Danny Dig

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Education

08/02 - 11/07	**University of Illinois at Urbana-Champaign (UIUC)**	**Urbana, IL**
	Ph.D. in Computer Science	
	Thesis: *Automated Upgrading of Component-based Applications*	
	Ralph Johnson, advisor	
10/01 - 06/02	**Politechnics University of Timisoara**	**Timisoara, Romania**
	M.S. in Computer Science	
	Thesis: *Refactoring to Patterns: An Automated Approach*	
	Radu Marinescu, advisor	
10/96 - 06/01	**Politechnics University of Timisoara**	**Timisoara, Romania**
	B.S. in Computer Science	
	Thesis: *Automated Refactoring for Object-Oriented Applications*	

Research Interests

I enjoy doing research in Software Engineering. I am particularly working on **interactive program analysis and transformation**, **Generative AI, Agentic AI, and Large Language Models (LLMs)** to augment static analysis, automated refactoring, design & architectural patterns, **concurrency and parallelism**, **mobile computing**, software analytics, software testing, and software evolution.

Grants

Lead PI for **$7.592M** in funding from government and industry, my share: $2.8M. An additional $10M as a Co-PI on the Microsoft-Intel Parallel Computing Center at University of Illinois.

2023	Lead PI, "IUCRC Phase 1: Center on Pervasive Personalized Intelligence (PPI). Industry membership fees", $225K.
2022	Lead PI, "IUCRC Phase 1: Center on Pervasive Personalized Intelligence (PPI). Industry membership fees", $450K.
2022	PI, "Collaborative Research: CCRI: New: A Software Refactoring Community Infrastructure", National Science Foundation, CNS-2213763, $1.3M. Co-PIs: Marouane Kessentini (Lead) and Mehdi Bagherzadeh (OU), Yuanfang Cai (Drexel), Mohamed Mkaouer and Christian Newman (RIT), Wael Kessentini and Vahid Alizadez (DePaul)
2021	Lead PI, "IUCRC Phase 1: Center on Pervasive Personalized Intelligence (PPI). Industry membership fees", $450K.
2020	Lead PI, "IUCRC Phase 1: University of Colorado Boulder and Oregon State University: Center on Pervasive Personalized Intelligence (PPI)", $1.5M.
2018	Lead PI, "IUCRC Planning Oregon State University: Center on Pervasive Personalized Intelligence (PPI)", National Science Foundation, $15K.
2017	Sole PI, "Program Analysis for Android Runtime Permissions", Google gift, $53K.
2016	Sole PI, "CAREER: Program Analysis and Transformations for Asynchrony", National Science Foundation, CCF-1553741, $521K.
2015	Sole PI, "Refactoring for Asynchronous Execution on Android Apps", Google gift, $52K.
2015	Lead PI, "Research Experience for Undergrads (REU) Supplement", National Science Foundation, $16K.
2013	Sole PI, "Automating Refactorings for Readability and Performance", Microsoft gift, $25K.
2012	**Lead PI**, "SHF: Large: Collaborative Research: Science and Tools for Software Evolution", National Science Foundation, CCF-1439957, **$2.2M**. Co-PIs: Brian Bailey, Ralph Johnson, Darko Marinov (UIUC), and Don Batory (UT Austin)

2012	Sole PI, "SHF: Small: Interactive Refactoring for Parallelism", National Science Foundation, CCF-1442157, $250K.
2012	Sole PI, "Analyzing and Automating Refactorings for Parallelism", from Intel, $150K.
2011	Sole PI, "Interactive Refactoring for Parallelism", Microsoft gift, $75K.
2011	Sole PI, "Interactive Refactoring for Parallelism", from Intel, $150K.
2011	Sole PI, "Practical Multicore Parallel Programming", Curriculum Development, from Intel, $25K.
2011	Sole PI, "Multicore Parallel Programming with Java", Training Course, from Boeing, $105K.
2005	Co-PI with Ralph Johnson, "Using Refactorings to Automatically Upgrade Component-based Applications", Eclipse Innovation Grant, from IBM, $30K.

Selected Awards and Honors

2022	**IoT Innovator of the Year** from the IoT Innovator, recognizing 50 thought leaders across the globe who are advancing the IoT revolution in a meaningful way.
2019	**Best Reviewer Award** at the International Conference on Software Maintenance and Evolution (ICSME'19)
2017	**ACM SIGSOFT Distinguished Paper Award** at the Foundations of Software Engineering (FSE'17)
2017	**ACM SIGPLAN Distinguished Artifact Award** at the ACM SIGPLAN International Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA'17)
2017	**IEEE TCSE Distinguished Paper Award** at the IEEE International Conference on Software Maintenance and Evolution (ICSME'17)
2017	Google Faculty Research Award
2017	**IBM-ISSIP Best Paper Award** at the Hawaii International Conference on System Sciences (HICSS'17)
2016	**ACM SIGSOFT Distinguished Paper Award** at the Foundations of Software Engineering (FSE'16)
2016	**NSF CAREER Award**
2015	Google Faculty Research Award
2015	**Most Influential Paper** Award (N-10 years), International Conference on Software Maintenance (ICSM)
2015	**Best Paper Award**, International Conference on Software Maintenance and Evolution (ICSME'15)
2014	**ACM SIGSOFT Distinguished Paper Award** at the International Conference on Software Engineering (ICSE'14)
2013	Microsoft Software Engineering Innovation Award (SEIF'13)
2013	**ACM SIGSOFT Distinguished Paper Award** at the International Symposium on Software Testing and Analysis (ISSTA'13)
2013	**Best Paper Award** at the International Conference on Software Testing, Verification, and Validation (ICST'13)
2011	Microsoft Software Engineering Innovation Award (SEIF'11)
2009	David J. Kuck Outstanding Ph.D. Thesis Award for the Best Ph.D. Dissertation at the Computer Science department at UIUC. The department also nominated my dissertation for the ACM Dissertation Award.
2007	PhD Dissertation Completion Fellowship, awarded by the Graduate College at UIUC
2006	Outstanding Mentoring Fellowship for summer 2006, awarded by UIUC CS department.
2006	**1st Prize** at inter-disciplinary **Grand Finals of ACM** Student Research Competition, awarded during the ACM Turing Award banquet, San Francisco, May 20th.
2005	1st Prize at ACM SIGPLAN Student Research Competition, held at OOPSLA'05.

Research Experience

01/20 - present **Associate Professor**   **University of Colorado**
I am the founder and executive director of the IUCRC Center on Pervasive Personalized Intelligence (`https://ppicenter.org`), an industry-university consortium under the supervision of the NSF. The PPI Center develops applications and platforms that push personalized intelligence to the edge of the network. I lead research on automated software evolution using static analysis and Generative AI (LLMs). Focus on domain-specific refactorings, e.g. for ML and IoT codebases. I lead the Software Evolution Group, advising PhD and MS students.

01/23 - 07/25 **JetBrains Faculty Scholar**   **JetBrains Research**
I was on Sabbatical at the Machine Learning for Software Engineering (ML4SE) research group at JetBrains, the company that makes the leading IDEs for several programming languages. I led several research projects that combine the creativity of Generative AI & Large Language Models (LLMs) and the power of the IDE to solve several tasks that software developers find difficult.

07/13 - 12/19 **Assistant then Associate Professor**   **Oregon State University**
I lead research on automated software evolution. Focus on change-oriented programming environment and domain-specific refactorings. I led the Software Evolution Group, advising four PhD students, one postdoc, two Master students, and three undergrads.

09/10 - present **Research Professor (non-tenure track)**   **University of Illinois**
Lead research on software evolution, advising four PhD, one MS, and one undergrad student.

09/08 - 08/10 **Postdoctoral Researcher / Principal Investigator**   **University of Illinois**
Universal Parallel Computing Research Center (UPCRC).
I lead research on interactive program transformations [TR'10, TR'09, ASE'09a] for reengineering existing sequential code for concurrency. Collaborated on the design and implementation of Deterministic Parallel Java [OOPSLA'09]. Collaborated on automatic repairing of obsolete unit tests [ASE'09b].
Marc Snir, center director

11/07 - 08/08 **Postdoctoral Research Associate**   **Massachusetts Institute of Technology**
Program Analysis Group.
Opened the field of human-initiated program transformations [ICSE'09] to retrofit parallelism into existing sequential Java code. Collaborated on automatic testing of dynamic web pages [TSE'10, ISSTA'08].
Michael Ernst, supervisor

08/04 - 10/07 **Research Assistant**   **University of Illinois**
Software Architecture Group.
Studied the evolution of real-world software components (libraries and frameworks) to determine how many of the API changes are caused by refactorings [ICSM'05, JSME'06]. Developed automated techniques to detect refactorings [ECOOP'06] in software components and to automatically upgrade component-based applications [ICSE'07, TSE'08, ICSE'08] to use the latest version of their components.
Ralph Johnson, advisor

01/07 - 05/07 **Research Assistant**   **University of Illinois**
Parallel Processing Principles Group.
Studied the state-of-the-art patterns for parallel programming. Wrote a new catalog of patterns [ParaPLoP] for solving N-Body problems.
Marc Snir, mentor

05/05 - 08/05 **Research Intern**   **IBM TJ Watson Research Lab**
Pervasive Infrastructure Department.
Extended Pegboard, a framework for developing mobile applications, to support highly configurable launchings of multiple applications in parallel [MobiSys'06]. The Pegboard framework has been successfully used to generate skeleton code for mobile applications at IBM Research and their clients.
Danny Soroker, mentor

06/04 - 09/04 **Research Intern**   **IBM Zurich Research Lab**
Eclipse Java Development Tools (JDT-UI) Group
Added refactorings in the official Eclipse release to migrate code written in Java 1.4 to 1.5 syntax.
Erich Gamma, mentor

10/01 - 06/02 **Graduate Researcher**   **Politechnics University of Timisoara**
Object-Oriented Software Engineering Group.
Automated the retrofitting of creational design patterns into existing code through means of high-level refactorings. Refactorings-to-patterns implemented in JavaRefactor.
Radu Marinescu, mentor

| 10/00 - 06/01 | **Undegraduate Researcher** | **Politechnics University of Timisoara** |

Developed and released JavaRefactor, the first open-source Java refactoring engine, over 17,000 downloads within first six months after its release. http://plugins.jedit.org/plugins/?JavaRefactor
Horia Ciocarlie, advisor

Research and Creative Scholarship[1]

49 top conference papers, 13 journal papers, 27 short conference or workshop papers. 8500+ citations in Google Scholar.

