

Michael Franz

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Major Research Emphases

- Compilers and related systems software. On-the-fly, feedback-directed and continuous code generation and optimization; binary translation; trace-based compilation. Compiling for mobile and embedded computing and for low power consumption. Automatic parallelization. Memory management.
- Trustworthy Computing. Mobile code security; secure and efficient mobile program representations; code verification. Language-based security. Information flow; system-level end-to-end security properties. Automatically generated software diversity, multi-variant parallel programming.
- Software Engineering. Software architecture for secure systems; minimizing the trusted code base. Component-oriented programming languages and their implementation. Software reliability and robustness.

Education

Doctor of Technical Sciences, ETH Zürich, Switzerland; February 1994
Dissertation Title: “Code-Generation On-the-Fly: A Key to Portable Software”
Advisor: Niklaus Wirth

Diplomingenieur, ETH Zürich; May 1989

Academic Appointments

- 2007 – present *Full Professor of Electrical Engineering & Computer Science* (by courtesy)
Department of Electrical Engineering & Computer Science
The Henry Samueli School of Engineering
University of California, Irvine
- 2006 – present *Full Professor of Computer Science* (with tenure)
Department of Computer Science
The Donald Bren School of Information & Computer Sciences
University of California, Irvine
- 2001 – 2006 *Associate Professor* (with tenure)
Department of Computer Science (since January 2003)
Department of Information and Computer Science (until January 2003)
University of California, Irvine
- 1996 – 2001 *Assistant Professor*
Department of Information and Computer Science
University of California, Irvine
- 1994 – 1995 *Senior Research Associate (“Oberassistent”) and Lecturer*
Institut für Computersysteme
ETH Zürich, Switzerland

Visiting Appointments

August 2010 – September 2011	<i>Visiting Professor</i> (on Sabbatical from UC Irvine) ETH Zurich, Switzerland (Host: Prof. Dr. Thomas Gross)
January – September 2002	<i>Visiting Researcher</i> (on Sabbatical from UC Irvine) University of California, Berkeley (Host: Prof. Dr. George Necula)
Summer Semester 2000	<i>Visiting Professor</i> University of Klagenfurt, Austria (Host: Prof. Dr. Laszlo Böszörményi)
Summer Semester 1998	<i>Visiting Professor</i> University of Ulm, Germany (Host: Prof. Dr. Peter Schulthess)

Professional Society Honors

- Distinguished Scientist, *Association for Computing Machinery (ACM)*, since 2006.
- Senior Member, *The Institute of Electrical and Electronics Engineers (IEEE)*, since 2006.

Major Professional Honors

- *University of California, Irvine, Distinguished Mid-Career Faculty Award for Research*, 2010. This is the Academic Senate's highest honor for research. One such award at most is given yearly to an Assistant Professor, one to an Associate or Full Professor Step I-IV (the "Mid-Career Award"), and one to a Professor Step V or higher.
- *National Science Foundation CAREER Award*, 1997.
- *Fulbright Scholarship*, 1989.

Teaching Honors

- *Dean's Award for Graduate Student Mentoring*, Donald Bren School of Information and Computer Sciences, UC Irvine, 2007.
- *Outstanding Professor of the Year Award*, Graduating Class of 2007, UC Irvine.

Institutional Affiliations

- Director, *Secure Systems and Software Laboratory*, Donald Bren School of Information and Computer Sciences, UC Irvine.
- Charter Faculty Member, *The California Institute for Telecommunications and Information Technology (Cal-(IT)²)*, one of four California Institutes for Science and Technology.
- Charter Faculty Member, *Security Computing and Networking Center (SCoNCe)* (previously named *Center for Cyber-Security and Privacy*), Donald Bren School of Information and Computer Sciences, UC Irvine.

Noteworthy Contributions With Wide Impact

I am the co-inventor (with my former Ph.D. student Andreas Gal) of the "Trace Tree" compilation technique, which has been transitioned successfully from academic research into one of the most widely distributed open-source projects. From version 3.5 (June 2009) onwards, the JavaScript engine in *Mozilla's Firefox* browser has been based directly on my academic research (see publication C.58).

Furthermore, since version 4.0 (March 2011), the *Firefox* browser additionally contains the "Compartmental Memory Manager" developed in collaboration between my lab and Mozilla (see publication C.69).

Publications

Awarded Patent

- P.1 M. Franz (lead), W. Amme, and J. von Ronne; *Safe Computer Code Formats And Methods For Generating Safe Computer Code*; United States Patent No. 7,117,488; filed October 2001, issued October 2006.

Pending Patent Applications

- PA.2 M. Franz (lead), A. Gal, and B. Salamat; *Multi-Variant Parallel Program Execution to Detect, Quarantine and Repair Malicious Code Injection*; United States Patent Application No. 12/075,127; filed March 2008.
- PA.1 A. Gal (lead) and M. Franz; *Dynamic Incremental Compiler and Method*; United States Patent Application No. 11/676,198; filed February 2007, published September 2007.

Book

M. Franz; *Code-Generation On-the-Fly: A Key to Portable Software*, Doctoral Dissertation No. 10497, ETH Zürich; published in book form by Verlag der Fachvereine, Zürich, ISBN 3-7281-2115-0; March 1994.

Peer-Reviewed Book Chapters

- BC.8 T. Jackson, B. Salamat, A. Homescu, K. Manivannan, G. Wagner, A. Gal, S. Brunthaler, Ch. Wimmer, and M. Franz; “Compiler-Generated Software Diversity;” in S. Jajodia, A.K. Ghosh, V. Swarup, C. Wang, and X.S. Wang (Eds.), *Moving Target Defense: Creating Asymmetric Uncertainty for Cyber Threats*; Springer, ISBN 978-1-4614-0976-2; expected September 2011.
- BC.7 M. Franz, W. Amme, M. Beers, N. Dalton, P. H. Fröhlich, V. Haldar, A. Hartmann, P. S. Housel, F. Reig, J. von Ronne, Ch. H. Stork, and S. Zhenochin; “Making Mobile Code Both Safe And Efficient;” in J. Lala (Ed.), *Foundations of Intrusion Tolerant Systems*; IEEE Computer Society Press, ISBN 0-7695-2057-X, pp. 337–356; December 2003. (Expanded version of conference paper C.15)
- BC.6 M. Franz; “A Fresh Look At Low-Power Mobile Computing;” in L. Benini, M. Kandemir, J. Ramanujam (Eds.), *Compilers and Operating Systems for Low Power*; Kluwer Academic Publishers, Boston, ISBN 1-4020-7573-1, pp. 209–220; September 2003. (Expanded version of conference paper C.18)
- BC.5 M. Franz; “Safe Code: It’s Not Just For Applets Anymore;” in L. Böszörményi and Peter Schojler (Eds.), *Modular Programming Languages: Proceedings of the Sixth Joint Modular Languages Conference (JMLC 2003)*, Klagenfurt, Austria; Springer Lecture Notes in Computer Science, No. 2789, ISBN 3-540-40796-0; pp. 12–22; August 2003. (Full Text of Invited Keynote Address)
- BC.4 J. von Ronne, A. Hartmann, W. Amme, and M. Franz; “Efficient Online Optimization by Utilizing Offline Analysis and the SafeTSA Representation;” in J. Powers and J. T. Waldron (Eds.), *Recent Advances in Java Technology: Theory, Application, Implementation*; Computer Science Press, Trinity College Dublin, Dublin, Ireland, ISBN 0-9544145-0-0, pp. 233–241; November 2002. (Expanded version of conference paper C.22)
- BC.3 M. Franz; “Oberon: The Overlooked Jewel;” in L. Böszörményi, J. Gutknecht, G. Pomberger (Eds.), *The School of Niklaus Wirth: The Art of Simplicity*; Morgan Kaufmann, San Francisco; ISBN 1-55860-723-4, pp. 41–53; September 2000.
- BC.2 J. Gutknecht and M. Franz; “Oberon with Gadgets: A Simple Component Framework;” in M. Fayad, D. Schmidt, R. Johnson (Eds.), *Implementing Application Frameworks: Object-Oriented Frameworks at Work*; Wiley, ISBN 0-4712-5201-8, pp. 323–338; September 1999. (A precursor to this article was published as UCI ICS Technical Report No. 96-55.)
- BC.1 M. Franz; “Adaptive Compression of Syntax Trees and Iterative Dynamic Code Optimization: Two Basic Technologies for Mobile-Object Systems;” in J. Vitek and Ch. Tschudin (Eds.), *Mobile Object Systems: Towards the Programmable Internet*; Springer Lecture Notes in Computer Science, No. 1222, ISBN 3-540-62852-5, pp. 263–276; February 1997. doi:10.1007/3-540-62852-5_19

Strongly Reviewed Journal & Magazine Articles

*Note: Several conference proceedings have appeared as “special issues” of journals. My contributions to such journal special issues that contain regular conference proceedings are **not** included in this section but are listed under “conference papers” below.*

