Marc Eaddy

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Research Interests

I plan to make software easier to develop and maintain by enabling developers to better understand and modularize programs. My primary research area is Software Engineering, focusing on development tools, language design, program analysis, and empirical studies.

Education

9/2003–5/2008	PhD in Computer Science, *Columbia University*, New York, NY Thesis: *An Empirical Assessment of the Crosscutting Concern Problem* Advisor: Alfred Aho	GPA: 4.0
5/2001	MS in Computer Science, *Columbia University*, New York, NY	GPA: 4.0
4/1995	Dual BS in Electrical Engineering and Computer Science, *Florida State University*, Tallahassee, FL	GPA: 3.1

Research Experience

6/2005–present **Research Assistant**, *Columbia University*, Prof. Alfred Aho, New York, NY

- Performed pioneering research on the crosscutting concern problem, i.e., the inability to effectively modularize the *concerns* (requirements, features, etc.) of a program.
- Created model to formalize the problem, methodology and tool (Java, 19,000 lines) for locating code related to a concern, and metrics to quantify the amount of crosscutting.
- Obtained empirical evidence indicating that as crosscutting increases so do defects.
- Created tools and language extensions for reducing crosscutting concerns, including Wicca (C#, 37,000 lines), the first dynamic aspect-oriented programming system to support source-level debugging, edit-and-continue, and fine-grained weaving using statement-level annotations.

6/2006–8/2006 **Research Intern**, *Microsoft Research*, *Programming Languages and Tools Group*, Redmond, WA

- Created program dependency analysis and visualization tool that refactors classes into open classes to eliminate compile-time dependency cycles.

6/2005–8/2005 **Research Intern**, *Microsoft Research*, *Phoenix Back-end Compiler Group*, Redmond, WA

- Designed and implemented Phx.Morph, a post-compile-time tool that manipulates byte code to enable aspect-oriented programming and open classes. It was built using C# (19,000 lines) and Phoenix, Microsoft's leading-edge back-end compiler infrastructure.

9/2003–6/2005 **Research Assistant**, *Columbia University*, Prof. Steven Feiner, New York, NY

- Created a novel platform for developing 3D augmented and virtual reality applications and games implemented using C# (13,500 lines) and Managed DirectX. It enables dynamic aspect-oriented programming and edit-and-continue.

Industrial Experience

10/1998–8/2003 **Project Supervisor/System Architect**, *Thomson Financial*, New York, NY

- Promoted to Project Supervisor after demonstrating innovation and competence as System Architect for the Thomson ONE product. Later promoted to Merrill Lynch Desktop Coordinator in charge of coordinating the development efforts of 75 developers and managers to rollout Thomson ONE to 25,000 users.
- Thomson ONE is Thomson's flagship real-time stock market data product–a

multithreaded ActiveX control container written in C++ (120,000 lines)–onto which all Thomson and third-party products and content are integrated including ActiveX controls, web pages, and applications.

- Designed and developed the system architecture, object model, XML schemas, SDK, and scripting and logging subsystems. Supervised a team of 6 developers and served as coordinator and driver for integration and optimization activities with other project groups. Participated and oversaw all aspects of the Thomson ONE development process including requirements, design, release, feature integration, documentation, optimization and maintenance.
- Designed and developed the GridLayout C++ DLL (20,000 lines) which uses XML to define the presentation layout and business logic for real-time stock market data for several ActiveX controls.
- Helped develop the ILXQuote ActiveX control that displays real-time global market data for stocks, bonds, options, futures, treasuries, and many other security types.
- Profiled applications using NuMega TrueTime and Intel VTune and implemented several optimizations across our product suite. Collaborated with Intel to improve application performance on Intel Xeon processors (http://www.intel.com/software/products/vtune/vtune60/techtopics/flexmonitor.pdf).
- Innovated and developed several mechanisms using DHTML, behaviors, cascading style sheets, and the Web Browser control for improving usability and achieving tighter integration with web applications.
- Helped design the Application Framework which enables code reuse and ensures interoperability across all Thomson ActiveX controls. Designed interfaces, developed shared templates and code, and wrote extensive documentation. Helped wean developers off "copy-and-paste" reuse. Evangelized adoption of XML (GridLayout was the first project to use XML). Improved hiring process by creating a 75 question interview test that covered C++, COM, etc.

9/1995–10/1998 **Software Engineer**, *News Internet Services*, New York, NY

- Worked on team projects with editors, producers, designers and programmers in a dynamic newsroom environment to implement leading-edge applications for News Corporation's internet sites.
- Developed C++ programs (70,000 lines) and scripts running on UNIX to build the TV Guide Online Listings (www.tvguide.com) continuously (24/7).
- Employed OOD principals to design and develop the ApeSnmp COM system architecture that provides SNMP monitoring for our PrimeAPE Web Publishing Tools.
- Developed several web applications for *Major League Baseball*, *iVillage*, *Movietone*, and *TV Guide*, including online ballots and one of the first web postcard programs.

7/1995–9/1995 **Assistant Systems Administrator**, *Pioneer Management*, Dublin, Ireland

- Developed PERL scripts on AIX UNIX to automate daily procedures including batch processing, nightly backups, and disk usage statistics reporting.

2/1995–5/1995 **Software Developer**, *Supercomputer Computations Research Institute*, Tallahassee, FL

- Developed PERL scripts on Solaris UNIX to convert the Statutes and Bills of the State of Florida to HTML pages for the Florida Legislature web site (www.leg.state.fl.us).

10/1994–2/1995 **Systems Administrator**, *Chemical Engineering Dept., College of Engineering*, Tallahassee, FL

- Installed and maintained various software and hardware, and wrote programs and scripts, for DEC ALPHA UNIX, IBM RISC/6000 UNIX, and IBM PC.