Refereed Journal Papers

TSE 23 [J13] Operation-based Refactoring-aware Merging: An Empirical Evaluation
Max Ellis, Sarah Nadi, Danny Dig
IEEE Transactions on Software Engineering (TSE), Volume 49(4), pp 2698-2721, April 2023.

TSE 22 [J12] Refactoring Miner 2.0
Nikolaos Tsantalis, Ameya Ketkar^S, Danny Dig
IEEE Transactions on Software Engineering (TSE), Volume 48(3), pp 930–950, March 2022.

TOSEM21 [J11] Understanding Software-2.0: a Study of Machine Learning library usage and evolution
Malinda Dilhara^S, Ameya Ketkar^S, Danny Dig
ACM Transactions on Software Engineering and Methodology (TOSEM) , Volume 30 (4), pp 1-42, July 2021.

TSE 21 [J10] Version Control Systems: An Information Foraging Perspective
Sruti Srinivasa^S, Mihai Codoban^S, David Piorkowski, Danny Dig, Margaret Burnett
IEEE Transactions on Software Engineering (TSE), Volume 47(8), pp 1644-1655, August 2021.

EMSE 19 [J9] The Life-Cycle of Merge Conflicts: Processes, Barriers, and Strategies
Nicholas Nelson^S, Caius Brindescu, Shane McKee^S, Anita Sarma, Danny Dig
IEEE Empirical Software Engineering (EMSE), Volume 24, Number 5, pp 2863–2906, February 2019.

PACMPL 17 [J8] Understanding the use of lambda expressions in Java
Ameya Ketkar^S, Davood Mazinanian, Nikolaos Tsantalis, Danny Dig
Proceedings of the ACM on Programming Languages (PACMPL), Volume 1, Number OOPSLA, pp 85:1–85:31, Oct 2017.

SOFT 15 [J7] Refactoring for Asynchronous Execution on Mobile Devices
Danny Dig
IEEE Software, Volume 32, Number 6, pp 52–61, Nov/Dec 2015.

TOSEM15 [J6] Effective Techniques for Static Race Detection in Java Parallel Loops
Cosmin Radoi^S and Danny Dig
ACM – Transactions on Software Engineering and Methodology (TOSEM), Volume 24, Number 4, pp 1–30, Aug 2015.

STVR 15 [J5] A Study and Toolkit of CHECK-THEN-ACT Idioms of Java Concurrent Collections
Yu Lin^S and Danny Dig
Wiley –Software Testing, Verification and Reliability (STVR), Volume 25, Number 4, pp 397–425, June 2015.

SOFT 11 [J4] A Refactoring Approach to Parallelism
Danny Dig
IEEE Software, Volume 28, Number 1, pp 17–22, Jan 2011.

TSE 10 [J3] Finding Bugs in Web Applications Using Dynamic Test Generation and Explicit State Model Checking
Shay Artzi, Adam Kiezun, Julian Dolby, Frank Tip, Danny Dig, Amit Paradkar, Michael Ernst
IEEE Transactions on Software Engineering (TSE), Volume 36, Number 4, pp 474–494, Jul 2010.

TSE 08 [J2] Effective Software Merging in the Presence of Object-Oriented Refactorings
Danny Dig, Kashif Manzoor^S, Ralph Johnson, and Tien Nguyen.
IEEE Transactions on Software Engineering (TSE), Volume 34, Number 3, pp 321–335, May/June 2008.

JSME 06 [J1] How do APIs Evolve? A Story of Refactoring
Danny Dig and Ralph Johnson.
Journal of Software Maintenance and Evolution (JSME) Volume 18, Issue 2, pp. 83–107, March/April 2006.

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[1]Students under my supervision are denoted by S

Refereed Conference Papers

ICSME25 [C49]   Together We Are Better: LLM, IDE and Semantic Embedding to Assist Move Method Refactoring
Abhiram Bellur[S], Fraol Batole, Mohammed Raihan Ullah[S], Malinda Dilhara[S], Yaroslav Zharov, Timofey Bryksin, Kai Ishikawa, Haifeng Chen, Masaharu Morimoto, Takeo Hosomi, Tien Nguyen, Hridesh Rajan, Nikolaos Tsantalis, Danny Dig
International Conference on Software Maintenance and Evolution (ICSME), pp 430–442, Auckland, New Zealand, Sept 25.
Acceptance ratio: 30% (45/150).

ICSME24 [C48]   Next-Generation Refactoring: Combining LLM Insights and IDE Capabilities for Extract Method
Dorin Pomian[S], Abhiram Bellur[S], Malinda Dilhara[S], Zarina Kurbatova, Egor Bogomolov, Timofey Bryksin, Danny Dig
International Conference on Software Maintenance and Evolution (ICSME), pp 275–287, Flagstaff, US, Oct 24.
Acceptance ratio: 26% (49/188).

FSE 24 [C47]   Unprecedented Code Change Automation: The Fusion of LLMs and Transformation by Example
Malinda Dilhara[S], Abhiram Bellur[S], Timofey Bryksin, Danny Dig
Foundations of Software Engineering (FSE), pp 631–652, Porto de Galihnas, Brazil, July 2024.
Acceptance ratio: 25.5% (121/474).

ICSE 23 [C46]   PyEvolve: Automating Frequent Code Changes in Python ML Systems
Malinda Dilhara[S], Ameya Ketkar[S], Danny Dig
International Conference on Software Engineering (ICSE), pp 995-1007, Melbourne, Australia, May 2023.
Acceptance ratio: 26% (208/796).

ASE 23 [C45]   From Commit Message Generation to History-Aware Commit Message Completion
Aleksandra Eliseeva, Yaroslav Sokolov, Egor Bogomolov, Yaroslav Golubev, Danny Dig, Timofey Bryksin
International Conference on Automated Software Engineering (ASE), pp 723-735, Luxembourg, Sept 2023.
Acceptance ratio: (21%) (134/629).

ICSE 22 [C44]   Discovering Repetitive Code Changes in Python ML Systems
Malinda Dilhara[S], Ameya Ketkar[S], Nikhith Sannidh[S], Danny Dig
International Conference on Software Engineering (ICSE), pp 736–748, Pittsburgh, USA, May 2022.
Acceptance ratio: 26% (197/757).

ICSE 22 [C43]   Inferring And Applying Type Changes
Ameya Ketkar[S], Oleg Smirnov, Nikolaos Tsantalis, Danny Dig and Timofey Bryksin
International Conference on Software Engineering (ICSE), pp 1206–1218, Pittsburgh, USA, May 2022.
Acceptance ratio: 26% (197/757).

FSE 20 [C42]   Understanding Type Changes in Java
Ameya Ketkar[S], Nikos Tsantalis, Danny Dig
Foundations of Software Engineering (FSE), pp 629-641, Sacramento, CA, USA, Nov 2020.
Acceptance ratio: 28% (101/360)

ICSE 19 [C41]   Type Migration in Ultra-Large-Scale Codebases
Ameya Ketkar[S], Ali Mesbah, Davood Mazinanian, Danny Dig, Edward Aftandilian
International Conference on Software Engineering (ICSE), pp 1142–1153, Montreal, Canada, May 2019.
Acceptance ratio: 21% (109/529).

ICSE 19 [C40]   Graph-based Mining of In-the-Wild, Fine-grained, Semantic Code Change Patterns
Hoan Nguyen, Tien Nguyen, Danny Dig, Son Nguyen, Hieu Tran and Michael Hilton[S]
International Conference on Software Engineering (ICSE), pp 819–830, Montreal, Canada, May 2019.
Acceptance ratio: 21% (109/529).

ICSE 18 [C39]   Accurate and efficient refactoring detection in commit history
Nikolaos Tsantalis, Matin Mansouri, Laleh Mousavi Eshkevari, Davood Mazinanian, Danny Dig
International Conference on Software Engineering (ICSE), pp 483–494, Gothenburg, Sweden, May 2018.
Acceptance ratio: 20% (105/502).

FSE 17 [C38]   Trade-Offs in Continuous Integration: Assurance, Security, and Flexibility
Michael Hilton[S], Nicholas Nelson[S], Timothy Tunnell, Darko Marinov, Danny Dig
Foundations of Software Engineering (FSE), pp 197–207, Padderborn, Germany, Sept 2017.
ACM SIGSOFT Distinguished Paper Award
Acceptance ratio: 24% (72/295).

ICSM17 [C37] Software Practitioner Perspectives on Merge Conflicts and Resolutions
Shane McKee[S], Nicholas Nelson[S], Anita Sarma, Danny Dig
International Conference on Software Maintenance and Evolution (ICSME), pp 467–478, Shanghai, China,
Sept 2017.
IEEE TCSE Distinguished Paper Award
Acceptance ratio: 27.8% (42/151).