- J.27 G. Wagner, A. Gal, and M. Franz; “Slimming a Java Virtual Machine by way of Cold Code Removal and Optimistic Partial Program Loading;” in *Science of Computer Programming*, Vol. 76, No. 11, pp. 1037–1053; November 2011. doi:10.1016/j.scico.2010.04.008 (Expanded version of conference paper C.53)
- J.26 B. Salamat, T. Jackson, G. Wagner, Ch. Wimmer, and M. Franz; “Run-Time Defense Against Code Injection Attacks Using Replicated Execution;” in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, Vol. 8, No. 4; July 2011. doi:10.1109/TDSC.2011.18
- J.25 W. Amme, J. von Ronne, Ph. Adler, and M. Franz; “The Effectiveness of Producer-Side Machine-Independent Optimizations for Mobile Code;” in *Software—Practice and Experience*, Vol. 39, No. 10, pp. 923–946; July 2009. doi:10.1002/spe.v39:10 (Expanded version of conference paper C.40)
- J.24 E. Yardimci and M. Franz; “Mostly Static Program Partitioning of Binary Executables;” in *ACM Transactions on Programming Languages and Systems (TOPLAS)*, Vol. 31, No. 5, Article No. 17; June 2009. doi:10.1145/1538917.1538918 (A precursor to this article was published as UCI ICS Technical Report No. 06-09)
- J.23 A. Gal, Ch. W. Probst, and M. Franz; “Java Bytecode Verification via Static Single Assignment Form;” *ACM Transactions on Programming Languages and Systems (TOPLAS)*, Vol. 30, No. 4, Article No. 21, pp. 1–21; July 2008. doi:10.1145/1377492.1377496 (A precursor to this article was published as UCI ICS Technical Report No. 06-11.)
- J.22 E. Yardimci and M. Franz; “Dynamic Parallelization of Binary Executables on Hierarchical Platforms;” *The Journal of Instruction-Level Parallelism*, Vol. 10, Paper 6, ISSN 1942-9525, pp. 1–24; June 2008. (Expanded version of conference paper C.41)
- J.21 M. Franz; “Containing the Ultimate Trojan Horse;” *IEEE Security and Privacy*, Vol. 5, No. 4, pp. 52–56; July 2007. doi:10.1109/MSP.2007.77
- J.20 W. Amme, J. von Ronne, and M. Franz; “SSA-Based Mobile Code: Implementation and Empirical Evaluation;” *ACM Transactions on Architecture and Code Optimization (TACO)*, Vol. 4, No. 2, Article No. 13; June 2007. doi:10.1145/1250727.1250733 (A precursor to this article was published as Technical Report No. 2006-005, Department of Computer Science, University of Texas at San Antonio)
- J.19 V. Venkatachalam, M. Franz, and Ch. W. Probst; “A New Way Of Estimating Compute Boundedness And Its Application To Dynamic Voltage Scaling;” *International Journal of Embedded Systems (IJES)*, Vol. 3, No. 1/2, pp. 17–30; 2007.
- J.18 V. Venkatachalam and M. Franz; “Power Reduction Techniques For Microprocessor Systems;” *ACM Computing Surveys (CSUR)*, Vol. 37, No. 3, pp. 195–237; September 2005. doi:10.1145/1108956.1108957 (A precursor to this article was published as UCI ICS Technical Report No. 03-31.)
- J.17 M. Franz, D. Chandra, A. Gal, V. Haldar, Ch. W. Probst, F. Reig, and N. Wang; “A Portable Virtual Machine Target For Proof-Carrying Code;” *Science of Computer Programming*, (Special Issue on Interpreters, Virtual Machines, and Emulators), Vol. 57, No. 3, pp. 275–294; September 2005. doi:10.1016/j.scico.2004.09.001 (Expanded version of conference paper C.28)
- J.16 M. Franz, P. H. Fröhlich, and A. Gal; “Supporting Software Composition at the Programming-Language Level;” *Science of Computer Programming*, (Special Issue on New Software Composition Concepts), Vol. 56, Nos. 1–2, pp. 41–57; April 2005. doi:10.1016/j.scico.2004.11.004 (46 articles were submitted to this special issue, of which 14 were accepted. A precursor to this article was published as UCI ICS Technical Report No. 03-22.)
- J.15 W. Amme and M. Franz; “Effiziente Codegenerierung für mobilen Code;” *Informatik-Spektrum*, Vol. 26, No. 4, pp. 237–246; August 2003. doi:10.1007/s00287-003-0317-1 (A precursor to this article was published as Technical Report No. 07/03, Friedrich-Schiller-Universität Jena, Germany.)

- J.14 T. Kistler and M. Franz; “Continuous Program Optimization: A Case Study;” *ACM Transactions on Programming Languages and Systems (TOPLAS)*, Vol. 25, No. 4, pp. 500–548; July 2003. doi:10.1145/778559.778562 (Precursors to this article were published as UCI ICS Technical Reports No. 99-12 and 00-19.)
- J.13 T. Kistler and M. Franz; “Continuous Program Optimization: Design and Evaluation;” *IEEE Transactions on Computers*, Vol. 50, No. 6, pp. 549–566; June 2001. doi:10.1109/12.931893
- J.12 T. Kistler and M. Franz; “Automated Data-Member Layout of Heap Objects to Improve Memory-Hierarchy Performance;” *ACM Transactions on Programming Languages and Systems (TOPLAS)*, Vol. 22, No. 3, pp. 490–505; May 2000. doi:10.1145/353926.353937 (Precursors to this article were published as UCI ICS Technical Reports No. 99-21 and No. 98-22.)
- J.11 T. Kistler and M. Franz; “A Tree-Based Alternative to Java Byte-Codes;” *International Journal of Parallel Programming*, Vol. 27, No. 1, pp. 21–34; February 1999. doi:10.1023/A:1018740018601 (Expanded version of conference paper C.05)
- J.10 M. Franz; “The Java Virtual Machine: A Passing Fad?;” *IEEE Software*, Vol. 15, No. 6, pp. 26–29; November 1998. doi:10.1109/52.730834
- J.09 M. Franz; “Open Standards Beyond Java: On the Future of Mobile Code for the Internet;” *Journal of Universal Computer Science (j.uics)*, Vol. 4, No. 5, pp. 521–532; May 1998. (Expanded version of conference paper C.08)
- J.08 M. Franz; “Java: Anmerkungen eines Wirth-Schülers“ (in German); *Informatik-Spektrum*, Vol. 21, No. 1, pp. 23–26; February 1998. doi:10.1007/s002870050086 (A Russian translation of this paper is listed below as publication P.97 and a Lithuanian translation as publication P.98b)
- J.07 M. Franz and T. Kistler; “Slim Binaries;” *Communications of the ACM*, Vol. 40, No. 12, pp. 87–94; December 1997. doi:10.1145/265563.265576 (A precursor to this article was published as UCI ICS Technical Report No. 96-24.)
- J.06 M. Franz; “The Programming Language Lagoon: A Fresh Look at Object-Oriented;” *Software-Concepts and Tools*, Vol. 18, No. 1, pp. 14–26; March 1997. (A precursor to this article was published as UCI ICS Technical Report No. 96-40.)
- J.05 M. Franz; “Dynamic Linking of Software Components;” *IEEE Computer*, Vol. 30, No. 3, pp. 74–81; March 1997. doi:10.1109/2.573670 (A precursor to this article was published as UCI ICS Technical Report No. 96-26.)
- J.04 M. Brandis, R. Crelier, M. Franz, and J. Tempel; “The Oberon System Family;” *Software—Practice and Experience*, Vol. 25, No. 12, pp. 1331–1366; December 1995. (A precursor to this article was published as ETH Zürich Dept. Informatik Technical Report No. 174.)
- J.03 M. Franz; “Protocol Extension: A Technique for Structuring Large Extensible Software-Systems;” *Software—Concepts and Tools*, Vol. 16, No. 2, pp. 86–94; July 1995. (A precursor to this article was published as ETH Zürich Dept. Informatik Technical Report No. 226.)
- J.02 M. Franz; “The Case for Universal Symbol Files;” *Structured Programming*, Vol. 14, No. 3, pp. 136–147; October 1993.
- J.01 M. Franz; “Emulating an Operating System on Top of Another;” *Software—Practice and Experience*, Vol. 23, No. 6, pp. 677–692; June 1993.

Strongly Reviewed Conference and Workshop Papers († = presented paper at the conference or workshop)

Note: Several conference proceedings have appeared as “special issues” of journals. They are included in this section rather than under “journal articles” above, and for faster identification have been marked with an asterisk. Talks given at conferences are annotated in this section and are not listed again under “presentations” below.

- C.70 M. Chang, B. Mathiske, E. Smith, A. Chaudhuri, M. Bebenita, A. Gal, Ch. Wimmer, and M. Franz; “The Impact of Optional Type Information on JIT Compilation Of Dynamically Typed Languages,” accepted for publication in *7th Dynamic Languages Symposium (DLS 2011)*, Portland, Oregon; October 2011.

- C.69 †G. Wagner, A. Gal, Ch. Wimmer, B. Eich, and M. Franz; “Compartmental Memory Management in a Modern Web Browser,” in *International Symposium on Memory Management 2011 (ISMM’11)*, San Jose, California, ACM Press, ISBN 978-1-4503-0263-0; June 2011. doi:10.1145/1993478.1993496
- C.68 †T. Jackson, B. Salamat, G. Wagner, Ch. Wimmer, and M. Franz; “On the Effectiveness of Multi-Variant Program Execution for Vulnerability Detection and Prevention;” in *6th International Workshop on Security Measurements and Metrics (MetriSec’10)*, Bolzano-Bozen, Italy, ACM Press, ISBN 978-1-4503-0340-8; September 2010. doi:10.1145/1853919.1853929
- C.67 †M. Franz; “E unibus pluram: Massive-Scale Software Diversity as a Defense Mechanism;” in *2010 Workshop on New Security Paradigms (NSPW’10)*, Concord, Massachusetts, ACM Press, ISBN 978-1-4503-0415-3; September 2010. doi:10.1145/1900546.1900550
- C.66 †M. Bebenita, M. Chang, K. Manivannan, G. Wagner, M. Cintra, B. Mathiske, A. Gal, Ch. Wimmer, and M. Franz; “Trace-Based Compilation in Execution Environments without Interpreters;” in A. Krall, H. Mössenböck (Eds.), *8th International Conference on the Principles and Practice of Programming in Java 2010 (PPPJ’10)*, Vienna, Austria, ACM Press, ISBN 978-1-4503-0269-2, pp. 59–68; September 2010. doi:10.1145/1852761.1852771
- C.65 †K. Manivannan, Ch. Wimmer, and M. Franz; “Decentralized Information Flow Control on a Bare-Metal JVM;” in *Sixth Annual Workshop on Cyber Security and Information Intelligence Research (CSIIRW’10)*, Oak Ridge, Tennessee, ACM Press, ISBN 978-1-4503-0017-9; April 2010. doi:10.1145/1852666.1852738
- C.64 †T. Jackson, Ch. Wimmer, and M. Franz; “Multi-Variant Program Execution for Vulnerability Detection and Analysis;” in *Sixth Annual Workshop on Cyber Security and Information Intelligence Research (CSIIRW’10)*, Oak Ridge, Tennessee, ACM Press, ISBN 978-1-4503-0017-9; April 2010. doi:10.1145/1852666.1852708
- C.63 †Ch. Wimmer and Michael Franz; “Linear Scan Register Allocation on SSA Form;” in *The Eighth International Symposium on Code Generation and Optimization (CGO 2010)*, Toronto, Canada, ACM Press, ISBN 978-1-60558-635-9, pp. 170–179; April 2010. doi:10.1145/1772954.1772979
- C.62 A. Yermolovich, †Ch. Wimmer, and M. Franz; “Optimization of Dynamic Languages Using Hierarchical Layering of Virtual Machines;” in *5th Symposium on Dynamic Languages (DLS 2009)*, Orlando, Florida, ACM Press, ISBN 978-1-60558-769-1, pp. 79–88; October 2009. doi:10.1145/1640134.1640147
- C.61 Ch. Wimmer, M. Cintra, M. Bebenita, M. Chang, A. Gal, and M. Franz; “Phase Detection using Trace Compilation;” in *7th International Conference on the Principles and Practice of Programming in Java 2009 (PPPJ 2009)*, Calgary, Alberta, ACM Press, ISBN 978-1-60558-598-7, pp. 172–181; August 2009. doi:10.1145/1596655.1596683
- C.60 Ch. Kerschbaumer, †G. Wagner, Ch. Wimmer, A. Gal, Ch. Steger, and M. Franz; “SlimVM: A Small Footprint Java Virtual Machine for Connected Embedded Systems;” in *7th International Conference on the Principles and Practice of Programming in Java 2009 (PPPJ 2009)*, Calgary, Alberta, ACM Press, ISBN 978-1-60558-598-7, pp. 133–142; August 2009. doi:10.1145/1596655.1596678
- C.59 M. Bebenita, M. Chang, A. Gal, and †M. Franz; “Stream-Based Dynamic Compilation for Object-Oriented Languages;” in M. Oriol and B. Meyer (Eds.), *Objects, Components, Models and Patterns*, 47th International Conference (TOOLS-EUROPE 2009), Zurich, Switzerland, Springer Lecture Notes in Business Information Processing (LNBIP), Vol. 33, ISBN 978-3-642-02570-9, pp. 77–95; June 2009. doi:10.1007/978-3-642-02571-6_6 (A precursor to this paper was published as UCI ICS Technical Report No. 07-12.)
- C.58 †A. Gal, B. Eich, M. Shaver, D. Anderson, B. Kaplan, G. Hoare, D. Mandelin, B. Zbarsky, J. Orendorff, J. Ruderman, E. Smith, R. Reitmaier, M. R. Haghghat, M. Bebenita, M. Chang, and M. Franz; “Trace-based Just-in-Time Type Specialization for Dynamic Languages;” in *Programming Language Design and Implementation (PLDI 2009)*, Dublin, Ireland, ACM Press, ISBN 978-1-60558-392-1, pp. 465–478; June 2009. doi:10.1145/1542476.1542528
- C.57 B. Salamat, †T. Jackson, A. Gal, and M. Franz; “Intrusion Detection Using Parallel Execution and Monitoring of Program Variants in User-Space;” in *EuroSys’09*, Nuremberg, Germany, ACM Press, ISBN 978-1-60558-482-9, pp. 33–46; April 2009. doi:10.1145/1519065.1519071

