languages. I introduce three novel flow-analytic techniques: abstract garbage collection, abstract counting and frame strings. Combined, these simultaneously improve the speed, the precision and the power of an ordinary flow analysis. This information expands both the degree to which a program can be optimized and the kinds of optimizations available. Empirically, the precision improves to near perfection and the time of the analysis drops by orders of magnitude. I prove the correctness of the underlying analysis, the correctness of each technique and the correctness of Super-β transformations based on the results of the analysis. An instantiation of the combined analysis for Scheme (a popular functional programming language) supports its versatility and provides experimental validation of my claims.

- Publications: C3, C5, J1, J2.

- Software: S2.

- Awards: A2, A3.

Software

S1. MLCPS. Modified MLton compiler for Standard ML with a CPS phase inserted for ΓCFA.

S2. HOFAE. Middle end for higher-order languages.

  - Supports ΔCFA and ΓCFA.
  - Accepts R5RS scheme.

S3. Diagnox. Middle end for industrial languages.

  - Supports ΓCFA & logic-flow analysis.
  - Accepts Shimple IR for Java.
  - Accepts LLVM IR for C/C++.
  - Scans for vulnerabilities, *e.g.*, buffer overflow, uninitialized value usage.

Teaching

Positions held at Georgia Institute of Technology.

- Instructor, "Introduction to Object-Oriented Programming."
  Spring 2005.

  - Responsible for 3 sections of 50 students each.
  - Delivered three lectures per week on Java GUI programming.

- Graduate Teaching Assistant, "Introduction to Information Security."
  Spring 2004.

  - Responsible for 35 students.
  - Graded assignments.

- Lecturer, Graduate Teaching Assistant, "Languages and Translation."
  Fall 2003.

- – Responsible for 1 section of 50 students.
- – Developed and delivered weekly recitation lecture.
- – Ran weekly laboratory session.
- – Developed and graded three-phase term project, a Lisp interpreter.

- Graduate Teaching Assistant, "Introduction to Proofs and Logic."
  Spring 2003.

  - – Responsible for 100 students.
  - – Ran weekly help session.

- Graduate Teaching Assistant, "Compilers, Interpreters and Program Analyzers."
  Fall 2002.

  - – Responsible for 25 students.
  - – Hand-graded each phase of twelve 8-phase compilers.

Awards

A1. Nominee for ACM SIGPLAN Dissertation Award.   2007.

A2. Nominee for ACM Doctoral Dissertation Award.   2007.

A3. Outstanding Doctoral Dissertation, Computing, Georgia Tech. 2007.

A4. Presidential Fellowship. $20,000.   August 2003.

A5. Dean's Fellowship. $10,000.   August 2003.

A6. Marshall D. Williamson Fellowship. $1,000.   April 2002.

A7. ACM Honor Society (ΥΠΕ) Membership.   Fall 2003.

A8. Economics Honor Society (ΟΔΕ) Membership.   Spring 2001.

A9. SGA Honors Scholar.   Spring 2000, Spring 2001.

A10. ΟΔΚ Freshman Leadership Award.   Spring 2000.

Undergraduate advisees

- Benjamin Chambers.   Fall 2006–Spring 2007.
  Publications: C2, U4.
  Software: S1, S3.
  Now a Ph.D. student at Northeastern University.

- Daniel Harvey.   Fall 2006–Summer 2006.
  Software: S1.
  Now at Microsoft Corporation.

Invited talks

- University of Utah.   27 March 2008.
  Salt Lake City, Utah, U.S.A.
  "Static analysis of higher-order programs."

- Brandeis University.   22 March 2008.
  Boston, Massachussetts, U.S.A.
  "Static analysis of higher-order programs."

- Northwestern University.   12 March 2008.
  Evanston, Illinois, U.S.A.
  "Static analysis of higher-order programs."

- Max Planck Institute for Software Systems.   5 March 2008.
  Saarbrücken, Germany.
  "Static analysis of higher-order programs."

- University of Chicago.   13 April 2007.
  Chicago, Illinois, U.S.A.
  "Beyond Higher-Order Control-Flow Analysis."

- Sandia National Laboratory.   13 September 2006.
  Albuquerque, New Mexico, U.S.A.
  "Efficient and Precise Analysis of Higher-Order Systems."

Professional activities

- External reviewer for *ICFP 2008*.

- Reviewer for *ACM Computing Surveys*. Fall 2007.

- External reviewer for *POPL 2008.*

- External reviewer for *APLAS 2007.*

- External reviewer for *POPL 2007.*

Personal

- Born July 1981 in Washington, D.C.

- Citizenship: U.S.

- Married Cristina Casanova in August 2003.

- Children: Bertrand Thomas, born December 2007.

- Health excellent.

- Languages:

  - Native English speaker.
  - Fluent in Spanish.
  - One year's instruction in Egyptian and Modern Standard Arabic.

Hobbies

- Happy Tails pet-assisted therapy.

- Martial arts. Ranked 6th kup in Hapkido.

- Sailing. 2000+ nautical miles in passage-making.

- SCUBA.

- Ham radio. Callsign KG4UXN. Technician-certified.

References

- Olin Shivers, Advisor.
  Associate Professor, College of Computer and Information Sciences.
  Northeastern University.
  `shivers@ccs.neu.edu`

- Patrick Cousot.
  Professor, Département d'Informatique.
  École Normale Supérieure.
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- Panagiotis (Pete) Manolios.
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- Santosh Pande.
  Associate Professor, College of Computing.
  Georgia Institute of Technology.
  +1 404 385 2169.
  santosh@cc.gatech.edu

- Stephen Ziliak.
  Professor of Economics, College of Arts and Sciences.
  Roosevelt University.
  +1 312 566 0975.
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