SPLC 17 [C36] Refactoring Java Software Product Lines
Jongwook Kim, Don S. Batory, Danny Dig
International Systems and Software Product Line Conference (SPLC), pp 59–68, Sevilla, Spain, Sept 2017.
Acceptance ratio: 30%.

OOPSLA17
[C35] Understanding the use of lambda expressions in Java
Ameya Ketkar[S], Davood Mazinanian, Nikolaos Tsantalis, Danny Dig
nternational Conference on Object Oriented Programming, Systems, Languages, and Applications (OOP-SLA'17), pp 1–31, Vancouver, BC, Canada, Oct 2017.
ACM SIGPLAN Distinguished Artifact Award
Acceptance ratio: 29% (66/223).

FSE 16 [C34] API Code Recommendation Using Statistical Learning from Fine-grained Changes
Anh Nguyen, Michael Hilton[S], Mihai Codoban[S], Hoan Nguyen, Lily Mast[S], Eli Rademacher[S], Tien Nguyen,
Danny Dig
Foundations of Software Engineering (FSE), pp 511–522, Seattle, WA, USA, Nov 2016.
ACM SIGSOFT Distinguished Paper Award
Acceptance ratio: 27% (74/273).

FSE 16 [C33] Interactive and Guided Architectural Refactoring with Search-Based Recommendation
Yun Lin, Xin Peng, Yuanfang Cai, Danny Dig, Diwen Zheng, Wenyun Zhao
Foundations of Software Engineering (FSE), pp 535–546, Seattle, WA, USA, Nov 2016.
Acceptance ratio: 27% (74/273).

ASE 16 [C32] Usage, Costs, and Benefits of Continuous Integration in Open-Source Projects
Michael Hilton[S], Timothy Tunnell, Kai Huang, Darko Marinov, and Danny Dig
International Conference on Automated Software Engineering (ASE), pp 426–437, Singapore, Sept 2016.
Acceptance ratio: 19% (57/298).

ICSE 16 [C31] Improving Refactoring Speed by 10X
Jongwook Kim, Don Batory, Danny Dig, and Maider Azanza
International Conference on Software Engineering (ICSE), pp 1145–1156, Austin, TX, USA, May 2016.
ACM SIGSOFT Distinguished Paper Award Runner-up
Acceptance ratio: 19% (101/530).

XP 16 [C30] TDDViz: Using Software Changes to Understand Conformance to Test Driven Development
Michael Hilton[S], Nicholas Nelson[S], Hugh McDonald[S], Sean McDonald[S], Ronald Metoyer and Danny Dig
International Conference on Agile Software Development (XP), pp 53–65, Edinburgh, Scotland, May 2016.

MobileSoft16
[C29] Understanding Code Smells in Android Applications
Umme Ayda Mannan, Iftekhar Ahmed, Rana Abdullah M Almurshed, Danny Dig and Carlos Jensen
International Conference on Mobile Software Engineering and Systems (MobileSoft), pp 225–234, Austin, TX,
USA, May 2016.

ASE 15 [C28] Study and Refactoring of Android Asynchronous Programming
Yu Lin[S], Semih Okur[S], Danny Dig
International Conference on Automated Software Engineering (ASE), pp 224–235, Lincoln, NE, USA, Nov
2015.
Acceptance ratio: 20% (60/289).

ICSME [C27] Software History Under the Lens: A Study on Why and How Developers Examine It
Mihai Codoban[S], Sruti Srinivasa Ragavan[S], Danny Dig, and Brian Bailey
International Conference on Software Maintenance and Evolution (ICSME), pp 1–10, Bremen, Germany, Sept
2015.
Best Paper Award
Acceptance ratio: 22% (32/148).

ICSME [C26] Scripting Parametric Refactorings in Java to Retrofit Design Patterns
Jongwook Kim, Don Batory, and Danny Dig
International Conference on Software Maintenance and Evolution (ICSME), pp 211–220, Bremen, Germany, Sept 2015.
Acceptance ratio: 22% (32/148).

FSE 14 [C25] Retrofitting Concurrency for Android Applications through Refactoring
Yu Lin[S], Cosmin Radoi[S], and Danny Dig
Foundations of Software Engineering (FSE), pp 341–352, Hong Kong, China, Nov 2014.
Acceptance ratio: 22% (61/273).

ICSE 14 [C24] A Study and Toolkit for Asynchronous Programming in C#
Semih Okur[S], David Hartveld, Danny Dig, and Arie van Deursen
International Conference on Software Engineering (ICSE), pp 1117–1127, Hyderabad, India, May 2014.
ACM SIGSOFT Distinguished Paper Award
Acceptance ratio: 20% (99/499).

ICSE 14 [C23] How Do Centralized and Distributed Version Control Systems Impact Software Changes?
Caius Brindescu[S], Mihai Codoban[S], Sergii Shmarkatiuk[S], and Danny Dig
International Conference on Software Engineering (ICSE), pp 322–333, Hyderabad, India, May 2014.
Acceptance ratio: 20% (99/499).

ICSE 14 [C22] Mining Fine-Grained Code Changes to Detect Unknown Change Patterns
Stas Negara[S], Mihai Codoban[S], Danny Dig, and Ralph Johnson
International Conference on Software Engineering (ICSE), pp 803–813, Hyderabad, India, May 2014.
ACM SIGSOFT Distinguished Paper Award Runner-up
Acceptance ratio: 20% (99/499).

MobileSoft [C21] Refactoring Local to Cloud Data Types for Mobile Apps
Michael Hilton[S], Arpit Christi, Danny Dig, Michal Moskal, Sebastian Burckhardt and Nikolai Tillmann
International Conference on Mobile Software Engineering and Systems, co-located with ICSE'14, pp 83–92, Hyderabad, India, May 2014.

ECOOP [C20] Converting Parallel Code from Low-Level Abstractions to Higher-Level Abstractions
Semih Okur[S], Cansu Erdogan, and Danny Dig
European Conference on Object-Oriented Programming (ECOOP), pp 515–540, Uppsala, Sweden, July 2014.
Acceptance ratio: 27% (27/101).

FSE 13 [C19] Crossing the Gap from Imperative to Functional Programming through Refactoring
Alex Gyori[S], Lyle Franklin[S], Danny Dig, and Jan Lahoda
Foundations of Software Engineering (FSE), pp 543–553, Saint Petersburg, Russia, Aug 2013.
Acceptance ratio: 20% (51/251).

ISSTA [C18] Practical Static Data Race Detection for Java Parallel Loops
Cosmin Radoi[S] and Danny Dig
International Symposium in Software Testing and Analysis, pp 178–190, Lugano, Switzerland, July 2013.
ACM SIGSOFT Distinguished Paper Award
Acceptance ratio: 26% (32/124).

ICST 13 [C17] Check-then-Act Misuse of Java Concurrent Collections
Yu Lin[S] and Danny Dig
International Conference on Software Testing, Verification and Validation, pp 164–173, Luxembourg, March 2013.
Best Paper Award
Acceptance ratio: 25% (38/152).

ECOOP [C16] A Comparative Study of Manual and Automated Refactoring
Stas Negara[S], Nicholas Chen, Mohsen Vakillian, Ralph Johnson, and Danny Dig
European Conference on Object Oriented Programming, pp 552–576, Montpelier, France, July 2013.
Acceptance ratio: 25% (29/116).

FSE 12 [C15] How Do Developers Use Parallel Libraries?
Semih Okur[S] and Danny Dig
Foundations of Software Engineering (FSE), pp 54–65, Raleigh, USA, Nov 2012.
Acceptance ratio: 17% (35/201).

ICSM 12 [C14] Refactoring Meets Spreadsheet Formulas
Sandro Badame[S] and Danny Dig
International Conference on Software Maintenance (ICSM), pp 399–408, Riva del Garda, Italy, June 2012.
Acceptance ratio: 25% (46/181).

ECOOP [C13] Is it Dangerous to Use Version Control Histories to Study Source Code Evolution
Stas Negara[S], Mohsen Vakilian, Nicholas Chen, Ralph Johnson, Danny Dig
European Conference on Object-Oriented Programming (ECOOP), pp 79–103, Beijing, China, June 2012.
Acceptance ratio: 21% (30/114).

ICSE 11 [C12] Transformation for Class Immutability
Fredrik Kjolstad[S], Danny Dig, Gabriel Acevedo, Marc Snir
International Conference on Software Engineering (ICSE), pp 61–70, Honolulu, USA, May 2011.
ACM SIGSOFT Distinguished Paper Award Runner-up
Acceptance ratio: 14% (62/441).

ASE 09a [C11] Inferring Method Effect Summaries for Nested Heap Regions
Mohsen Vakilian, Danny Dig, Robert Bocchino, Jeff Overbey, Vikram Adve, Ralph Johnson
International Conference on Automated Software Engineering (ASE'09), pp 421-432, Auckland, New Zealand, Nov 2009.
Acceptance ratio: 17% (38/222).

ASE 09b [C10] ReAssert: Suggesting Repairs for Broken Unit Tests
Brett Daniel, Vilas Jagannath, Danny Dig, Darko Mariov
International Conference on Automated Software Engineering (ASE'09), pp 433-444, Auckland, New Zealand, Nov 2009.
Acceptance ratio: 17% (38/222).