- C.56 M. Franz; “Information-Flow Aware Virtual Machines: Foundations For Trustworthy Computing;” in *Cyber-security Applications and Technologies Conference for Homeland Security (CATCH 2009)*, Washington, D.C., IEEE Computer Society Publications, ISBN 978-0-7695-3568-5, pp. 91–96; March 2009. doi:10.1109/CATCH.2009.45
- C.55 †M. Chang, E. Smith, R. Reitmaier, A. Gal, M. Bebenita, Ch. Wimmer, B. Eich, and M. Franz; “Tracing for Web 3.0: Trace Compilation for the Next Generation Web Applications;” in *2009 ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE 2009)*, Washington, D.C., ACM Press, ISBN 978-1-60558-375-4, pp. 71–80; March 2009. doi:10.1145/1508293.1508304
- C.54 †L. Wang and M. Franz; “Automatic Partitioning of Object-Oriented Programs for Resource-Constrained Mobile Devices with Multiple Distribution Objectives;” in *The 14th IEEE International Conference on Parallel and Distributed Systems (ICPADS’08)*, Melbourne, Victoria, Australia, December 2008. doi:10.1109/ICPADS.2008.84 (A precursor to this paper was published as UCI ICS Technical Report No. 07-11.)
- C.53 †G. Wagner, A. Gal, and M. Franz; “SlimVM: Optimistic Partial Program Loading for Connected Embedded Java Virtual Machines;” in L. Veiga, V. Amaral, N. Horspool, and G. Cabri (Eds.), *Principles and Practice of Programming in Java 2008 (PPPJ 2008)*, Proceedings of the 6th International Conference, Modena, Italy, ACM Press, ISBN 978-1-60558-223-8, pp. 117–126; September 2008. doi:10.1145/1411732.1411749 (Best Paper Award; A precursor to this paper was published as UCI ICS Technical Report No. 06-18.)
- C.52 A. Yermolovich, †A. Gal, and M. Franz; “Portable Execution of Legacy Binaries on the Java Virtual Machine;” in L. Veiga, V. Amaral, N. Horspool, and G. Cabri (Eds.), *Principles and Practice of Programming in Java 2008 (PPPJ 2008)*, Proceedings of the 6th International Conference, Modena, Italy, ACM Press, ISBN 978-1-60558-223-8, pp. 63–72; September 2008. doi:10.1145/1411732.1411742
- C.51 †A. Noll, A. Gal, and M. Franz; “CellVM: A Homogeneous Virtual Machine Runtime System for a Heterogeneous Single-Chip Multiprocessor;” in *2008 Workshop on Cell Systems and Applications*, Beijing, China; June 2008. (A precursor to this paper was published as UCI ICS Technical Report No. 06-17.)
- C.50 †B. Salamat, A. Gal, and M. Franz; “Reverse Stack Execution in a Multi-Variant Execution Environment;” in *2008 Workshop on Compiler and Architectural Techniques for Application Reliability and Security (CATARS’08)*, Anchorage, Alaska; June 2008.
- C.49 B. Salamat, †A. Gal, T. Jackson, K. Manivannan, G. Wagner, and M. Franz; “Multi-Variant Program Execution: Using Multi-Core Systems to Defuse Buffer-Overflow Vulnerabilities;” in *2008 International Conference on Complex, Intelligent and Software Intensive Systems (CISIS 2008)*, Barcelona, Spain, IEEE Computer Society Press, ISBN 978-0-7695-3109-0, pp. 843–848; March 2008. doi:10.1109/CISIS.2008.136
- C.48 †M. Franz; “Eliminating Trust From Application Programs By Way Of Software Architecture;” in *Software Engineering 2008 (SE 2008)*, Munich, Germany, Lecture Notes in Informatics (LNI) No. 121, GI-Edition, Gesellschaft für Informatik, Bonn, ISBN 978-3-88579-215-4, pp. 112–126; February 2008. (A precursor to this paper was published as UCI ICS Technical Report No. 07-13.)
- C.47 †M. Franz; “Understanding and Countering Insider Threats In Software Development;” in P. Kropf, M. Beny-oucef, and H. Mili (Eds.), *2008 International Montreal Conference on e-Technologies (MCETECH 2008)*, Montreal, Canada, IEEE Computer Society Publications, ISBN 978-0-7695-3082-6, pp. 81–90; January 2008. doi:10.1109/MCETECH.2008.32 (A precursor to this paper was published as UCI ICS Technical Report No. 07-09.)
- C.46 D. Chandra and †M. Franz; “Fine-Grained Information Flow Analysis and Enforcement in a Java Virtual Machine;” in *23rd Annual Computer Security Applications Conference (ACSAC 2007)*, Miami Beach, Florida, IEEE Computer Society Publications, ISBN 0-7695-3060-5, pp. 463–474; December 2007. doi:10.1109/ACSAC.2007.37
- C.45 †M. Bebenita, A. Gal, and M. Franz; “Implementing Fast JVM Interpreters In Java Itself;” in V. Amaral, L. Veiga, L. Marcelino, and H. C. Cunningham (Eds.), *Principles and Practices of Programming in Java, Proceedings of the 5th International Conference (PPPJ 2007)*, Lisbon, Portugal, ACM Press, ISBN 978-1-59593-672-1, pp. 145–154; September 2007. doi:10.1145/1294325.1294345

- C.44 A. Gal, M. Bebenita, and †M. Franz; “One Method At A Time Is Quite a Waste of Time;” in *Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems (ICOOOLPS’2007)*, Berlin, Germany, Report No. 2007-5, Technische Universität Berlin, ISSN 1436-9915, pp. 11–16; July 2007.
- C.43 †M. Franz, A. Gal, and C. W. Probst; “Automatic Generation of Machine Emulators: Efficient Synthesis of Robust Virtual Machines for Legacy Software Migration;” in W.-G. Bleek, J. Raasch, H. Züllighoven (Eds.), *Software Engineering 2007 (SE 2007)*, Hamburg, Germany, Lecture Notes in Informatics (LNI) No. 105, GI-Edition, Gesellschaft für Informatik, Bonn, ISBN 978-3-88579-199-7, pp. 83–94; March 2007.
- C.42 †A. Gal, C. W. Probst, and M. Franz; “HotpathVM: An Effective JIT Compiler for Resource-Constrained Devices;” in *Second International Conference on Virtual Execution Environments (VEE 2006)*, Ottawa, Canada, ACM Press, ISBN 1-59593-332-6, pp. 144–153; June 2006. doi:10.1145/1134760.1134780
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- P.91 M. Franz; “The Rewards of Generating True 32-bit Code;” *ACM Sigplan Notices*, Vol. 26, No. 1, pp. 121–123; January 1991. doi:10.1145/122203.122212
- TR.90-142 M. Franz; *MacOberon Reference Manual*; Technical Report No. 142, Departement Informatik, ETH Zürich; November 1990.
- TR.90-141 M. Franz; *The Implementation of MacOberon*; Technical Report No. 141, Departement Informatik, ETH Zürich; October 1990.

Software Artifacts

As a researcher in the computer systems area, I have authored and co-authored several substantial software works. Each of the software systems listed in this section represents an effort of more than 3 man-years.

HotpathVM / TraceMonkey / Tamarin Tracing / Maxine Java VM, 2004–current, with M. Bebenita, M. Chang, A. Gal, G. Wagner, and Ch. Wimmer. Joint work with Adobe, Mozilla, and Oracle Sun Labs.

HotpathVM is a dynamic compilation system in which the unit of compilation is a loop, potentially spanning multiple procedures and even library code. As a consequence, our approach performs inlining and dynamic method specialization automatically as a side-effect. Using a new intermediate representation, the “Trace Tree” that is discovered and updated lazily on-demand while the program is being executed, our compiler generates object code that is competitive with traditional dynamic compilers, but that uses only a fraction of the compile time and memory footprint.

Our original academic research has since been transitioned into widespread practice. It led directly to the TraceMonkey JavaScript engine that has been shipping as a standard component of Mozilla’s Firefox web browser since June

2009 and that was developed in direct collaboration between Mozilla and my lab. In a joint project with Adobe, we have been working on the Tamarin Tracing virtual machine for ActionScript/Flash, and in a joint project with Oracle Sun Labs, my group has been contributing a just-in-time compiler to their Maxine research virtual machine for the Java language.

Orchestra, 2006–2010, with A. Gal, T. Jackson, K. Manivannan, B. Salamat, G. Wagner, and Ch. Wimmer.

Orchestra is a system that can detect at run-time when buffer-overflow and similar software vulnerabilities are exploited, enabling us to stop cyber-attacks before they can cause damage. The key idea is to generate several slightly different variants of the same software and then run these variants simultaneously and in lock-step on different cores of a multiprocessor. The different variants are created in such a way that their behavior under “normal” operation is the same for all variants, while it diverges when a buffer overrun occurs. For example, our prototype system grows the stack in two different directions in different versions. It is able to stop actual exploit codes when executing unpatched variants of the popular Apache web server, yet incurs only moderate performance penalties on the order of 20%.

Virtual Execution Environment for Legacy Software (VEELS), 2003–2009, with A. Gal, Ch. Probst, and A. Yermolovich.

VEELS is a system that automatically synthesizes specialized virtual-machine interpreters and just-in-time compilers for a given machine architecture to be emulated. These automatically generated interpreters and compilers are then executed on top of an existing software portability platform such as Java. Our approach allows for the quick construction of emulators for legacy software platforms with a considerably reduced implementation effort compared to traditional methods, yet the resulting emulators provide surprisingly good execution performance.

Multi Level Security Virtual Machine (MLSVM), 2002–2006, with D. Chandra and V. Haldar.

