

FILIP PIZLO

Curriculum Vitae

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Summary

I'm the co-founder and president of Fiji Systems LLC, an Indianapolis-based technology startup specializing in real-time Java solutions. My academic research, on which Fiji Systems' core product is based, spans real-time systems, memory management, virtual machines, runtime systems, static analysis, type systems, and programming models.

Education

- Ph.D., PURDUE UNIVERSITY, West Lafayette, IN., dissertation topic: **Java on Bare Hardware**. Key courses: Compilers, Programming languages, Operating Systems, Formal Compiling Methods, Analysis of Algorithms, Parallel Computing, Numerical Methods, Randomized and Probabilistic Algorithms, Numerical Solutions to Ordinary Differential Equations. **Due to graduate in 2010.**
- 2003 B.S., PURDUE UNIVERSITY, West Lafayette, IN., double-majored in computer science and math. Key courses: Computer Architecture, Analysis of Algorithms, Data Structures, Databases, Compilers, Operating Systems, Software Engineering, Computer Networking, Real Time Systems, Scientific Computing, Numerical Methods, Calculus, Discrete Math, Linear Algebra, Differential Equations, Abstract Algebra, Physical Mechanics I (Honors), Gamma-ray Astrophysics, Russian
- 1999 High school diploma, BREBEUF JESUIT PREPARATORY SCHOOL, Indianapolis, IN.

Awards

- Principal Investigator on NSF SBIR Phase I award to Fiji Systems LLC, \$100,000.
- IBM PhD Fellowship Nominee for 2009-2010.
- Tied for best presentation, International Symposium on Memory Management (ISMM 2008).
- Google Summer of Code 2008 Participant (for Jikes RVM).
- Microsoft PhD Fellowship Finalist, 2008.
- Halstead Scholarship, Purdue University, \$4,000, 2005.

Publications - Journals

- [1] J. Baker, A. Cunei, T. Kalibera, F. Pizlo, J. Vitek. Accurate Garbage Collection in Uncooperative Environments. To appear in *Concurrency and Computation: Practice and Experience*, 2008.
- [2] A. Armbuster, J. Baker, A. Cunei, C. Flack, D. Holmes, F. Pizlo, E. Pla, M. Prochazka, J. Vitek. A Real-Time Java Virtual Machine with Applications in Avionics. In *ACM Transactions in Embedded Computing Systems (TECS)*, 2006.

Publications - Refereed Conferences

- [3] T. Wrigstad, F. Pizlo, F. Meawad, L. Zhao, J. Vitek. Loci: Simple Thread-Locality for Java. To appear in the *2009 European Conference on Object-Oriented Programming (ECOOP 2009)*.

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Publications - Refereed Conferences (continued)

- [4] F. Pizlo, E. Petrank, B. Steensgaard. Path Specialization: Reducing Phased Execution Overheads. *In The 2008 International Symposium on Memory Management (ISMM 2008)*
- [5] F. Pizlo, E. Petrank, B. Steensgaard. A Study of Concurrent Real-time Garbage Collectors. *In the ACM SIGPLAN 2008 Conference on Programming Language Design and Implementation (PLDI 2008)*. (Acceptance rate: 18%)
- [6] F. Pizlo, J. Vitek. Memory Management for Real-time Java: State of the Art. *Proceedings of the IEEE International Symposium on Object-oriented Real-Time Distributed Computing (ISORC)*, May 2008.
- [7] F. Pizlo, D. Frampton, E. Petrank, B. Steensgaard. Stopless: A Real-Time Garbage Collector for Modern Platforms. *In The 2007 International Symposium on Memory Management (ISMM 2007)*, October 2007.
- [8] F. Pizlo, A. Hosking, J. Vitek. Hierarchical Real-time Garbage Collection. *In the ACM SIGPLAN/SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'07)*, held in San Diego as part of the Federated Computing Research Conference (FCRC'07). (Acceptance rate: 27%)
- [9] J. Spring, F. Pizlo, R. Guerraoui, J. Vitek. Reflexes: Programming Abstractions for Highly Responsive Systems. *In the 2007 ACM International Conference on Virtual Execution Environments (VEE'07)*, held in San Diego as part of the Federated Computing Research Conference (FCRC'07). (Acceptance rate: 26%)
- [10] J. Baker, A. Cunei, F. Pizlo, J. Vitek. Accurate Garbage Collection in Uncooperative Environments with Lazy Pointer Stacks. *In Compiler Construction, 16th International Conference, CC 2007, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2007*. (Acceptance rate: 23%)
- [11] F. Pizlo, J. Vitek. An Empirical Evaluation of Memory Management Alternatives for Real-time Java. *In Proceedings of the 27th IEEE Real-Time Systems Symposium (RTSS)*, December 2006. (Acceptance rate: 23%)
- [12] J. Baker, A. Cunei, C. Flack, F. Pizlo, M. Prochazka, J. Vitek, A. Armbuster, E. Pla, D. Holmes. Real-time Java in Avionics Applications. *In Proceedings of the 12th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)*, 2006. (Acceptance rate: 29%)
- [13] F. Pizlo, J. Fox, D. Holmes, J. Vitek. Real-time Java scoped memory: design patterns, semantics. *In Proceedings of the IEEE International Symposium on Object-oriented Real-Time Distributed Computing (ISORC'04)*, pp 101112, Vienna, Austria, May 2004. (Acceptance rate: 20%)

Publications - Workshops

- [14] F. Pizlo. First in, first out memory. *Presented at the 3rd Workshop on Java Technologies for Real-time and Embedded Systems (JTRes 2005)*, collocated with the ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA), October 2005.