OOPSLA [C9] A Type and Effect System for Deterministic Parallel Java
Robert Bocchino, Vikram Adve, Danny Dig, Sarita Adve, Stephen Heumann, Rakesh Komuravelli, Jeffrey Overbey, Patrick Simmons, Hyojin Sung, Mohsen Vakilian
International Conference on Object Oriented Programming, Systems, Languages, and Applications (OOPSLA'09), pp 97-116, Orlando, USA, Oct 2009.
Over 450 citations in Google Scholar
Acceptance ratio: 17% (25/144).

ICSE 09 [C8] Refactoring Sequential Java Code for Concurrency via Concurrent Libraries
Danny Dig, John Marrero[S], Michael D. Ernst.
International Conference on Software Engineering (ICSE'09), pp 397-407, Vancouver, Canada, May 2009.
Acceptance ratio: 12% (50/405).

ISSTA 08 [C7] Finding Bugs in Dynamic Web Applications
Shay Artzi, Adam Kiezun, Julian Dolby, Frank Tip, Danny Dig, Amit Paradkar, Michael D. Ernst.
International Symposium on Software Testing and Analysis (ISSTA'08), pp 261-272, Seattle, USA, July 2008.
Acceptance ratio: 26% (26/100).

ICSE 08 [C6] ReBA: Refactoring-aware Binary Adaption of Evolving Libraries
Danny Dig, Stas Negara, Vibhu Mohindra, Ralph Johnson.
International Conference on Software Engineering (ICSE'08), pp 441-450, Leipzig, Germany, May 2008.
Acceptance ratio: 15% (56/371).

FSE 07 [C5] Automatic Testing of Refactoring Engines
Brett Daniel, Danny Dig, Kely Garcia, Darko Marinov.
Foundations of Software Engineering (FSE'07), pp 185-194, Dubrovnik, Croatia, September 2007.
Acceptance ratio: 17% (43/251).

ICSE 07 [C4] Refactoring-aware Configuration Management for Object-Oriented Programs
Danny Dig, Kashif Manzoor, Ralph Johnson, and Tien Nguyen.
International Conference on Software Engineering (ICSE'07), pp 427-436, Minneapolis, MN, USA, May 2007.
Acceptance ratio: 15% (50/334).

ECOOP [C3] Automatic Detection of Refactorings in Evolving Components
Danny Dig, Can Comertoglu, Darko Marinov, and Ralph Johnson.
European Conference on Object-Oriented Programming (ECOOP '06), pp. 404-428, Nantes, France, July 2006.
Over 350 citations in Google Scholar
Acceptance ratio: 13% (21/160)

MobiSys [C2] Pegboard: A Framework for Developing Mobile Applications
Danny Soroker, Ramon Caceres, Danny Dig, Andreas Schade, Susan Spraragen, and Alpana Tiwari.
Mobile Systems (MobiSys '06), pp. 138-150, Uppsala, Sweden, June 2006.
Acceptance ratio: 15% (19/120)

ICSM 05 [C1] The Role of Refactorings in API Evolution
Danny Dig and Ralph Johnson.
International Conference on Software Maintenance (ICSM '05), pp. 389-398, Budapest, Hungary, September 2005.
Best Paper Award Runner-up. This paper **Received Most Influential Paper Award 10 years later**.
Acceptance ratio: 31% (55/180).

Refereed Formal Demos, Short Conference, or Workshop Papers

FSE 24 [S23] EM-Assist: Safe Automated ExtractMethod Refactoring with LLMs
Dorin Pomian, Abhiram Bellur, Malinda Dilhara, Zarina Kurbatova, Egor Bogomolov, Andrey Sokolov, Timofey Bryksin, Danny Dig:
ACM Foundations of Software Engineering (FSE) – Tool Demo), pp 582–586, Porto de Galihnas, Brazil, July 2024.

ICSE 22 [S22] IntelliTC: Automating Type Changes in IntelliJ IDEA
Oleg Smirnov, Ameya Ketkar, Timofey Bryksin, Nikolaos Tsantalis, Danny Dig:
International Conference on Software Engineering (ICSE) – Tool Demo), pp 115–119, Pittsburgh, PA, USA, May 2022.

HICSS19 [S21] Examining User-Developer Feedback Loops in the iOS App Store
Kendall Bailey[S], Meiyappan Nagappan, Danny Dig
Hawaii International Conference on System Sciences (HICSS), pp 7411–7420, Wailea, HI, USA, Jan 2019.

SPLC [S20] X15: A Tool For Refactoring Java Software Product Lines
Jongwook Kim, Don S. Batory, Danny Dig
Proceedings of the 21st International Systems and Software Product Line Conference (SPLC), pp 28–31, Sevilla, Spain, Sept 2017

HICSS17 [S19] Are Web Applications Ready for Parallelism?
Cosmin Radoi[S], Stephan Herhut, Jaswanth Sreeram, Danny Dig
Hawaii International Conference on System Sciences (HICSS), pp 1–8, Waikoloa, HI, USA, Jan 2017.
IBM-ISSIP Best Paper Award

ICSE 16 [S18] COPE: Vision for a Change-oriented Programming Environment
Danny Dig, Ralph Johnson, Darko Marinov, Brian Bailey, Don Batory
International Conference on Software Engineering (ICSE) – Visions of 2025 and Beyond (V2025 Track), pp 773–776, Austin, TX, USA, May 2016.

ASE 15 [S17] Refactorings for Android Asynchronous Programming
Yu Lin[S] and Danny Dig
International Conference on Automated Software Engineering (ASE) – Formal Demo, pp 836–841, Lincoln, NE, USA, Nov 2015.

ASE 15 [S16] Assessing the Benefits of Computational Offloading in Mobile-Cloud Applications
Tahmid Nabi, Pranjal Mittal, Pooria Azimi, Danny Dig, Eli Tilevich
Third International Workshop on Mobile Development Lifecycle (MobileDeli'15) in conjunction with SPLASH15, pp 17–24, Pittsburgh, PE, USA, Oct 2015.

PPoPP [S15] Are web applications ready for parallelism?
Cosmin Radoi[S], Stephan Herhut, Jaswanth Sreeram, Danny Dig
ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP) – Poster Session, pp 289–290, San Francisco, CA, USA, Jan 2015.

FSE 14 [S14] BumbleBee: a refactoring environment for spreadsheet formulas
Felienne Hermans and Danny Dig
ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE) – Formal Demo, pp 747–750, Hong Kong, China, Nov 2014.

ICSE 13 [S13] LAMBDAFICATOR: from imperative to functional programming through automated refactoring
Lyle Franklin[S], Alex Gyori[S], Jan Lahoda, Danny Dig
International Conference on Software Engineering (ICSE) – Formal Demo, pp 1287–1290, San Francisco, CA, USA, May 2013.

ICSE 11 [S12] ReAssert: a tool for repairing broken unit tests
Brett Daniel, Danny Dig, Tihomir Gvero, Vilas Jagannath, Johnston Jiaa, Damion Mitchell, Jurand Nogiec, Shin Hwei Tan, Darko Marinov
International Conference on Software Engineering (ICSE) – Formal Demo, pp 1010–1012, Honolulu, HI, USA, May 2011.

ETSE 11 [S11] Automated GUI Refactoring and Test Script Repair
Brett Daniel, Qingzhou Luo, Mehdi Mirzaaghaei, Danny Dig, Darko Marinov, and Mauro Pezze
First International Workshop on End-to-End Test Script Engineering (ETSE 11), pp 38-41, Toronto, Canada, July 2011.

IWMSE [S10] How do Programs Become More Concurrent? A Story of Program Transformations
Danny Dig, John Marrero[S], Michael Ernst
Fourth International Workshop on Multicore Software Engineering (IWMSE'11), pp 1-8, Honolulu, HI, USA, May 2011.

CAP 10 [S9] Bringing the HPC Programmer's IDE into the 21st Century through Refactoring
Fredrik Kjolstad[S], Danny Dig, Marc Snir
SPLASH 2010 Workshop on Concurrency for the Application Programmer (CAP'10), pp 1-4, Reno, NV, USA, Oct 2010.

ParaPloP [S8] N-Body Pattern Language
Danny Dig, Ralph Johnson, Marc Snir
Workshop on Parallel Programming Patterns (ParaPLoP'09), pp 1-12, Santa Cruz, CA, USA, June 2009.

WRT'08 [S7] Gathering Refactoring Data: a Comparison of Four Methods
Emerson Murphy-Hill, Andrew Black, Danny Dig, Chris Parnin
2nd ACM Workshop on Refactoring Tools (WRT'08), pp 1-5, Nashville, TN, USA, October 2008.

ASE 07 [S6] Automated Detection of API Refactorings in Libraries
Kunal Taneja, Danny Dig, Tao Xie
Automated Software Engineering (ASE'07), pp 377-380, Atlanta, GA, USA, November 2007.
Acceptance ratio: 25% ((37+40)/312).

FSE 06 [S5] Refactoring-aware Software Merging and Configuration Management
Danny Dig, Kashif Manzoor, Tien Nguyen, and Ralph Johnson.
Poster Session, Foundations of Software Engineering (FSE'06), Portland, OR, USA, November 2006.

ETX 06 [S4] MolhadoRef: A Refactoring-aware Configuration Management Infrastructure for Object-Oriented Programs
Danny Dig, Tien Nguyen, and Ralph Johnson.
Eclipse Technology Exchange (ETX '06), held at OOPSLA'06, pp 25-29, Portland, OR, USA, October 2006.