MLSVM is a Java Virtual Machine augmented by a tagging mechanism that allows to implement Multi-Level Security schemes and Perl-style taint propagation. A surprising result is that the overhead of implementing information-flow tracking in a JVM is much smaller than expected, on the order of 5% runtime cost when using per-object tags, and still perfectly reasonable when pushing tagging down to the level of instance variables and also tracking implicit flows through control flow. Our implementation is 100% backward compatible with the existing Java platform. Unlike other approaches that “freeze policies at the time of compilation”, our system truly separates the policies from the enforcement mechanism and allows policy changes even during execution. Our system can stop malicious and faulty Java programs (including cross-scripting attacks) fully automatically.

Virtual Power for Wireless Devices, 2002–2007, with Ch. Probst, V. Venkatachalam, and L. Wang.

Virtual Power is a system that automatically off-loads dynamic code generation and whole computations from resource-constrained wireless devices such as handheld computers and mobile phones to a stationary infrastructure. This enables the resource-constrained devices to use far larger applications than could normally be run, and it conserves battery power. The Virtual Power system uses a combination of static analysis techniques and dynamic profiling to partition applications between the server and the mobile device, and for dynamically adjusting the voltage on the mobile device depending on whether the execution is compute-bound or memory-bound.

Azure, 2001–2006, with N. Dalton and E. Yardimci.

Azure is a binary translation system that automatically parallelizes sequential programs using dynamic execution profiles. Among the techniques employed are control speculation, loop distribution across several threads, and automatic parallelization of recursive routines. In contrast to related systems that postulate new hardware constructs and provide results only via simulation, Azure is a fully operational software-only solution that runs on commercially available multiprocessors and that delivers significant actually measured speedups.

SafeTSA, 1999–2009, with Ph. Adler, W. Amme, A. Hartmann, and J. von Ronne.

SafeTSA is target-machine independent software transportation system that is a superior alternative to Java. It provides incorruptible referential integrity and uses “type separation” to achieve intrinsic type safety. These properties reduce the code verification effort at the code consumer’s site considerably. It also permits to perform many program analyses ahead of time that then don’t need to be performed on the target computer and that can be used to improve overall code

quality. SafeTSA is the subject of a patent awarded to UC Irvine.

Slim Binaries / WELL, 1996–2007, with M. Beers, Th. Kistler and Ch. Stork.

The Slim Binaries system and its successor, WELL, explore encoding formats for computer programs that have the property that “only legal programs” according to some decidable criterion can be encoded in the format. Hence, a “well formed” program in this representation does not need to be verified prior to execution. Interestingly, encoding formats used by Slim Binaries and WELL are also exceptionally dense, hence these systems also represent very capable compressors for computer programs.

MacOberon, 1989–1996.

I am the sole designer and implementor of the *MacOberon* compiler and programming environment. In the early 1990's, MacOberon was used as the primary environment for computer science education at several universities. MacOberon is available from various archive sites on the Internet, and on several CD-ROMs, including:

- Addison-Wesley, Inc.; *Oberon—das neue Pascal*; ISBN 3-89319-791-5.
- Anthra Norell, Inc.; *The Oberon System*; ISBN 0-964-29530-X.

Professional Activities

Major Honors and Awards

- *University of California, Irvine, Distinguished Mid-Career Faculty Award for Research*, 2010. This is the Academic Senate's highest honor for research. One such award at most is given yearly to an Assistant Professor, one to an Associate or Full Professor Step I-IV (the "Mid-Career Award"), and one to a Professor Step V or higher.
- *National Science Foundation CAREER Award*, CCR-9701400, "Dynamic Optimization of Software Component Systems," 1st March 1997 – 28th February 2001, \$205,000 (**sole PI**). PM Dr. Anand Tripathi.
- I was awarded a *Fulbright Scholarship* (for graduate study in the United States) in 1989, but subsequently declined this award in order to join the research group of Prof. Niklaus Wirth at ETH Zürich.

Major Grants and Awards: Current and Ongoing Funding

- *National Science Foundation, Computing and Communications Foundations Program*, CCF-1117162, "SHF: CSR: Small: Fine-Grained Modularity and Reuse of VM Components," 1st August 2011 – 31st July 2014, \$499,867 (**sole PI**). PM Dr. Bill Pugh.
- *DARPA, Clean-Slate Design of Resilient, Secure Hosts (CRASH) Program & Transformative Apps Program*, D11PC20024, "Defending Mobile Apps Through Automated Software Diversity," 4th February 2011 – 3rd February 2014, \$1,380,162 (**sole PI**). PMs Dr. Howard Shrobe and Dr. Mari Maeda.
- *Samsung Telecommunications America*, Richardson, Texas, Agreement No. 51070, "Fine-Grained Modularity and Reuse of Virtual-Machine Components," 1st January 2011 – 31st December 2011, \$349,965 (**sole PI**). PM Venky Raju.
- *National Science Foundation, Trusted Computing Program*, CNS-0905684, "Next-Generation Infrastructure for Trustworthy Web Applications," 1st September 2009 – 31st August 2012, \$600,000 (**lead PI**, award is split evenly with co-PI C. Flanagan of UC Santa Cruz). PM Dr. Karl Levitt.

Major Grants and Awards: Past Funding

- *California MICRO Program* and industrial sponsor *Sun Microsystems, Inc.*, Project No. 07-127, "Trace Compilation for a Server Java Virtual Machine," 24th August 2007 – 30th June 2009, \$81,500 (\$50,000 gift from sponsor, \$31,500 matching cash contribution from MICRO, waiver of overhead charges applies to the total grant amount; **sole PI**).
- *National Intelligence Community, Enterprise Cyber Assurance Program (NICECAP)*, FA8750-07-2-0085, "Leveraging Parallel Hardware to Detect, Quarantine, and Repair Malicious Code Injection," 17th May 2007 – 17th August 2009, \$1,020,375 (**sole PI**). PM Dr. Carl Landwehr. (This solicitation drew 265 responses, of which 11, including this one, were funded. Among the 11 funded projects, 4 were from M.I.T. and one each from Carnegie-Mellon, Columbia, Cornell, Stanford, and UT Austin. UC Irvine was the only university in the competition to receive a grant awarded to a sole Principal Investigator.)
- *National Science Foundation, Trusted Computing Program*, CNS-0627747, "MLS-VM: Design and Implementation of a Next-Generation Information-Centric Target Platform for Trusted Internet Computing," 1st September 2006 – 31st August 2010, \$400,000 (**sole PI**). PM Dr. Helen Gill.
- *National Science Foundation, Embedded and Hybrid Systems Program*, CNS-0615443, "Virtual-Machine Techniques for Resource-Constrained Devices: Reconciling Reliability With Reusability and Low Development Costs in the Embedded Systems Space," 1st July 2006 – 30th June 2010, \$300,000 (**sole PI**). PM Dr. Helen Gill.
- *United States Homeland Security Advanced Research Projects Agency (HSARPA)*, FA8750-05-2-0216, "Adding Mandatory Access Control to Virtual Machines", 2nd May 2005 – 1st November 2007, \$312,483 (**sole PI**). PM Dr. Douglas Maughan. (My proposal was the only one of 80 submissions in the category "Vulnerability Prevention" that got funded by DHS. Overall, the Homeland Security solicitation drew 583 responses, of which 17, including this one, were funded.)

- *National Science Foundation, Information Technology Research (ITR)*, CCR-0205712, “Virtual Power for a Wireless Campus: Orchestrated Modeling, Analysis, Composition and Compilation Strategies for Distributed Embedded Systems,” 1st September 2002 – 31st August 2005, \$2,000,796 (**lead PI** with C. Krintz and R. Wolski of UC Santa Barbara). PM Dr. Helen Gill. (Award is split \$500,000 to Franz, Krintz and Wolski each, with a further \$500,000 going to an internal sub-contract at UC Irvine with Senior Personnel P. Chou, N. Dutt, and T. Givargis.)
- *California MICRO Program* and industrial sponsor *Microsoft Research*, Project No. 04-032, “Executing Legacy Machine Code on a Safe Virtual Machine,” 11th August 2004 – 30th June 2005, \$46,881 (waiver of overhead charges applies to the total grant amount; **sole PI**).
- *Deutsche Forschungsgemeinschaft (DFG)* [German National Science Foundation], AM-150/1-3, “SafeTSA: Entwicklung syntaxorientierter Verfahren zur sicheren und effizienten Ausführung von mobilem Code,” 1st March 2004 – 28th February 2006, Euro 140,000 (equal co-PI with W. Amme and W. Rossak of the University of Jena, Germany). (This is a new grant that provides continuing support for an earlier DFG-funded research project listed below.)
- *National Science Foundation, Trusted Computing Program*, CCR-TC-0209163, “Practical Language-Based Security, From the Ground Up,” 1st August 2002 – 31st July 2005, \$300,000 (**sole PI**). PM Dr. Carl Landwehr.
- *DARPA Information Systems Office*, F30602-99-1-0536, “New Approaches to Mobile Code: Reconciling Execution Efficiency With Provable Security,” follow-on effort, 22nd June 2002 – 30th September 2003, additional \$207,632 (**sole PI**). PM Dr. Jaynarayan H. Lala.
- *National Science Foundation, Operating Systems and Compilers Program*, CCR-0105710, “Design and Implementation of Component-Oriented Programming Languages,” 1st July 2001 – 30th June 2004, \$240,000 (**sole PI**). PM Dr. Xiaodong Zhang.
- *Department of Defense, Critical Infrastructure Protection and High Confidence, Adaptable Software (CIP/SW) Research Program of the University Research Initiative*, N00014-01-1-0854, “A Comprehensive Context for Mobile-Code Deployment,” 1st May 2001 – 30th September 2004, \$981,121, (**lead PI** with B. Fleisch of UC Riverside). PMs Frank Deckelman and Dr. Ralph Wachter. (Award is split \$793,201 to Franz and \$187,920 to Fleisch. According to the ONR website, “the competition drew 115 white papers, from which 74 proposals were received. After a thorough evaluation by technical expert teams, 20 of these proposals were selected for funding.”)
- *Deutsche Forschungsgemeinschaft (DFG)* [German National Science Foundation], AM-150/1-1, “SafeTSA: Entwicklung syntaxorientierter Verfahren zur sicheren und effizienten Ausführung von mobilem Code,” 23rd August 2001 – 1st February 2004, Euro 135,000 [corresponding to 270,000 Deutsche Marks] (equal Co-PI with W. Amme and W. Rossak of the University of Jena, Germany).
- *National Science Foundation, Next Generation Software Program*, EIA-9975053, “TMO Based Modeling and Design of Reliable Next-Generation Complex Software,” 15th August 1999 – 14th August 2002, \$550,000 (with K. Kim, Principal Investigator, and P. C.-Y. Sheu, Department of Electrical and Computer Engineering, UC Irvine). PM Dr. Frederica Darema. (\$117,000 of the total allocated to co-PI Franz.)
- *California MICRO Program* and industrial sponsor *Microsoft Research*, Project No. 99-039, “An Infrastructure for Dynamic Optimization at Run-Time,” 2nd August 1999 – 30th June 2000, \$38,000 (waiver of overhead charges applies to the total grant amount; **sole PI**).
- *National Science Foundation, Operating Systems and Compilers Program*, CCR-9901689, “Graph-Based Mobile-Code Representations for High-Performance Portable Software,” 1st September 1999 – 31st August 2002, \$180,000 (**sole PI**). PM Dr. Mukesh Singhal.
- *DARPA Information Systems Office*, F30602-99-1-0536, “New Approaches to Mobile Code: Reconciling Execution Efficiency With Provable Security,” 22nd June 1999 – 21st June 2002, \$720,741 (**sole PI**). PM Dr. Jaynarayan H. Lala.