Academic Experience

spring 2004 **Instructor, C Programming Language**, *Columbia University*, New York, NY

fall 2004
spring 2005

- Taught C programming language and good programming practices for 3 semesters.
- Created lecture material, assignments, quizzes and exams.
- Developed scripts that automate testing, grading, and emailing results.

Selected Publications

refereed publications

M. Eaddy, A. Aho, G. Antoniol, and Y.-G. Guéhéneuc, "CERBERUS: Tracing Requirements to Source Code Using Information Retrieval, Dynamic Analysis, and Program Analysis," *International Conference on Program Comprehension (ICPC)* (*to appear*), 2/2008.

M. Eaddy, T. Zimmermann, K.D. Sherwood, V. Garg, G.C. Murphy, N. Nagappan, and A. Aho, "Do Crosscutting Concerns Cause Defects?," *IEEE Transactions on Software Engineering (TSE) (in press)*, 2/2008.

M. Eaddy, A. Aho, and G.C. Murphy, "Identifying, Assigning, and Quantifying Crosscutting Concerns," *Workshop on Assessment of Contemporary Modularization Techniques (ACOM)*, 5/2007.

M. Eaddy, A. Aho, W. Hu, P. McDonald, and J. Burger, "Debugging Aspect-Enabled Programs," *International Symposium on Software Composition (SC)*, 3/2007.

M. Eaddy and A. Aho, "Towards Assessing the Impact of Crosscutting Concerns on Modularity," *AOSD Workshop on Assessment of Aspect Techniques (ASAT)*, 3/2007.

M. Eaddy and A. Aho, "Statement Annotations for Fine-Grained Advising," *ECOOP Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE)*, 7/2006.

M. Eaddy, G. Blaskó, J. Babcock, S. Feiner. "My Own Private Kiosk: Privacy-Preserving Public Displays," *International Symposium on Wearable Computers (ISWC)*, 10/2004.

books

M. Rothstein, M. Eaddy, et al. *Ace the Technical Job – Programming Edition*, McGraw-Hill, 1/2000.

magazine articles

M. Eaddy. "C# Versus Java: Do we really need another language?" *Dr Dobb's Journal*, 2/2001.

posters

M. Eaddy, "Goblin: A Platform for 3D, Virtual Reality, and Augmented Reality Applications and Games," *Microsoft Faculty Summit*, 6/2005.

Presentations

workshop presentations

"Identifying, Assigning, and Quantifying Crosscutting Concerns," *ACOM*, 2007.

"Towards Assessing the Impact of Crosscutting Concerns on Modularity," *ASAT*, 2007.

"Statement Annotations for Fine-Grained Advising," *RAM-SE*, 2006.

invited talks

"Why hasn't Microsoft adopted Aspect-Oriented Programming?" *Microsoft AOP Goes .NET Workshop*, 2005.

tool demos

"Wicca 2.0: Dynamic Weaving using the .NET 2.0 Debugging APIs," *AOSD*, 2007.

"Phx.Morph: Weaving using the Microsoft Phoenix compiler back-end," *AOSD*, 2006.

"Wicca: Flexible and Powerful Aspect-Oriented Programming using Hybrid Weaving," Columbia University, 2006.

"Refactoring Libraries for Reuse using Open Classes," Microsoft Research, 2006.

"Phx.Morph: AOP using Phoenix," Microsoft, 2005.

other talks

"My Own Private Kiosk: Privacy-Preserving Public Displays," *ISWC*, 2004.

Selected Class Projects

fall 2003 — *Programming Languages and Translators* – Designed and implemented back-end compiler, simulator and concurrency semantics for a novel language.

fall 2003 — *Game Technology and Design* – Led team to design and develop Snowglobe–a 3D arcade-style game–using C# and Managed DirectX.

fall 1998 — *Advanced Software Engineering* – Led team to design and develop a distributed data filtering

system in Java (15,000 lines) using Java RMI.

fall 1997 *Web-Based Collaborative Work* – Developed (along with two students) the first public domain Web Distributed Authoring and Versioning (WebDAV, RFC 2518) server in Java (12,500 lines). It garnered the highest project grade in class, received attention from Microsoft, Sun, IBM, and Xerox, was featured in *IEEE Computing*, and is referenced at the official WebDAV.org site. We recently sold the first commercial license for the software.

Honors and Awards

2004–2005 Awarded $80,000 grant from Microsoft Research.
2005–2008 Awarded Graduate Research Assistantship.
summer 2004 Awarded Graduate Research Assistantship.
spring 2004 Awarded PhD Teaching Assistantship.
2002 Thomson ONE voted Product of the Year by *Inside Market Data* magazine.

Professional Activities

2008 PC Member, *Workshop on Linking Aspect Technology and Evolution (LATE)*
2006 PC Member, *Workshop on Foundations of Aspect-Oriented Languages (FOAL)*
2006 Reviewer, *International Symposium on Code Generation and Optimization (CGO)*
2005 Reviewer, *International Symposium on Mixed and Augmented Reality (ISMAR)*
2004 Reviewer, *International Symposium on Wearable Computers (ISWC)*
2003-*present* Student Member, *IEEE*

Community Activities

2004-2008 Member, *Columbia University Graduate Students Advisory Council*
2006 Volunteer, *New York Cares*

Skills/Knowledge

expert knowledge: C/C++, C#/.NET, Java

advanced knowledge: Scripting (PERL, shell, JavaScript, VB Script), HTML/DHTML, XML, COM, ATL, ActiveX, VB, MFC, UML, TCP/IP, UDP

References

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