OOPSLA [S3] Using Refactorings to Automatically Upgrade Component-Based Applications
Danny Dig.
Doctoral Symposium extended abstract, Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'05), pp. 228-230, San Diego, CA, USA, October 2005. **1st Prize Winner of the ACM SIGPLAN Student Research Competition**

WOOR 05 [S2] Automated Detection of Refactorings in Frameworks and Libraries
Danny Dig, Can Comertoglu, Darko Marinov and Ralph Johnson.
Sixth Workshop on Object-Oriented Reengineering, held at European Conference on Object-Oriented Programming (ECOOP'05), published online, Glasgow, UK, July 2005.

PLoP 04 [S1] Of Steers and Peers - Patterns for Effective Pair-Programming
Danny Dig.
11th Conference on Pattern Languages of Programs (PLoP '04), published online, Monticello, IL, September 2004.

Patents

IBM Patent *Consolidated Launching of Multiple Tasks* - U.S. Patent No: US8219991, Date of Patent: July 10, 2012. http://www.google.com/patents/US8219991
Danny Soroker, **Danny Dig**, Ramon Caceres, Sebastien Demathieu, Apratim Purakayastha.

Teaching Experience

01/26 - 04/26   **Instructor**   **University of Colorado**
Building Software Agents (CSCI 7000-005).
Enrollment: 13 students.

01/26 - 04/26   **Instructor**   **University of Colorado**
AI-driven Leadership (CSCI 7000-006).
Enrollment: 10 students.

09/25 - 12/25   **Instructor**   **University of Colorado**
GenAI-powered Software Engineering (CSCI 7000-011).
Enrollment: 10 students.

01/22 - 05/22   **Instructor**   **University of Colorado**
Software Development for IoT Systems (CSCI 7000-008).
Enrollment: 10 students.

01/21 - 05/21   **Instructor**   **University of Colorado**
OO Analysis and Design (CSCI 4448/5448).
Enrollment: 100+ students.

04/19 - 06/19   **Instructor**   **Oregon State University**
Graduate Course on Software Maintenance and Evolution (CS563).
Enrollment: 6 students.

04/18 - 06/18   **Instructor**   **Oregon State University**
Graduate Course on Software Maintenance and Evolution (CS563).
Enrollment: 7 students.

04/17 - 06/17   **Instructor**   **Oregon State University**
Graduate Course on Applied Research in Software Engineering (CS562).
Enrollment: 6 students.

09/16   **Industrial Instructor**   **Oregon State University**
Technical Course on Asynchronous Programming for Mobile Devices, organized by the Technology Association of Oregon, Portland, OR. Industry participants from 9 companies.

09/15 - 12/15   **Instructor**   **Oregon State University**
Graduate Course on Software Engineering I (CS561).
Enrollment: 9 students.

01/15 - 03/15   **Instructor**   **Oregon State University**
Undergraduate Course on Software Engineering I (CS361).
Enrollment: 37 students.

10/14   **Industrial Instructor**   **Oregon State University**
Summer School on Multicore Programming with Java, held in conjunction with the SPLASH'14 conference in Portland, OR. Industry participants from 5 companies.

10/14 - 12/14   **Instructor**   **Oregon State University**
Graduate Course on Software Engineering I (CS561).
Enrollment: 10 students.

01/14 - 03/14   **Instructor**   **Oregon State University**
Undergraduate Course on Software Engineering I (CS361).
Enrollment: 26 students.

09/13 - 12/13   **Instructor**   **Oregon State University**
Graduate Course on Software Evolution for Mobile Devices (CS519). Using TouchDevelop as research platform.
Enrollment: 6 students.

01/13 - 05/13   **Instructor**   **University of Illinois**
Undergraduate Course on Software Engineering II (CS 428/429)
Enrollment: 140 students.

08/12 - 12/12   **Instructor**   **University of Illinois**
Undergraduate Course on Multicore Parallel Programming (CS 498DD)
Enrollment: 16 students.

01/12 - 05/12	**Instructor**	**University of Illinois**

Undergraduate Course on Software Engineering II (CS 428/429)
Enrollment: 142 students.

08/11 - 12/11	**Instructor**	**University of Illinois**

Undergraduate Course on Software Engineering I (CS 427)
Enrollment: 151 students. I made the class *interactive* and *participatory*. This increased the classroom student attendance from 20% in previous years, to 80%.

09/11, 05/12	**Industrial Instructor**	**Boeing — Seattle I and II & Huntington Beach**

Multicore Programming with Java.
Taught 3 intensive 1-week industrial training sessions to Boeing engineers. Enrollment: 15 managers, 55 programmers. Course rated as "The best technical course I took at Boeing" – Boeing senior software engineer.

10/10, 09/10	**Tutorial Presenter**	**OOPSLA'10, ICSM'10**

Presented half-day tutorials on Refactoring for Parallelism:
- 15 participants, held at OOPSLA'10, Reno, NV
- 28 participants, held at ICSM'10, Timisoara, Romania

06/09, 07/10,	**Summer School Instructor**	**University of Illinois, Singapore Advance Digital Sciences Center**

08/10,   07/11,
07/12

Lectured in the UPCRC & I2PC Summer School on Multicore Programming on the topics of Java parallelism and refactoring for concurrency. Designed and coordinated lab assignments.
- 30 participants, University of Illinois, July 2012
- 260 participants, University of Illinois, July 2011
- 153 participants, University of Illinois, July 2010
- 30 participants, Singapore ADSC, Aug 2010
- 163 participants, University of Illinois, June 2009

09/09 - 12/09	**Co-Instructor**	**University of Illinois**

Graduate Course on Advanced Topics in Software Engineering (CS 527), co-taught with Ralph Johnson.
Taught the special theme for this year's course on tools for parallel programming. Supervised graduate projects. Based on the course projects, **two students published one ICSE paper**.

08/02 - 05/05	**Head Teaching Assistant**	**University of Illinois**

Graduate Object-Oriented Programming and Design (CS 598REJ) (thrice)
Software Engineering I (CS 427) (twice)
Software Engineering II (CS 428) (twice)
eXtreme Programming Coach - coached five 8-person projects (three semesters)
Gave guest lectures, designed and graded homework, designed and graded exams, graded course projects, led project retrospectives, introduced a points-based reward system to encourage student participation during lectures.

10/01 - 06/02	**Teaching Assistant**	**Politechnics University of Timisoara**

Compiler Construction
Programming Languages and Interpreters
Gave recitations and graded problem sets, exams and projects for several groups of students.

09/98 - 06/00	**Teacher**	**Logos Junior College, Emanuel Junior College**

Computer Programming, Operating Systems, Databases Management.
Full responsibility for course curriculum, lectures, and exams.

Advising and Mentoring

Current	**PhD students**	**University of Colorado**
PhD exp. '28	Abhiram Bellur	
PhD exp. '29	Raihan Ullah	

Former	**Grad students**	**CU Boulder, OSU / Illinois**
PhD 2024	Malinda Dilhara, *Code Change Patterns as Reusable Code Abstractions*	
	first job:Amazon	
MS 2023	Dorin Pomian	
	first job:Amadeus	
MS 2023	Carla Pomian	
	first job:Vlog	
MS 2022	Nikhith Sannidhi	
	first job: MathWorks	

PhD 2021	Ameya Ketkar, *Towards Automating Type Changes*
	first job: Uber PL Research group
PhD 2017	Michael Hilton, *Understanding Software Development and Testing Practices*
	first job: teaching faculty at Carnegie Mellon University
PhD 2016	Semih Okur, *Correct Usage of State-of-the-Art Concurrency Through Program Transformations*, wins **Feng Chen Memorial Award** at UIUC
	first job: Microsoft, Redmond, WA
PhD 2015	Yu Lin, *Automated Refactoring for Java Concurrency*
	first job: Google, Mountain View, CA
MS 2015	Kendall Bailey, *Out of the Mouths of Users: Examining User-Developer Feedback Loops Facilitated by App Stores*
	first job: Software Developer, Intel, Hillsborough, OR
MS 2015	Mihai Codoban, *A Comparative Study on how SVN and Git Affect Software Changes*
	first job: Software Developer, Microsoft, Redmond
PhD 2013	Stas Negara (co-advised with Ralph Johnson), *Towards a Change-Oriented Programming Environment*
	first job: Google, Mountain View, CA
MS 2013	Cosmin Radoi, *Practical Static Data Race Detection for Java Loops*, wins **David Kuck Outstanding MS Thesis Award** at UIUC.
	first job: PhD student at UIUC
MS 2012	Sandro Badame, *Refactoring Meets Spreadsheet Formulas*
	first job: Google, NY
MS 2011	Fredrik Kjolstad, *Refactoring Transformations for Maintainable, Scalable, and Efficient Parallelism*, co-advised by Marc Snir
	first job: PhD student at MIT
MS 2009	Binh Le, *Parallelizing Learning-based Java Applications*, co-advised by Ralph Johnson
	first job: MBA student at Boston University
MS 2008	Stas Negara, *Refactoring-aware Binary Adaptation of Evolving Libraries*, co-advised by Ralph Johnson,
	first job: PhD student at UIUC
MS 2007	Kashif Manzoor, *Refactoring-aware Software Merging*, co-advised by Ralph Johnson
	first job: solution architect at Oracle Corporation, Malaysia
MS 2006	Can Comertoglu, *Inferring Refactorings in Evolving Components*, co-advised by Ralph Johnson
	first job: requirements manager at Microsoft, Redmond