Supplementary Awards

- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CNS-0905684, Summer 2011, \$16,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CNS-0905684, Summer 2010, \$8,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CNS-0627747, Summer 2007, \$6,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CNS-0615443, Summer 2007, \$6,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CCR-0205712, Summer 2004, \$6,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CCR-0205712, Summer 2003, \$10,000.
- National Science Foundation, Research Experiences for Undergraduates (REU) Award Supplement for Grant CCR-9701400, Summer 1998, \$5,000.

Unrestricted Gifts

- Google Corporation, \$61,000; June 2011.
- Adobe Corporation, \$35,000; August 2010.
- Adobe Corporation, \$40,000; March 2010.
- Mozilla Corporation, \$85,000; December 2009.
- Sun Microsystems, \$80,000; May 2009.
- Google Corporation, \$50,000; January 2008.
- Mozilla Corporation, \$85,000; May 2007.
- Intel Corporation, \$30,000; April 2006.
- Intel Corporation, \$30,000; June 2005.
- Sun Microsystems Laboratories, \$56,031; September 2004
- Intel Corporation, \$30,000; July 2004.
- Microsoft Research, \$33,183, April 2004.

Service to the Professional Community: Ongoing

- Program Committee Member, *Eighth ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE 2012)*, London, United Kingdom; March 2012.
- Program Committee Member, *27th Annual Computer Security Applications Conference (ACSAC 2011)*, Orlando, Florida; December 2011.
- Program Committee Member, *6th Workshop on Programming Languages and Operating Systems (PLOS 2011)*, Cascais, Portugal; October 2011.

- Program co-Chair, *International Workshop on Programming Language And Systems Technologies for Internet Clients (PLASTIC 2011)*, Portland, Oregon; October 2011.
- Program Committee Member, *Third IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT2011)*, Boston, Massachusetts; October 2011.
- Program Committee Member and Paper Shepherd, *2011 New Security Paradigms Workshop (NSPW 2011)*, Sonoma, California; September 2011.
- Journal Editorial Board Member, *Software—Practice and Experience (SPE)*; since July 2010.
- Journal Editorial Board Member, *Computer Science—Research and Development (CSR D)*; since October 2009.
- Observer, *IFIP Working Group 11.3 (“Data and Application Security”)*, 2008 – present.
- Steering Committee Member, *Joint Modular Languages Conference Series (JMLC)*, 2002 – present.
- Full Voting Member, *IFIP Working Group 2.4 (“Software Implementation Technology”)*, 2002 – present.
- Charter Faculty Member, *Security Computing and Networking Center (SCoNCe)* (previously named *Center for Cyber-Security and Privacy*), Donald Bren School of Information and Computer Sciences, UC Irvine, May 2005 – present.
- Charter Member, *UC Irvine Networked Systems Center (NSC)*, January 2002 – present.
- Charter Member, *The California Institute for Telecommunications and Information Technology (Cal-(IT)²)*, one of four California Institutes for Science and Technology, December 2000 – present.

Service to the Professional Community: Past

- Program Committee Member, *4th International Conference on Trust and Trustworthy Computing (TRUST 2011)*, Pittsburgh, Pennsylvania; June 2011.
- Program Committee Member and Session Chair, *ACM Sigplan Conference on Programming Language Design and Implementation (PLDI 2011)*, San Diego, California; June 2011.
- Organization Committee Member and Sponsorship co-chair, *EuroSys 2011*, Salzburg, Austria; March 2010.
- Program Committee Member, *5th International Multidisciplinary Conference on e-Technologies (MCETECH 2011)*, Les Diablerets, Switzerland; January 2011.
- **Program Chair** and Session Chair, *26th Annual Computer Security Applications Conference (ACSAC 2010)*, Austin, Texas; December 2010. 237 submitted papers, 39 accepted.
- Program Committee Member and Session Chair, *19th ACM/IEEE/IFIP International Conference on Parallel Architectures and Compilation Techniques (PACT 2010)*, Vienna, Austria; September 2010.
- Program Committee Member, *2010 IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT-10)*, Minneapolis, Minnesota; August 2010.
- Program Committee Member, *ACM SIGPLAN/SIGBED Conference on Languages, Compilers and Tools for Embedded Systems (LCTES 2010)*, Stockholm, Sweden; April 2010.
- Program Committee Member and Session Chair, *ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE 2010)*, Pittsburgh, Pennsylvania; March 2010.
- Program Committee Member, *International Symposium on Engineering Secure Software and Systems (ESSoS 2010)*, Pisa, Italy; February 2010.
- **Program co-Chair**, *25th Annual Computer Security Applications Conference (ACSAC 2009)*, Honolulu, Hawaii; December 2009.

- Program Committee Member, *12th Information Security Conference (ISC 2009)*, Pisa, Italy; September 2009.
- Program Committee Member, *2009 New Security Paradigms Workshop (NSPW 2009)*, Oxford, United Kingdom; September 2009.
- Program Committee Member, *2009 IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT-09)*, Vancouver, British Columbia, Canada; August 2009.
- Program Committee Member, *2009 International Conference on Principles and Practices of Programming in Java (PPPJ'2009)*, Calgary, Alberta, Canada; August 2009.
- Program Committee Member, *47th International Conference on Objects, Models, Components, and Patterns (TOOLS-EUROPE 2009)*, Zurich, Switzerland, June/July 2009.
- Program Committee Member, *4th Montreal Conference on eTechnologies (MCETECH)*, Ottawa, Canada; May 2009.
- Review Panel Member, *National Science Foundation, Program on Computer and Network Systems*, Arlington, Virginia, April 2009.
- Organizing Committee Member (Student Travel Chair), *Fourteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '09)*, Washington, D.C.; March 2009.
- Program Committee Member, *Compiler Construction 2009 (CC 2009)*, York, United Kingdom; March 2009.
- Panels Chair and Conference Committee Member, *24th Annual Computer Security Applications Conference (ACSAC 2008)*, Anaheim, California; December 2008.
- Steering Committee Member, *ACM SIGPLAN/SIGOPS/USENIX International Conference Series on Virtual Execution Environments (VEE)*, 2004 – 2008.
- Program Committee Member, *2008 IEEE Symposium on Security and Privacy*, Oakland, California; May 2008.
- Program Committee Member, *2008 Annual IEEE Computer Society/ACM International Symposium on Code Generation and Optimization (CGO 2008)*, Boston, Massachusetts; March 2008.
- Program Committee Member and Session Chair, *23rd Annual Computer Security Applications Conference (ACSAC 2007)*, Miami Beach, Florida; December 2007.
- Program Committee Member, *2007 International Conference on Principles and Practices of Programming in Java (PPPJ'2007)*, Monte de Caparica/Lisbon, Portugal; September 2007.
- Program Committee Member, *New Security Paradigms Workshop (NSPW 2007)*, Washington Valley, New Hampshire; September 2007.
- Local Arrangements Chair, *IFIP WG2.4 Working Meeting*, Arrowhead, California, May 2007.
- Review Panel Member, *National Science Foundation, Program on Foundations of Computing Processes and Artifacts*, Arlington, Virginia, February 2007.
- Program Committee Member, *Workshop on Linguistic Support for Modern Operating Systems (PLOS 2006)*, October 2006.
- Program Committee Member, *The Second Workshop on Advances in Trusted Computing (WATC'06 Fall)*, Tokyo, Japan, November-December 2006.
- Program Committee Member and Session Chair, *Seventh Joint Modular Languages Conference (JMLC 2006)*, Oxford, United Kingdom, September 2006.
- Program Committee Member, *2006 International Conference on Principles and Practices of Programming in Java (PPPJ'2006)*, Mannheim, Germany, September 2006.

- Program Committee Member and Local Arrangements Co-Chair, *New Security Paradigms Workshop (NSPW 2006)*, Dagstuhl, Germany, September 2006.
- Review Panel Member, *National Science Foundation, CAREER Program in CyberTrust*, Arlington, Virginia, November 2005.
- Program Committee Member, *New Security Paradigms Workshop (NSPW 2005)*, Lake Arrowhead, California, September 2005.
- Program Committee Member, *ECOOP Workshop on Programming Languages and Operating Systems (ECOOP-PLOS 2005)*, June 2005.
- **Founding Steering Committee Co-Chair** (with Sam Midkiff of Purdue University), *ACM SIGPLAN/SIGOPS/USENIX International Conference Series on Virtual Execution Environments (VEE)*, September 2004 – June 2005.
- Program Committee Member, *Third International Workshop on Compiler Optimization Meets Compiler Verification (COCV 2005)*, Edinburgh, Scotland, April 2005.
- Program Committee Member, *3. Arbeitstagung Programmiersprachen (ATPS 2004) of the German Computer Society (GI)*, Ulm, Germany, September 2004.
- Session Chair, *Invitational Workshop on the Future of Virtual Execution Environments*, Armonk, New York; September 2004
- Session Chair, *New Security Paradigms Workshop (NSPW 2004)*, White Point, Nova Scotia, September 2004.
- Session Chair, *The Fourth IEEE International Conference on Peer-to-Peer Computing (P2P 2004)*, Zurich, Switzerland, August 2004.
- Session Chair, *Southern California Parallel Processing and Computer Architecture Workshop*, Los Angeles, California, May 2004.
- Program Committee Member, *ECOOP Workshop on Programming Languages and Operating Systems (ECOOP-PLOS 2004)*, Oslo, Norway, June 2004.
- **General Chair**, *ACM SIGPLAN 2004 Workshop on Interpreters, Virtual Machines and Emulators (IVME 2004)*, Washington, D.C., June 2004.
- Program Committee Member, *ACM SIGPLAN 2004 Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'04)*, Washington, D.C., June 2004.
- Program Committee Member, *Second Annual IEEE/ACM International Symposium on Code Generation and Optimization (CGO 2004)*, San Jose, California, March 2004.
- Program Committee Member, *Third International Workshop on Compiler Optimization Meets Compiler Verification (COCV 2004)*, Barcelona, Spain, March/April 2004.
- Review Panel Member, *National Science Foundation, CAREER Program in Networking and Security*, Arlington, Virginia, November 2003.
- Program Committee Member, *ACM SIGSAC New Security Paradigms Workshop 2003 (NSPW-2003)*, Ascona, Switzerland, September 2003.
- Program Committee Member and Session Chair, *Sixth Joint Modular Languages Conference (JMLC 2003)*, Klagenfurt, Austria, August 2003.
- Program Committee Member, *ACM SIGPLAN 2003 Workshop on Interpreters, Virtual Machines and Emulators (IVME'03)*, San Diego, California, June 2003.
- Program Committee Member, *Second International Workshop on Compiler Optimization Meets Compiler Verification (COCV 2003)*, Warsaw, Poland, April 2003.