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Publications - Workshops (continued)

- [15] F. Pizlo, M. Prochazka, S. Jaggannathan, J. Vitek. Transactional lock-free data structure for Real Time Java. In *Workshop on Concurrency and Synchronization in Java Programs*, St John's, Newfoundland, Canada, July 2004. (Acceptance rate: 55%)

Publications in Other Disciplines - Journals

- [16] V. A. Acciari et al. VERITAS Observations of a Very High Energy γ -ray Flare from the Blazar 3C 66A. *To appear in Astrophysical Journal Letters*, 2009.
- [17] J. Holder et al. The first VERITAS telescope. *Astroparticle Physics, Volume 25, Issue 6*, p. 391-401. July 2006.
- [18] E. T. Linton et al. A new search for primordial black hole evaporations using the Whipple gamma-ray telescope. *Journal of Cosmology and Astroparticle Physics, Issue 01*, pp. 013. January 2006.
- [19] A. D. Falcone et al. A Search for TeV Gamma-Ray Emission from High-peaked Flat-Spectrum Radio Quasars Using the Whipple Air Cerenkov Telescope. *The Astrophysical Journal, Volume 613, Issue 2*, pp. 710-715. October 2004.
- [20] Steinman, R.M., Pizlo, Z., Pizlo, F. Phi is not beta, and why Wertheimer's discovery launched the Gestalt revolution: a minireview. *Vision Research*, 40, 2257-2264. 2000.

Professional Experience

- Fiji Systems FIJI SYSTEMS LLC, Indianapolis, IN
Co-founder and President, 2009-present
Co-founder of Fiji Systems LLC, president, and chief executive manager. I am the lead on Fiji Systems' core technology, the fVM, an exciting new Java virtual machine technology that allows real-time and systems code to be written in Java.
- S³ Lab PURDUE UNIVERSITY, West Lafayette, IN
Research Assistant, 2003-2009
PhD student, and core developer on OpenVM and Jikes RVM. My contributions to both systems span thread scheduling, lock implementation, garbage collection (real-time garbage collection in particular), compilation, data flow analysis, and type systems.
- VERITAS PURDUE UNIVERSITY, West Lafayette, IN
Research Assistant, 2000-2009
Designed and developed software for the VERITAS telescope array. VERITAS is an international project consisting of over 20 universities and research institutions. The telescope array is the largest of its type in the northern hemisphere. My work includes the design and development of the back-end data acquisition system, the real-time data analysis, and the standard data format.
- Microsoft MICROSOFT RESEARCH, Redmond, WA
Research Intern, Winter 2006-2007 and Summer 2007
Developed three algorithms for concurrent copying garbage collection. Also developed a new compiler optimization for improving garbage collector performance. Our CoCo algorithm for concurrent copying (published in ISMM'07) was the first such algorithm to support lock-freedom and multiprocessors while being fast enough for practical use.

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Professional Experience (continued)

IBM T.J. WATSON RESEARCH CENTER, Hawthorne, NY
Research Intern, Summer 2004
Member of original design team for the X10 programming language. Developed original X10 compiler.

Software Development Experience

fVM Project lead. Designed and implemented an ahead-of-time compiler that converts Java bytecodes to native code. This compiler uses techniques like OCFA and SSA to optimize high-level code into very fast executables. As well, I've designed two new real-time garbage collection techniques (soon to be published). See <http://www.fiji-systems.com/> for more information.

Jikes RVM Core team member. Implemented and stabilized native threading as a replacement for M:N green threading. Also worked on fixes and improvements in the compiler, garbage collector, and locking. Currently working on refactoring MMTk to handle high-throughput concurrent garbage collection. See <http://www.jikesrvm.org/> for more information about Jikes RVM.

VERITAS Telescope Member of the core engineering team. I'm responsible for the standard "VBF" data format, one of the main data analysis packages (namely, the Quicklook real-time analysis), and the back-end data acquisition system. My software is critical to the real-time recording, compression, and analysis of the 20 MB/sec VERITAS data stream. See <http://veritas.sao.arizona.edu/> for more information about VERITAS.

OpenVM Core developer. Designed novel garbage collection, scheduling, and data analysis techniques, in addition to implementing numerous features and fixes to other parts of the system. OpenVM has been used by Boeing as part of the DARPA PCES project to test real-time Java for avionics. See <http://www.ovmj.org/> for more information about OpenVM.

Bartok Compiler Extended the Microsoft Bartok Research Compiler to support three new on-the-fly lock-free concurrent copying garbage collectors and a new compiler optimization for improving garbage collector performance. Also added improvements to reference counting, inlining, devirtualization, and code scheduling. See <http://research.microsoft.com/research/act/default.aspx> for more information about Bartok.

TSF Library Designed and implemented the TSF open source data format library. TSF is a scientific data format not unlike HDF5, FITS, or NetCDF, and is used by VERITAS for storing data summaries. See <http://homepage.mac.com/pizlo/tsf/> for more information about TSF.

Stochastic M-CAS Designed and implemented a mechanism for lock-free atomic multi-word compare-and-swap (Multi-CAS, or M-CAS) based on random numbers. Stochastic Multi-CAS can be used for a variety of non-blocking applications, especially concurrent garbage collection. See <http://homepage.mac.com/pizlo/smcas/> for more information about Stochastic Multi-CAS

X10 Language Developed the original prototype X10 compiler using the Polyglot framework. See <http://www.research.ibm.com/x10/> for more information about X10.

MLton Compiler Contributed the Darwin/PPC port. See <http://www.mlton.org/> for more information about MLton.