Former	**Undergrad interns or individual research study**	**OSU/ Illinois / MIT**
Intern '16, '17	Jacob Lewis, from OSU	
Intern '16, '17	Jonathan Harijanto, from OSU	
Intern '16	George Harder, from OSU	
Intern '15	Lily Mast, from University of Evansville	
Intern '15	Elias Daniel Rademacher, from OSU	
Intern '14,'15	Sean McDonald, from OSU	
Intern '14,'15	Hugh McDonald, from OSU	
Intern '14,'15	Nicholas Nelson, from OSU	
Intern '12	Alexandria Shearer, Passion on Parallelism REU, from Santa Clara University	
Intern '12	Kyle Doren, Passion on Parallelism REU, from UIUC	
Intern '12	Lyle Franklin, ITI Undergrad summer internship, from Ball State University	
Intern '12	Alex Gyori, ITI Undergrad summer internship, from Politehnics University of Timisoara	
Res '12	Yuwei Chen, individual research study, from UIUC	
Res '11	Anda Bereckzy, individual research study, now software developer at Microsoft, Redmond	
Res '11	Alex Sikora, individual research study, now software developer at salesforce.com, L.A.	
Intern '11	Jack Ma, ITI Undergrad summer internship, from Rose-Hulman Institute	
Intern '11	Lorand Szacaks, ITI Undergrad summer internship, now PhD student at IA State University	
Intern '11	Caius Brindescu, ITI Undergrad summer internship, now PhD student at UIUC	
Intern '11	Mihai Codoban, ITI Undergrad summer internship, now PhD student at UIUC	
Intern '09	Mihai Tarce, ITI Undergrad summer internship, now MS student at U of Milan	
Intern '09	Cosmin Radoi, ITI Undergrad summer internship, now PhD student at UIUC	
Res '08	John Marrero, UROP research project at MIT, now MS student at MIT	

PhD Thesis	**Committee member**	**University / External**
2024	Member of the PhD committee for Fei Hu at CU Boulder, USA (final defense May 2024).	
2019	Member of the PhD committee for Arpit Christi at OSU, USA (final defense June 2019).	
2016	Member of the PhD committee for Amin Alipour at OSU, USA (final defense April 2017).	
2014	Member of the PhD committee for Peter Dinges at the University of Illinois at Urbana-Champaign, USA (final defense on April 2014).	

2014	Member of the PhD committee for Bradley Cossette at the University of Calgary, Canada (final defense on Sept 2014).
2013	Served on the PhD committee for Felienne Hermans at the Delft University of Technology, Netherlands (final defense on Jan 2013).

Invited Talks

72 invited talks, not counting conference presentations for the papers on which I am first author

12/2025	Your AI Pair Programmer: Genius or Liability? **AI Summit New York**. Host: VIctoria Cole.
12/2025	Rise of the AgentOps Stack: Building for Autonomy at Scale **AI Summit New York**. Host: VIctoria Cole.
10/2025	AI Programming Assistant **Universidad Nacional de la Plata, Argentina**. Host: Alejandra Garrido.
09/2025	AI Programming Assistant **Central Queensland University, Australia**. Host: Steve Gordon.
07/2025	AI Programming Assistant **JetBrains - Amsterdam, The Netherlands**. Host: Egor Bogolomov.
06/2025	AI Programming Assistant **Vreje University Amsterdam, The Netherlands**. Host: Mauricio Verano Merino.
06/2025	AI Programming Assistant **University College London, UK**. Host: Justyna Petke.
06/2025	AI Programming Assistant **University Babes Bolyai, Romania**. Host: Andrea Vescan.
05/2025	Leveraging GenAI in JetBrains IDEs **AIware Bootcamp, Ottawa, Canada**. Host: Ahmed Hassan.
05/2024	Challenges and Best Practices for Teaching Gen Z Students **JetBrains Academy**. Host: Julia Amatuni. Live stream on YouTube and the network of professors in JetBrains Academy.
04/2024	Reflections on Career, Growth and Development **ICSE'24 New Faculty Symposium**. Host: Arie van Deursen and David Lo. Lisbon, Portugal
12/2023	Accelerating Innovation and Agility in Manufacturing with IIoT and Machine Learning **Industrial IoT World**. Host: Lucian Fogoros. Virtual, 2000+ attendees
11/2023	ExtractMethod Assist: Generative AI and IDE: Together Go Farther **JetBrains AI Conference**. Host: Timofey Bryskin. Belgrade, Serbia
09/2023	Generative AI Programming Assistant **Applied Intelligence Live, 2023**. Host: Steve Brumer. Austin, TX
12/2022	The Smart Factory of Tomorrow – What you need to know and where to start **Industrial IoT World**. Host: Lucian Fogoros. Virtual, 2000+ attendees
11/2022	Reflections on Personal and Professional Growth **FSE'22 New Faculty Symposium**. Host: Laurie Williams. Singapore
11/2022	Together we go farther: industry-university R&D partnerships **IoT World & AI Summit 2022**. Host: Steve Brumer. Austin, TX
06/2020	Growth Lessons from a Decade of Refactoring Research **Keynote at International Workshop on Refactoring**. Host: Peng Xin. Seoul, South Korea
05/2019	Growth Lessons from a Decade of Refactoring Research **Keynote at TechDebt19**. Host: Paris Avgeriou. Montreal, Canada
08/2018	The Changing Landscape of Refactoring Research in the Last Decade **ACM SIGSOFT Webinar Series**. Host: Robert Dyer. Online audience 300
05/2018	The Changing Landscape of Refactoring Research in the last Decade **Keynote @ WAPI'18**. Host: Sarah Nadi. Gothenburg, Sweden
10/2017	The Changing Landscape of Refactoring Research in the last Decade

	Keynote @ GPCE'17. Host: Sebastian Erdweg. Vancouver, Canada
05/2017	Lessons in Refactoring Research **University of La Plata**. Host: Alejandra Garrido. La Plata, Argentina
11/2016	Analysis and Transformations in Support of Android Privacy **UIUC**. Host: Darko Marinov. Urbana, IL, USA
10/2016	Refactoring for Asynchronous Execution on Mobile Devices **Google**. Host: Raluca Sauciuc. Mountain View, CA, USA
10/2015	Software Wearables in the IDE: Continuous Monitoring of Changes **Keynote and Award Talk @ ICSME'15**. Host: Martin Robillard. Bremen, Germany
11/2014	Refactorings for Improving Responsiveness in Mobile Applications **DeMobile'14 Invited Talk at FSE'14**. Host: Aharon Abadi. Hong Kong, China
10/2014	Interactive Program Transformations **U of Victoria**. Host: Daniela Damian. Victoria, Canada
05/2014	Retrofitting Concurrency in Sequential Applications **IIT Hyderabad**. Host: M V Panduranga Rao. Hyderabad, India
10/2013	Refactoring: from Concurrency to Mobility **MobileDeli'13 Invited Talk**. Host: Aharon Abadi. Indianapolis, USA
05/2013	First-class Program Transformations **NCSU**. Host: Emerson Murphy-Hill. Raleigh, USA
04/2013	First-class Program Transformations **CMU**. Host: Jonathan Aldrich. Pittsburgh, USA
04/2013	First-class Program Transformations **OSU**. Host: Martin Erwig. Corvallis, USA
02/2013	Interactive Program Transformations **UIUC**. Host: Vikram Adve. Urbana, USA
08/2012	Interactive Parallelism **Intel**. Host: Mike Wrinn. Santa Clara, USA
07/2012	Automated Program Transformations **Microsoft Faculty Summit**. Host: Judith Bishop. Redmond, USA **Microsoft Research**. Host: Juan Vargas. Redmond, USA
12/2011	Interactive Refactoring for Parallelism **Intel**. Host: Ganapati Srinivasa. Hillsborough, USA **Intel**. Host: Ali Reza Tabatabai. Santa Clara, USA
08/2011	Interactive Refactoring for Parallelism, **Intel**. Host: Matt Frank, Santa Clara, USA
11/2010	Retrofitting Parallelism into Existing Sequential Programs, **Rose Hulman Institute**. Host: Curtis Clifton, Terre Haute, USA
11/2010	Getting a PhD: What, Why, and How to Live on the Frontier, **Inspirations for CS undergrads at Rose Hulman**. Terre Haute, IN
09/2010	Refactoring for Parallelism, **Politechnics University of Bucharest**. Host: Emil Slusanschi, Bucharest, Romania
09/2010	Refactoring for Parallelism, **Politechnics University of Timisoara**. Host: Marius Minea, Timisoara, Romania
08/2010	Retrofitting Parallelism into Sequential Applications **Institute for High Performance Computing**. Host: Rick Goh Siow Mong. Singapore **National University of Singapore**. Host: Wong Weng Fai. Singapore **Nanyang Technological University**. Host: Bertil Schmidt. Singapore
05/2010	Retrofitting Parallelism into Existing Sequential Programs, **UC San Diego**. Host: Sorin Lerner, San Diego, USA
04/2010	Refactoring for Parallelism, **IBM TJ Watson**. Host: Evelyn Duesterwald, Hawthorne, USA
03/2010	Refactoring for Parallelism, **University of Waterloo**. Host: Joanne Atlee, Waterloo, Canada
03/2010	Refactoring for Parallelism, **Ohio State University**. Host: Nasko Rountev, Columbus, USA