- Observer, *IFIP Working Group 2.4*, February 1998 – November 2002 (elected to full membership on November 14th).
- Program Committee Member, *4th Annual Workshop on Binary Translation (WBT-2002)*, Charlottesville, Virginia, September 2002.
- Review Panel Member, *National Science Foundation, Program in Embedded & Hybrid Systems*, Arlington, Virginia, June 2002.
- Program Committee Member, *Fifth ECOOP Workshop on Object-Oriented and Operating Systems (ECOOP-OOSWS 2002)*, Málaga, Spain, June 2002.
- Program Committee Member, *Fifth IEEE International Symposium on Object-Oriented Real-Time Distributed Computing (ISORC 2002)*, Washington, D.C., April–May 2002.
- Program Committee Member, *11th International Conference on Compiler Construction (CC'2002)*, Grenoble, France, March 2002.
- Session Chair, *Ninth International Workshop on Compilers for Parallel Computers (CPC 2001)*, Edinburgh, Scotland, June 2001.
- Program Committee Member and Session Chair, *Fourth IEEE International Symposium on Object-Oriented Real-Time Distributed Computing (ISORC 2001)*, Magdeburg, Germany, May 2001.
- Program Committee Member, *Fifth Joint Modular Languages Conference (JMLC 2000)*, Zurich, Switzerland, September 2000.
- Tutorials Chair, *ACM Sigplan Conference on Programming Language Design and Implementation (PLDI 2000)*, Vancouver, Canada, June 2000.
- Program Committee Member, *Third Workshop on Distributed Communities on the Web (DCW 2000)*, Quebec City, Canada, June 2000.
- Program Committee Member, *Third IEEE International Symposium on Object-Oriented Real-Time Distributed Computing (ISORC 2000)*, Newport Beach, California, March 2000.
- Local Arrangements Co-Chair, *Third IEEE International Symposium on Object-Oriented Real-Time Distributed Computing (ISORC 2000)*, Newport Beach, California, March 2000.
- Program Committee Member, *European Symposium on Programming (ESOP 2000)*, Berlin, Germany, March/April 2000.
- Program Committee Member and Session Chair, *Workshop on Binary Translation* (in conjunction with the International Conference on Parallel Architectures and Compilation Techniques, PACT '99), Newport Beach, California, October 1999.
- Executive Committee Member, *The Institute for Software Research at UC Irvine*, July 1999–January 2002.
- Charter Member, *The Institute for Software Research at UC Irvine*, July 1999.
- Program Committee Member, *ACM Sigplan 1999 Workshop on Compiler Support for System Software (WC-SSS'99)*, Atlanta, Georgia, May 1999.
- Session Organizer and Host, *Bay Area Round Table (BART)*, Palo Alto, California, February 1999.
- Program Committee Member, *Fourth California Software Symposium (CSS'98)*, Irvine, California, October 1998.
- Program Committee Member, *Workshop on Principles of Abstract Machines* (in conjunction with the joint international symposia SAS'98 and PLILP/ALP'98), Pisa, Italy, September 1998.
- Program Committee Member and Session Chair, *ACM Sigplan Conference on Programming Language Design and Implementation (PLDI'98)*, Montreal, Canada, June 1998.

- Program Committee Member and Session Chair, *Fourth Joint Modular Languages Conference (JMLC'97)*, Linz, Austria, March 1997.
- Executive Committee Member, *Irvine Research Unit in Software (IRUS)* [precursor to The Institute for Software Research], January 1996 – June 1999.
- Swiss Delegate to *IFIP Technical Committee No. 2*, “Software: Theory and Practice,” 1995–1996 term.
- Program Committee Chair, *Oberon Track at the First Joint Annual Conference of the Gesellschaft für Informatik and the Schweizer Informatiker Gesellschaft*, Zürich, September 1995.
- Executive Committee Member, *Special Interest Group on Oberon of the Schweizer Informatiker Gesellschaft*, 1994–1996.
- Organizing Committee Member, *Conference on Programming Languages and System Architectures*, Zürich, March 1994.

Invited Keynotes and Panels at Conferences

- M. Franz; “Eliminating the Insider Threat in Software Development by Combining Parallelism, Randomization and Checkpointing” (Invited Keynote Address); *Fourth Annual Cyber Security and Information Intelligence Research Workshop (CSIIRW'08)*, Oak Ridge National Laboratory, Oak Ridge, Tennessee; May 2008.
- M. Franz; “Security and Privacy in Service Oriented Architectures” (Panelist); *21st Annual IFIP WG 11.3 Working Conference on Data and Applications Security (DBSEC'07)*, Redondo Beach, California; July 2007.
- M. Franz; “Erinnerungen und Ausblicke: Was haben wir gelernt? Und was soll die nächste Generation lernen?” (Invited Panelist); *Tag der Informatik*, ETH Zurich, Switzerland, October 2006.
- M. Franz; “A New Approach to Embedded Java” (Invited Keynote Address); *Mobile Information & Communication Systems, Scientific Conference*, Zurich, Switzerland, October 2006.
- M. Franz; “Pervasive Security” (Panelist); *Software Security Panel, National Science Foundation, Trusted Computing Program, PI Meeting*, Pittsburgh, Pennsylvania; August 2004.
- M. Franz; “Safe Code: It’s Not Just For Applets Anymore” (Invited Keynote Address); *Sixth Joint Modular Languages Conference (JMLC 2003)*, Klagenfurt, Austria, August 2003.
- M. Franz; “Pervasive Security” (Panelist); *Trusted Computing Panel, National Science Foundation, Trusted Computing Program, PI Meeting*, Baltimore, Maryland; August 2003.
- M. Franz; “The Source is The Proof” (Panelist); *NSPW Panel, 18th Annual Computer Security Applications Conference (ACSAC-18)*, Las Vegas, Nevada; December 2002.
- M. Franz; “Extensible Programming: Ein neues Paradigma für die Softwareentwicklung” (Invited Keynote Address, in German); *Moderne Programmierparadigmen*, conference sponsored by Gesellschaft für Informatik, FH Braunschweig-Wolfenbüttel, Germany; October 1994.

Meeting Participation By Invitation († = I gave a presentation, ‡ = my student gave a presentation)

Note: Presentations at conferences with proceedings are documented under “Publications“ above and are not listed again here.

- † *DARPA Clean-Slate Design of Resilient, Secure Hosts (CRASH) Program, PI Meeting*, San Jose, California, May 2011.
- † *IFIP WG2.4 Working Meeting*, Berg en Terblijt, Netherlands, January 2010.
- *Networking and Information Technology Research and Development (NITRD) Program, National Cyber Leap Year Summit*, Arlington, Virginia, August 2009.

- † *National Intelligence Community, Enterprise Cyber Assurance Program (NICECAP), PI Meeting*, Washington, D.C., September 2008.
- † *National Intelligence Community, Enterprise Cyber Assurance Program (NICECAP), Reverse Site Visit*, Jessup, Maryland, January 2008.
- † *NCDI Workshop on Game-changing Solutions for Cyber Security* (jointly sponsored by NSF, DHS, IARPA, NSA, ONR, and OSD), College Park, Maryland, November 2007.
- † *National Intelligence Community, Enterprise Cyber Assurance Program (NICECAP), PI Meeting*, Boston, Massachusetts, September 2007.
- *U.S. Department of Energy Workshop on Cyber Security Research Needs for Open Science*, Bethesda, Maryland, July 2007.
- † *IFIP WG2.4 Working Meeting*, Arrowhead, California, May 2007.
- † *National Intelligence Community, Enterprise Cyber Assurance Program (NICECAP), Program Kick-Off Meeting*, Chantilly, Virginia, March 2007.
- † *U.S. Department of Homeland Security, S&T CyberSecurity R&D PI Meeting*, Menlo Park, California, February 2007.
- † *National Science Foundation Safe Computing Workshop*, Albuquerque, New Mexico, November/December 2006.
- † *U.S. Department of Homeland Security, S&T CyberSecurity R&D PI Meeting*, Arlington, Virginia, August 2006.
- † *IFIP WG2.4 Working Meeting*, Glasgow, Scotland, July 2006.
- *The First Workshop on Advances in Trusted Computing*, Tokyo, Japan, March 2006.
- † *U.S. Department of Homeland Security, S&T CyberSecurity R&D PI Meeting*, Menlo Park, California, January 2006.
- *National Science Foundation, Trusted Computing Program, PI Meeting*, Newport Beach, California, September 2005.
- † *U.S. Department of Homeland Security, BAA 04-17, Program Kick-Off Meeting*, Arlington, Virginia, July 2005.
- *Microsoft Academic Days in Silicon Valley*, Mountain View, California, October 2004.
- *Microsoft Research 2004 Faculty Summit*, Redmond, Washington, August 2004.
- † *Southern California Parallel Processing and Computer Architecture Workshop*, Los Angeles, California, May 2004.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, Final Review*, Annapolis, Maryland, May 2004.
- † *IFIP WG2.4 Working Meeting*, Brisbane, Australia, March 2004.
- † *IFIP WG2.4 Working Meeting*, Santa Cruz, California, August 2003.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, PI Meeting*, Ithaca, New York, July 2003.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, Review Meeting*, Arlington, Virginia, June 2003.
- *DARPA Organically Assured and Survivable Information Systems (OASIS) Program, PI Meeting*, Fort Lauderdale, Florida, January 2003.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, PI Meeting*, Irvine, California, January 2003.
- † *IFIP WG2.4 Working Meeting*, Dagstuhl, Germany, November 2002.

- † *DARPA Organically Assured and Survivable Information Systems (OASIS) Program, PI Meeting*, Santa Rosa, California, August 2002.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, PI Meeting*, State College, Pennsylvania, July 2002.
- † *IFIP WG2.4 Working Meeting*, Simon's Town, South Africa, March 2002.
- † *Southern California Parallel Processing and Computer Architecture Workshop*, Irvine, California, February 2002.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, PI Meeting*, Melbourne, Florida; January 2002.
- † *DARPA Organically Assured and Survivable Information Systems (OASIS) Program, PI Meeting*, Santa Fe, New Mexico; July 2001.
- † *ONR Critical Infrastructure Protection, Mobile Code Program, PI Meeting*, Arlington, Virginia; July 2001.
- † *Symposium on Research in Mobile Computing Systems*, Zurich, Switzerland; May 2001.
- † *DARPA Organically Assured and Survivable Information Systems (OASIS) Program, PI Meeting*, Norfolk, Virginia; February 2001.
- *University of Washington and Microsoft Research Summer Institute 2000, "Accelerating the Pace of Software Tools Research: Sharing Infrastructure"*, hosted by C. Chambers, D. Notkin, A. Srivastava, and B. Zorn; Seattle, Washington; August 2000.
- † *DARPA Intrusion Tolerant Systems (ITS) Program, PI Meeting*, Honolulu, Hawaii; July 2000.
- ‡ *17th Gesellschaft für Informatik (GI) Workshop on Programming Languages and Computing Concepts (with Special Emphasis on Software Components)*, Bad Honnef, Germany; May 2000.
- † *DARPA Intrusion Tolerant Systems (ITS) Program, PI Meeting*, Aspen, Colorado; February 2000.
- † *DARPA Intrusion Tolerant Systems (ITS) Program, PI Meeting*, Phoenix, Arizona; August 1999.
- *National Science Foundation CAREER Program, PI Meeting*, Washington, D.C.; January 1999.
- † *Southern California Parallel Processing and Computer Architecture Workshop*, Irvine, California; March 1998.
- † *International Workshop on Component-Oriented Programming*, Linz, Austria; July 1996.
- *Third International Workshop on Workstation Operating Systems*, Key Biscayne, Florida; April 1992.

Selected Recent Invited Colloquium-Style Presentations

2011

University of Edinburgh, Scotland, United Kingdom (Host: Christian Fensch); *Technical University of Vienna*, Austria (Host: Jens Knoop); *Imperial College London*, England, United Kingdom (Host: Alexander L. Wolf); *University College London*, England, United Kingdom (Host: M. Angela Sasse); *Universität Linz*, Austria (Host: Hanspeter Mössenböck).

2010

ETH Zurich, Switzerland (Host: Thomas Gross); *University of California, Berkeley* (Hosts: Dawn Song and Ras Bodik); *Google*, New York City (Host: Robert Muth); *Universität Cottbus*, Germany (Host: Claus Lewerentz); *Disney Animation*, Burbank, California (Host: Rasmus Tamstorf); *Intel*, Santa Clara, California (Host: Ali-Reza Adl-Tabatabai).

2009

IBM Zurich Research Laboratory, Rüschlikon, Switzerland (Host: Andreas Kind); *IBM T.J. Watson Research Laboratory*, Hawthorne, New York (Host: Martin J. Hirzel); *Università della Svizzera italiana*, Lugano, Switzerland (Host: Matthias Hauswirth & Mehdi Jazayeri); *Fraunhofer FIRST*, Berlin, Germany (Host: Stefan Jähnichen); *Qualcomm*, Santa Clara, California (Host: Mehrdad Reshadi); *Technische Universität Darmstadt*, Germany (Host: Johannes Buchmann); *Technische Universität Berlin*, Germany (Host: Stefan Jähnichen).

2008

University of California, Davis (Host: Matt Bishop); *Johannes-Kepler Universität Linz*, Austria (Host: Hanspeter Mössenböck); *VMWare*, Palo Alto, California (Host: Erwin Oertli); *ETH Zurich*, Switzerland (Host: Jürg Gutknecht); *SAP*, Palo Alto (Host: Dirk Riehle); *Samsung Mobile Communications Laboratory (SMCL)*, San Jose, California (Host: Ciaran Rochford); *Technical University of Denmark*, Lyngby, Denmark (Host: Christian Probst); *Martin-Luther-Universität Halle-Wittenberg*, Germany (Host: Wolf Zimmermann); *Universität Dresden*, Germany (Host: Uwe Assmann); *Microsoft Corporation*, Redmond, Washington (Host: Ian Carmichael); *University of California, Los Angeles* (Host: Todd Milstein).

2007

IBM Zurich Research Laboratory, Rüschlikon, Switzerland (Host: Matthias Schunter); *National Security Agency*, Fort Meade, Maryland; *Intel*, Santa Clara, California (Hosts: Neal Glew and Brian T. Lewis); *Sun Microsystems Labs*, Mountain View, California (Hosts: Mario Wolczko and Bernd Mathiske); *Mozilla Corporation*, Mountain View, California (Host: Brendan Eich); *Technical University of Berlin / Fraunhofer FIRST*, Berlin, Germany (Host: Stefan Jähnichen); *Ripple Networks*, El Segundo, California (Host: Ali Diab); *Symantec*, Santa Monica, California (Host: Darren Shou).

2006

Sun Microsystems Labs, Menlo Park, California (Host: Mario Wolczko); *Intel*, Santa Clara, California (Host: Neal Glew); *Mozilla Corporation*, Mountain View, California (Host: Brendan Eich); *IBM Tokyo Research Laboratory*, Kanagawa, Japan (Host: Michiharu Kudo); *Johannes-Kepler Universität Linz*, Austria (Host: Hanspeter Mössenböck); *Technische Universität Wien*, Austria (Host: Jens Knoop); *ETH Zürich*, Switzerland (Host: Thomas Gross); *New York University*, New York City (Host: Robert Grimm); *IBM T.J. Watson Research Laboratory*, Hawthorne, New York (Host: Michael Hind); *IBM T.J. Watson Research Laboratory*, Yorktown, New York (Host: Michael Gschwind); *Microsoft Research*, Redmond, Washington (Host: Benjamin Zorn).

Administrative Service

- Donald Bren School of Information and Computer Science, Chair, *Computing and Network Policy Committee*, 2005–2006, 2006–2007, 2008–2009.
- Donald Bren School of Information and Computer Science, *Executive Committee*, 2007–2008.
- Donald Bren School of Information and Computer Science, *Marketing and Outreach Committee*, 2004–2005.
- University of California, *Irvine Campus Committee on Undergraduate Admissions and Relations with Schools and Colleges*, 2000–2004.
- Donald Bren School of Information and Computer Science, Chair, *Faculty Search Committee, Position in Security and Cryptography*, 2002–2003.
- Donald Bren School of Information and Computer Science, *Committee on Graduate Policy*, 2002–2003.
- ICS Department, Chair, *Committee on Space Policy*, 2001–2002.
- ICS Department, *Faculty Search Committee, Position in Cryptography and Security*, 2000–2001.

- ICS Department, *Committee on Graduate Policy*, 2000–2001.
- ICS Department, *Ad-Hoc Faculty Search Committee, “Systems” Position*, 1999–2000.
- ICS Department, *Committee on Educational Policy*, 1999–2000.
- ICS Department, *Executive Committee*, 1998–1999.
- ICS Department, *Committee on Undergraduate Policy*, 1998–1999.
- ICS Department, *Faculty Search Committee, Multiple Positions in Interdisciplinary Applications of Computer Science*, 1998–1999. (Committee reviewed 170 applications = 4 linear feet of files and filled three open faculty positions.)
- University of California, *Irvine Campus Committee on Undergraduate Admissions and Relations with Schools and Colleges*, 1997–2000.
- ICS Department, *Committee on Graduate Policy*, 1997–1998.
- ICS Department, *Committee on Graduate Admissions*, 1997–1998.
- ICS Department, *Faculty Search Committee, Position in “Informatics,”* 1997–1998.
- University of California, *Irvine Campus Representative Assembly*, 1996–1997.
- ICS Department, *Committee on Personnel*, 1996–1997.
- ICS Department, *Faculty Search Committee, Position in Software Engineering*, 1995–1996.

Consulting: Ongoing

- I have been consulting for the law firm *Morrison & Foerster*, Los Angeles, California; since September 2007.
- I have also been retained to provide consulting services by the law firm *Nixon & Vanderhye*, Arlington, Virginia; since August 2009.

Consulting: Past

- I have been an expert witness for a client represented by the law firm *Call & Jensen*, Newport Beach; January 2002 – January 2003 (the case settled in mid-trial, after my deposition).
- I was the leader of ETH’s group in a consulting project for *Sony Telecom (Europe) N.V.*, Brussels, Belgium, involving evaluation and specification of a future product (joint work with Sony Computer Science Laboratory, Tokyo, Japan, 1994-1995).

Teaching Activities

Teaching Awards

- *Dean's Award for Graduate Student Mentoring*, Donald Bren School of Information and Computer Sciences, UC Irvine, 2007.
- *Outstanding Professor of the Year Award*, Graduating Class of 2007, UC Irvine.

Post-Doctoral Habilitation Theses Supervised

- Dr. Christian Herrman, Universität Ulm, Germany; thesis: “Verbesserte prozedurale Programmiersprachen” (Improved Procedural Programming Languages); March 2007.

Post-Doctoral Fellows Supervised

1. Dr. Wolfram Amme (January–December 2000); now a Privatdozent at the University of Jena, Germany.
2. Dr. Won-Kee Hong (October 2001–October 2002); now an Assistant Professor at Daegu University, South Korea.
3. Dr. Fermin Reig (October 2001–July 2003); now Software Systems Specialist at Morgan Stanley, United Kingdom.
4. Dr. Roxana Diaconescu (January 2003–September 2004); now a Vice President at Markit, London, United Kingdom.
5. Dr. Christian Probst (January 2003–May 2005); now an Associate Professor at the Technical University of Denmark.
6. Dr. Andreas Gal (since January 2007), now a Researcher at Mozilla, Mountain View, California.
7. Dr. Christian Stork (March 2007–September 2008).
8. Dr. Christian Wimmer (July 2008–April 2011), now a Principal Member of Technical Staff at Oracle Sun Labs, Redwood Shores, California).
9. Dr. Stefan Brunthaler (since April 2011).

Graduated Ph.D. Students (Principal Advisor and Dissertation Committee Chair)

1. Thomas Kistler
(affiliated in April 1995, candidacy: February 1998, final defense: November 1999; thesis: “Continuous Program Optimization;” first employment after graduation: *Transmeta, Inc.*, Santa Clara, California; now Director of GPU Software at *NVIDIA Corporation*, Santa Clara, California).
2. Peter H. Fröhlich
(affiliated in September 1998; advanced to candidacy in May 2001; final defense in March 2003; thesis: “The Structure of Component-Oriented Programming Languages;” first employment after graduation: *University of California, Riverside*; now a Research Assistant Professor and Senior Lecturer in the Department of Computer Science, Whiting School of Engineering, *Johns Hopkins University*, Baltimore, Maryland).
3. Jeffery von Ronne
(affiliated in September 1999; advanced to candidacy in February 2003; final defense in July 2005; thesis: “A Safe and Efficient Machine-Independent Code Transportation Format Based on Static Single Assignment Form and Applied to Just-In-Time Compilation;” now an Associate Professor at the *University of Texas at San Antonio*).