11/2009	A Type and Effect System for Deterministic Parallel Java, **Purdue University**. Host: Jan Vitek, West Lafayette, USA
11/2009	ReLooper: Refactoring for Loop Parallelism, **University of Auckland**. Host: Ewan Tempero, Auckland, New Zealand
09/2009	Automated Refactoring for Parallelism, **Microsoft Research**. Host: Wolfram Schulte. Redmond, WA
09/2009	Automated Upgrading of Component-based Applications, **Microsoft Visual Studio Team**. Host: Karen Liu, Redmond, USA
08/2009	Turning Parallel Patterns into Code, **Annual Intel Summit**. Hillsboro, OR
05/2008	ReBA: Refactoring-aware Binary Adaptation of evolving libraries, **Saarland University**. Host: Andreas Zeller, Saarbruecken, Germany
04/2008	Retrofitting Concurrency into Sequential Java Applications, **Manycore Group, MIT**. Host: Anant Agarwal, Cambridge, MA
11/2007	Automated Upgrading of Component-based Applications, **Departmental Talk, MIT**. Host: Michael Ernst, Cambridge, MA
02/2007	Getting a PhD: What, Why, and How to Live on the Frontier, **Inspirations for CS undergrads**. Urbana, IL
01/2007	MolhadoRef: a Refactoring-aware Software Configuration Management, **Department Colloquium, University of Colorado, Boulder**. Host: Amer Diwan. Boulder, CO
11/2006	PhD in Software Engineering: What, Why, and How to Live on the Frontier, **Inspirations track - FSE'06**. Portland, OR
10/2006	Refactoring-aware Software Configuration Management, **Software Seminar, Portland State University**. Host: Andrew Black. Portland, OR
07/2006	Towards Automated Upgrading of Component-based Applications, **Doctoral Symposium - ECOOP'06**. Nantes, France
05/2006	Automatic Detection of Refactorings **Compiler Seminar, University of California - Berkeley**. Host: Ras Bodik. Berkeley, CA **Software Seminar, Stanford University**. Host: Alex Aiken. Stanford, CA **University of California, Santa Cruz**. Host: Jim Whitehead. Santa Cruz, CA
04/2006	Automatic Detection of Refactorings, **Midwest Symposium on Programming Languages and Systems**. Urbana, IL
02/2006	Automatic Detection of Refactorings, **Software Engineering Lab, Iowa State University**. Host: Tien Nguyen. Ames, IA
12/2005	Automatic Detection of Refactorings, **Programming Languages and Compiler Seminar, UIUC**. Host: Vikram Adve. Urbana, IL
10/2005	Towards Automated Upgrades of Component-based Applications, **ACM SIGPLAN Student Research Competition**. San Diego, CA
10/2005	Thesis research talk, **OOPSLA'05 Doctoral Symposium**. San Diego, CA
08/2005	Using Refactorings to Automatically Upgrade Component-based Applications, **IBM TJ Watson Research Lab**. Host: Frank Tip. Hawthorne, NY
08/2004	Automated Refactoring: Past, Present, and Future Research, **IBM Zurich Research Lab**. Host: Erich Gamma. Zurich, Switzerland **Software Composition Group, University of Bern**. Host: Oscar Nierstrasz. Bern, Switzerland

Formal Demonstrations

10/2009	ReLooper: Refactoring for Loop Parallelism, **OOPSLA'09**. Orlando, FL
05/2009	Concurrencer: Retrofitting Concurrency into Sequential Java Applications via Concurrent Libraries, **ICSE'09**. Vancouver, Canada
10/2006	MolhadoRef: a Refactoring-aware Software Configuration Management Tool, **OOPSLA'06**. Portland, OR

Industry Experience

01/23 - 07/25	**JetBrains Research**	**USA**

Scientific Consultant with the ML4SE Research team. Lead projects on a new generation of AI Programming Assistant for refactoring and code renovation.

10/01 - 06/02	**Platinium, Inc**	**Timisoara, Romania**

Full time software engineer. Designed and implemented a Java framework for displaying and manipulating tables. The framework can be easily customized to read inputs in several formats.

1998 - 2000	**TopTech, Inc.**	**Deva, Romania**

Summer internship, worked in computer assembling and service department.

Department Service

01/20-current Mentorship Chair for CS Faculty, facilitate monthly group mentoring sessions for faculty in the CS department, Boulder, CO

01/15-12/19 Member of Steering Committee of the Technology Association of Oregon (TAO) Developer Forum, where I serve as a liaison between OSU and software industry partners, Corvallis, OR

01/14-12/19 Member of Faculty Hiring Committee at EECS OSU, Corvallis, OR

05/15 Organizer and moderator: panel on industry careers with 5 panelists from software companies, part of the Technology Association of Oregon (TAO) Education Roadshow, 250 students, Corvallis, OR

10/14 Co-Chair of Inspirations@SPLASH: inspired undergrads and minorities to apply for graduate school, SPLASH'14 Conference, Portland, OR

11/10 Inspired undergrads to apply for graduate school, Rose Hulman Institute

Spring'09-'13 Started a new seminar, Practice for Academic Job Talks (PACAJOT) at UIUC.

01/09- 12/12 **Co-organizer** of the Software Engineering seminar at UIUC.

01/08- 03/08 Started a new seminar, Practice for Academic Job Talks Seminar at MIT.

03/07 Interviewed faculty candidates in the CS department at UIUC.

02/07 **Organizer** of "Inspirations" event to encourage UIUC CS undergraduate students to apply for PhD.

2006 Assisted the Associate Head to investigate and possibly develop a new graduate program, Master of Software Engineering at UIUC.

Leadership and Service

Chair or co-chair of 18 workshops and 1 conference, PC member for 43 conferences and workshops, 10 NSF panels

2026 Co-Chair, Shonan Seminar on the Future of Refactoring in the GenAI Era.

2026 Program Co-Chair, The IDE Workshop at ICSE'26.

2025 General Chair, The IDE Workshop at ICSE'25.

2025 Program Committee Member, International Conference on Software Engineering (ICSE'26).

2024 Program Committee Member, International Conference on Software Engineering (ICSE'25).

2024 General Chair, The IDE Workshop at ICSE'24.

2024 Panelist and Speaker, New Faculty Symposium at International Conference on Software Engineering (ICSE'24).

2022 Panelist and Speaker, New Faculty Symposium at Foundations of Software Engineering (FSE'22).

18-21 **Faculty Mentoring Chair**, FSE'18, ASE'19, ICSE'19, ICSME'19, ICSE'20, OOPSLA'21.

2021 Program Committee Member, International Conference on Software Engineering – Demo Track (ICSE'22).

2019 Program Board Member, International Conference on Software Engineering (ICSE'20).

2019 **Co-Organizer**, International Workshop on Research and Experience for IoT Systems (SERP4IOT'19).

2019 Program Committee Member, International Conference on Software Maintenance and Evolution (ICSME'19).

2018 Program Committee Member, International Conference on Software Engineering (ICSE'19).

2018 Program Committee Member, International Conference on Software Maintenance and Evolution (ICSME'18).

2017	Program Committee Member, International Conference on Automated Software Engineering (ASE'17).
2016	Program Committee Member, International Conference on Software Engineering (ICSE'17).
2015	**Co-Chair**, International Conference on Mobile Software Engineering and Systems (MobileSoft'15).
2015	Program Committee Member, International Conference on Software Engineering – Visions of 2025 and Beyond (V2025) Track at ICSE 2016.
2015	Program Committee Member, International Conference on Automated Software Engineering (ASE'15).
2015	Program Committee Member, International Conference on Software Engineering – New Ideas and Emerging Results Track. (ICSE NIER'15).
2014	**Lead Co-organizer**, Dagstuhl Seminar on the "The Future of Refactoring". `http://www.dagstuhl.de/14211`
2014	**Co-Chair**, Workshop MobileDeli'14 collocated with SPLASH'14.
2014	Program Committee Member, International Conference on Automated Software Engineering (ASE'14).
2014	Program Committee Member and Judge, Foundations of Software Engineering – Student Research Competition. (FSE - SRC'15).
2013	Program Committee Member, OO Programming, Systems, Languages, and Applications (OOPSLA'13).
2013	Program Committee Member, European Conference on Object-Oriented Programming (ECOOP'13).
2013	Program Committee Member, International Parallel & Distributed Processing Symposium (IPDPS'13).
2013	Program Committee Member, International Conference on Software Engineering – New Ideas and Emerging Results Track. (ICSE NIER'13).
2013	Program Committee Member, International Conference on Software Maintenance (ICSM'13).
2013	Program Committee Member, International Conference on Automated Software Engineering (ASE'13).
2013	**Proceedings Chair**, OO Programming, Systems, Languages, and Applications (OOPSLA'13).
2012	Program Committee Member, International Symposium on Foundations of Software Engineering (FSE'12).
2012	External Review Committee, OO Programming, Systems, Languages, and Applications (OOPSLA'12).
2012	Program Committee Member, International Conference on Software Maintenance (ICSM'12).
2012	External Review Committee, European Conference on Object-Oriented Programming (ECOOP'12).
2012	**Co-Chair**, 4th Workshop on Hot Topics in Software Upgrades at ICSE'12.
2012	Program Committee Member, 5th Workshop on Refactoring Tools, adjacent to ICSE'12.
2012	Program Committee Member, International Conference on Multicore Software Engineering, Performance, and Tools (MSEPT'12).
2011	Program Committee Member, International Symposium on Software Testing and Analysis (ISSTA'11).
2011	Program Committee Member, Working Conference on Reverse Software Engineering (WCRE'11).
2011	**Co-Chair**, 4th Workshop on Refactoring Tools at ICSE'11.
2011	External Review Committee, Principles and Practice of Parallel Programming (PPoPP'11).
2011	Program Committee Member, ACM Student Research Competition held at ICSE'11.
2011	Program Committee Member, International Workshop on Principles of Software Evolution (IWPSE'11).
2010	Research Demonstrations Review Committee, Foundations of Software Engineering (FSE'10).
N/A	**Panelist**, National Science Foundation.
2010	**Co-Chair**, Indo-US Workshop on Collaboration in Parallel Programming at PPoPP'10.
2010	**North American Publicity Chair**, International Conference on Software Maintenance (ICSM'10).
2010	Program Committee Member, International Workshop on Principles of Software Evolution (IWPSE'10).
2009	**Co-Chair**, Workshop on Parallel Patterns and Problem Solving Techniques at the Annual Intel Summit.
2009	Program Committee Member, Object-Oriented Program., Syst., Lang., and Applications (OOPSLA'09).
2009	Program Committee Member, 2nd International Workshop on Multicore Software Engineering at ICSE'09.