4. Vivek Haldar
(affiliated in August 2000; advanced to candidacy: November 2002; final defense: February 2006; thesis: “Semantic Remote Attestation;” now with *Google, Inc.*, Santa Monica, California).
5. Efe Yardimci
(affiliated in August 2001; advanced to candidacy: November 2003; final defense: March 2006; thesis: “Exploiting Parallelism to Improve the Performance of Sequential Binary Executables;” first employment after graduation: *Advanced Micro Devices (AMD), Inc.*, Boxborough, Massachusetts; now with *The MathWorks*, Natick, Massachusetts).
6. Christian H. Stork
(affiliated in September 1998; advanced to candidacy: May 2001; final defense: August 2006; thesis: “WELL: A Language-Agnostic Foundation for Compact and Provably Safe Mobile Code”).
7. Deepak Chandra
(affiliated in August 2001; advanced to candidacy: March 2004; final defense: September 2006; thesis: “Information Flow Analysis and Enforcement in Java Bytecode;” now with *Google, Inc.*, Irvine, California).
8. Andreas Gal
(affiliated in January 2002; advanced to candidacy: December 2003; final defense: November 2006; thesis: “Efficient Bytecode Compilation and Verification in a Virtual Machine;” now at Mozilla).
9. Matthew Beers
(affiliated in September 1999; advanced to candidacy: July 2002; final defense: March 2007; thesis: “Shifting the Burden of Code Optimization to the Code Producer;” now with *Ocean Tomo* Intellectual Capital Equity, Irvine, California).
10. Ning Wang
(affiliated in September 2001; advanced to candidacy: September 2004; final defense: May 2007; thesis: “From Assumptions to Assertions: A Sound and Precise Points-to Analysis for the C Language;” now with *Fortify Software*, Palo Alto, California).
11. Vasanth Venkatachalam
(affiliated in September 2002; advanced to candidacy: September 2003; final defense: May 2007; thesis: “Self-Calibrating Processor Speed: A New Feedback Loop For Dynamic Voltage Scaling Control;” now with *Advanced Micro Devices (AMD)*, Austin, Texas).
12. Lei Wang
(affiliated in June 2001; advanced to candidacy: September 2004; final defense: June 2009; thesis: “Automatic Program Partitioning to Alleviate Resource Constraints of Object-Oriented Applications;” now with *Microsoft*, Redmond, Washington).
13. Babak Salamat
(affiliated in January 2007; advanced to candidacy: May 2007; final defense: June 2009; thesis: “Multi-Variant Execution: Run-Time Defense Against Malicious Code Injection Attacks;” now with *Qualcomm*, Mountain View, California).

Graduate Students Supervised as Principal Academic Advisor and Committee Chair

Advanced to Ph.D. Candidacy (in order of advancement date)

1. Michael Bebenita (since January 2007; advanced to candidacy in May 2009).
2. Mason Liu Chang (since June 2007; advanced to candidacy in May 2009)
3. Gregor Wagner (since September 2007; advanced to candidacy in May 2009)
4. Todd Morris Jackson (since September 2007; advancement to candidacy in June 2009)

5. Karthikeyan Manivannan (since March 2007; advancement to candidacy in August 2009)
6. Marcelo Cintra (since December 2007; advancement to candidacy in November 2009)

Not Yet Advanced to Candidacy (in order of affiliation date)

7. Eric Hennigan (since July 2008)
8. Christoph Kerschbaumer (since Summer 2010)
9. Andrei Homescu (since Fall 2010)
10. Mark Murphy (since Fall 2010)
11. Gulfem Savrun Yeniceri (since Fall 2010)

Graduated Ph.D. Students (Co-Advisor and “Opponent” During Final Dissertation Defense)

1. Christian Wimmer, University of Linz, Austria
(final defense: March 2008; thesis: “Automatic Object Inlining in a Java Virtual Machine”).
2. Stefan Brunthaler, Technical University of Vienna, Austria
(final defense: February 2011; thesis: “Purely Interpretative Optimizations”).
3. Thomas Würthinger, University of Linz, Austria
(final defense: April 2011; thesis: “Dynamic Code Evolution for Java”).

Other Ph.D. Students

graduated from U.C. Irvine (dissertation committee member)

- Andreas Gerstlauer (final defense: April 2004, committee chair: Daniel D. Gajski; thesis: “Modeling Flow for Automated System Design and Exploration”).
- Ana Lucia Velloso Azevedo (final defense: October 2002; committee chair: Alexandru Nicolau; thesis: “Annotation-based Compiler Technology”).
- Chang Liu (final defense: August 2002, committee chair: Debra J. Richardson; thesis: “Redundant Arrays of Independent Components;” now an Assistant Professor at Ohio University).
- Martin Burtscher, University of Colorado at Boulder
(final defense: April 2000, committee chair: Benjamin Zorn; thesis: “Improving Context-Based Load Value Prediction;” now an Assistant Professor at Cornell University).
- Jianwen Zhu (final defense: September 1999; committee chair: Daniel D. Gajski; thesis: “Behavioral Synthesis from an Extensible Object Oriented Language;” now an Assistant Professor at the University of Toronto).
advanced to candidacy (dissertation committee member)
- Nicolae Savoiu (candidacy: September 1999; committee chair: Alexandru Nicolau).

M.Sc. Students Graduated from UC Irvine

- Alexander Yermolovich, primary M.S. advisor, completed M.S. degree in May 2009; thesis: “Efficient Execution of Binary and Guest Virtual Machines on Platform Independent Host Virtual Machines,” now at Intel.
- Mason Liu Chang, primary M.S. advisor, completed M.S. degree in May 2009; thesis: “Tracing for Web 3.0 – Trace Compilation for the Next Generation Web Applications,” now a Ph.D. student in my research group.

- Songmei Han, primary M.S. advisor, graduated with a M.S. in Computer Science in June 2003 (she also received a Ph.D. in Cognitive Science, for which Barbara Doshier was the advisor); subsequently a tenure-track Assistant Professor of Cognitive Science and Computer Science at SUNY Oswego and now Usability Engineer at Apollo Group.
- Anjum Gupta, M.S. thesis committee member, graduated June 2003 (thesis: Design and Implementation of an Adaptive Cache on a Configurable Processor; committee chair: Rajesh Gupta).
- Sergiy Zhenochin, primary M.S. advisor, graduated Fall 2001, now at Apple Computer.
- Prashant Saraswat, primary M.S. advisor, graduated Fall 2001, now with the compiler group of the Non-Stop Kernel project of HP (formerly Compaq), Inc. at their Cupertino campus.
- Hans-Christian Stadler, primary M.S. advisor, graduated June 1998, now with Logossmartcard A/S, Denmark.

Undergraduate Honors Students Graduated from UC Irvine

- Muneeb Baig (honors research advisor); graduated Magna Cum Laude and Phi Beta Kappa in 2007; honors thesis: “Optimizing Array Bound Checking During Trace-Based Compilation”.
- Michael Masukawa (honors research advisor); graduated Summa Cum Laude and Phi Beta Kappa in 2007; honors thesis: “Dynamic Taint Propagation in Java Web Applications”.
- Jesse Morrow (honors research advisor); graduated Magna Cum Laude and Phi Beta Kappa in 2005.
- Matthew Chu (honors research advisor); graduated Phi Beta Kappa in 2004.
- Zachary Mouri (honors research advisor); graduated Phi Beta Kappa in 2004.
- Ronald Harvest (honors research advisor); graduated Summa Cum Laude and Phi Beta Kappa in 1999.
- Calvin Shen (honors research advisor); graduated Cum Laude in 1999.

Other Undergraduate Advising

- Chris Austin, NSF Research Experiences for Undergraduates Summer Scholar, faculty advisor, 2010.
- Daniel A. Ehrenberg, Carleton University, NSF Research Experiences for Undergraduates Summer Scholar, faculty advisor, 2010.
- Sean Kocol, honors research advisor, 2009.
- Jonathan Mood, honors research advisor, 2009.
- Adrian Tran, honors research advisor, 2009.
- Yaoxiang Zhou, honors research advisor, 2008.
- Raymond Yu, honors research advisor, 2007/08.
- Stephen C. Reed, California Alliance for Minority Participation in Science (CAMP) Summer Scholar, faculty advisor, 2004.

Visiting Diploma Students Supervised at UC Irvine

- Stefan Rath, Technische Universität Graz, Austria, co-supervised with Ch. Steger; July–December 2010.
- Franz Maier, Technische Universität Graz, Austria, co-supervised with Ch. Steger; March–September 2010.
- Christoph Kerschbaumer, Technische Universität Graz, Austria, co-supervised with Ch. Steger; March–September 2008.
- Giacomo Amorosa, ETH Zürich, Switzerland, co-supervised with J. Gutknecht; February–August 2008.
- Katharina Seke, Technische Universität Graz, Austria, co-supervised with Ch. Steger; July 2006–October 2006.
- Gregor Wagner, Technische Universität Graz, Austria, co-supervised with Ch. Steger; March 2006–October 2006.
- Albert Noll, Technische Universität Graz, Austria, co-supervised with Ch. Steger; March 2006–September 2006.
- Michael Rauch, Technische Universität Graz, Austria, co-supervised with Ch. Steger; March 2006–September 2006.
- Isabella Thomm, Universität Erlangen-Nürnberg, Germany, co-supervised with W. Schroeder-Preikschat; November 2005–February 2006.
- Michael Stilkerich, Universität Erlangen-Nürnberg, Germany, co-supervised with W. Schroeder-Preikschat; December 2004–February 2005 and November 2005–February 2006.
- Nicolas Marochow, Fachhochschule Braunschweig-Wolfenbüttel, Germany, co-supervised with R. Rüdiger; September 2004–January 2005.
- Jan Peterson, Universität Jena, Germany, co-supervised with W. Amme; May–September 2004.
- Tobias Körner, Fachhochschule Braunschweig-Wolfenbüttel, Germany, co-supervised with R. Rüdiger; March–August 2003.
- Alexander Apel, Universität Jena, Germany, co-supervised with W. Amme; September–November 2003.
- Christian Rattei, Fachhochschule München, Germany, co-supervised with K. Köhler; April–November 2000.
- Joachim Büchse, ETH Zürich, Switzerland, co-supervised with J. Gutknecht; thesis: “Procedure-Call Optimierungen zur Laufzeit,” 1998.
- M. Burtscher, ETH Zürich, thesis: “Dynamische Reoptimierung auf einem CISC,” 1996.
(work conducted at Irvine but thesis submitted in Zurich while Franz still had a formal association with ETH)
- M. Dätwyler, ETH Zürich, thesis: “Executable Content in Compound Documents,” 1996.
(work conducted at Irvine but thesis submitted in Zurich while Franz still had a formal association with ETH)

Diploma Students Supervised at ETH Zurich († = co-supervised with N. Wirth)

- E. Brandenberger, Oberon Module Interchange auf Intel-Prozessoren, 1996.
- D. Posva, Dynamische Reoptimierung auf einem RISC, 1996.
- M. Sperisen, Executable Content in WWW-Dokumenten: Java, 1996.
- †H. Buchser, Portable Objektfiles und codegenerierender Lader, 1995.
- †H. Domjan, Metaprogrammierung, 1995.
- †O. Dreer, “Slim Binaries” auf Macintosh, 1995.
- †Th. Kistler, Smartest Recompile, 1995.
- †Ch. Denzler, A Message Mechanism for Oberon, 1993.

- †E. Oertli, Oberon-2 für Macintosh, 1993.
- †I. Posva, Elimination redundanter Tests durch Programmanalyse, 1993.
- †Th. Bühlmann, Call Optimization for the MacOberon Compiler, 1992.
- †S. Ludwig, A Portable Object and Symbol File Format for Oberon, 1991.
- †S. Meier, Zeichenerkennung mittels Strukturanalyse, 1990.