2009	Program Committee Member, 3rd ACM Workshop on Refactoring Tools at OOPSLA'09.
2009	Program Committee Member, 2nd International Workshop on Hot Topics on Software Upgrades at OOPSLA'09.
2009	Program Committee Member, International Workshop on Principles of Software Evolution at FSE'09.
2008	**Co-Chair**, International Workshop on Hot Topics on Software Upgrades at OOPSLA'08.
2008	**Co-Chair**, 2nd Workshop on Refactoring Tools at OOPSLA'08.
2007	**Chair**, Doctoral Symposium, ECOOP 2007.
2007	**Chair and primary organizer**, 1st Workshop on Refactoring Tools at ECOOP'07.
2006	Panelist in the Inspirations track at FSE'06.
2005 - 2007	**President** of the Romanian Student Club, a 70-person student organization at the University of Illinois.
2004 - 2006	Program committee member, Pattern Languages of Programs (PLoP) '04, '05, '06.
2004	**Conference Chair**, 11th Conference on Pattern Languages of Programs (PLoP), Monticello, IL.
2004 - present	Member of **Hillside Group**, a community of software professionals who write patterns.
2002-2004	Student Volunteer at OOPSLA'02, '03, '04.

Community Service

2017,'18,'19,'21, '25	Based on invitations from presidents of countries, together with the John Maxwell Leadership Foundation, we provided leadership training for tens of thousands of leaders in Argentina, Paraguay, Costa Rica, and the Dominican Republic. Through these country-wide transformation initiatives, we trained leaders in all major streams of influence including government, business, education, health, media, etc. I was responsible for training ministers of science and technology, ministers of education, university presidents, and business leaders.
1996 - present	Involved in acoustic and electric *guitar performance. Perform regularly* with one gospel band and one jazz band. *Teach guitar lessons* to local students. Perform at charity and community events.
2001 - 2002	Director and founder of bells/chimes choir, performing at weddings.
1998 - 2002	Choir director - lead 40-person choir, performing at faith-based services and community events.
1999 - 2001	Staff member with **International Children's Aid Foundation**, non-profit organization working with orphans.

Journal Reviewer and Conference Co-reviewer

reviewer for 11 journal papers, external reviewer for 14 conferences and workshops

11/12	IEEE Transactions on Software Engineering (TSE).
03/12	IEEE Transactions on Software Engineering (TSE).
07/11	ACM Transactions on Software Engineering and Methodology (TOSEM).
05/11	IEEE Transactions on Software Engineering (TSE).
02/11	IEEE Transactions on Software Engineering (TSE).
02/11	Elsevier Journal of Systems and Software (JSS).
12/10	IEEE Transactions on Software Engineering (TSE).
08/10	IEEE Transactions on Software Engineering (TSE).
08/10	ACM Transactions on Software Engineering and Methodology (TOSEM).
07/09	ACM Transactions on Software Engineering and Methodology (TOSEM).
04/08	Generative Programming and Component Engineering (GPCE'08).
04/08	Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'08).
02/08	European Conference on Object-Oriented Programming (ECOOP'08).
07/07	International Conference on Automated Software Engineering (ASE'07).
05/07	International Conference on Software Maintenance (ICSM'07).

04/07	Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'07).
03/07	The International Symposium on Software Testing and Analysis (ISSTA'07).
02/07	2007 Genetic and Evolutionary Computation Conference (GECCO'07).
01/07	ACM SIGPLAN 2007 Conference on Programming Language Design and Implementation (PLDI 2007).
11/06	Wiley InterScience Journal of Software Maintenance and Evolution: Research and Practice (JSME).
09/06	International Workshop on Software Quality Assurance (SOQUA'06).
2004 - 2007	Shepherd for Pattern Languages of Programs (PLoP '04, '05, '06, '07).

Released Software

CoRenameAgnt First GenAI Agent for automating coordinated refactorings. A plugin for IntelliJ IDEA that uses multi-agents with human-in-the-loop.
https://renameagent.netlify.app

MM-Assist First automated refactoring tool to use LLMs and RAG for navigating large scale project context. A plugin for IntelliJ IDEA that combines LLMs, semantic embeddings, and RAG with the safety analysis of IDEs for performing MoveMethod refactoring.
https://cuboulder-se-research.github.io/move-method-assist/

EM-Assist First automated refactoring tool to use LLMs. A plugin for IntelliJ IDEA that combines the creativity of LLMs with the safety analysis of IDEs for performing ExtractMethod refactoring.
https://github.com/llm-refactoring/llm-refactoring-plugin

PyCraft A tool that combines LLMs with Program Transformation by Example to provide unprecedented level of change automation
https://pycrafttool.github.io/

PyEvolve Mines best practices from Python open-source projects and transplants them at new code side in other projects.
https://pythoninfer.github.io/

TC-Infer IntelliTC A plugin for IntelliJ IDEA that mines and learns rules for performing Type Migrations for Java
https://type-change.github.io/index.html

R-CPatMiner A tool for mining repetitive code changes in Python and adapting Python code for AST-based analysis with Java static analysis tools
https://mlcodepatterns.github.io

AsyncDroid A refactoring tool which enables Android developers to transform existing improperly-used async constructs (leading to memory leaks, losing task results, and wasting energy) into correct async constructs.
http://refactoring.info/tools/asyncdroid/

Asynchronizer An automated refactoring tool that enables Android developers to extract long-running operations into `AsyncTask`. Asynchronizer uses a points-to static analysis to determine the safety of the transformation.
http://refactoring.info/tools/asynchronizer/

Asyncifier, AsyncFixer (i) Asyncifier – an automated refactoring tool that converts callback-based asynchronous code to the new `async/await` in C#; (ii) AsyncFixer – a tool that finds and corrects common misuses of `async/await`.
http://learnasync.net

LambdaFicator A refactoring tool for retrofitting functional features like lambda expressions and `map` and `filter` operations into imperative Java 8 code. Refactoring existing code to use these new functional extensions enables explicit but unobtrusive parallelism and makes the code more succinct. Ships with the official release of NetBeans IDE.
http://refactoring.info/tools/LambdaFicator

CTADetector A testing tool that finds *check-then-act* atomicity violations when using concurrent collections (e.g., non-atomic checking whether collection contains elements and acting to remove elements). The tool found hundreds of bugs in mature open-source applications, and for many of them the developers accepted the patch generated by our tool.
http://mir.cs.illinois.edu/~yulin2/CTADetector/

Immutator A refactoring tool for converting mutable into immutable classes. This refactoring is useful in several domains. Eliminating side-effects from Java classes can simplify sequential programming, it can make distributed programming more efficient, and it simplifies parallel programming since an immutable class does not require any synchronization.
http://refactoring.info/tools/Immutator

ReLooper	A refactoring tool for converting sequential loops into parallel loops. ReLooper replaces sequential loops with the equivalent parallel operation/operator in the Java's upcoming ParallelArray framework. ReLooper performs a data-flow analysis and warns the programmer about potential races in the loops to be parallelized. `http://refactoring.info/tools/ReLooper`
Concurrencer	A refactoring tool for retrofitting concurrency into sequential applications via concurrent libraries. Concurrencer enables programmer to replace field accesses with thread-safe, atomic APIs, and to convert sequential, recursive divide-and-conquer functions into functions that solve the recursive subproblems in parallel. Concurrencer is built on top of Eclipse's refactoring engine and works for Java programs. `http://refactoring.info/tools/Concurrencer`
ReBA	A tool for automatically generating binary compatibility layers between evolving libraries and the applications that use these APIs. Experimental evaluation shows that ReBA introduces a small memory and runtime overhead (less than 8%), while allowing older binary applications to properly run with newer versions of library APIs. ReBA is released as an Eclipse plugin and works for Java programs: `http://dig.cs.illinois.edu/tools/ReBA/index.html`
MolhadoRef	The first version control system that can treat refactorings intelligently. Without losing any power to merge manual edits, it converts refactorings from being the weakest link in a version control system to being the strongest. MolhadoRef automatically resolves more merge conflicts than traditional text-based systems (e.g., CVS), preserves program history better and makes it easier to understand program evolution. MolhadoRef is released as an Eclipse plugin and works for Java programs: `http://dig.cs.illinois.edu/tools/MolhadoRef/index.html`
Refactoring Crawler	An analysis tool that detects refactorings that happened between two versions of a component. The strength of the tool lies in the combination of a fast syntactic analysis to detect refactoring candidates and more expensive semantic analysis to refine these candidates. This fusion makes RefactoringCrawler scale to large real-world components, with accuracy over 85%. RefactoringCrawler was downloaded hundreds of times, with results reported from research institutions (Portland State U, NC State University, U of Montreal) and industry (CuramSoftware). RefactoringCrawler is released as an Eclipse plugin: `http://dig.cs.illinois.edu/tools/RefactoringCrawler/`
JavaRefactor	The first open-source refactoring engine for Java, released as a plugin for JEdit in 2001. JavaRefactor was well received within the JEdit community, getting more than **17,000 downloads** within first six months after its release. An older version (requires JEdit 4.1) can be found here: `http://plugins.jedit.org/plugins/?JavaRefactor`