Filip Pizlo

Curriculum Vitae

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Summary

Co-founder and president of Fiji Systems Inc., a startup specializing in real-time Java solutions. Filip's 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. He is also involved in scientific computing efforts as part of the VERITAS collaboration.

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 2011**.

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 and Grants

- Principal Investigator on NSF SBIR Phase Ib 2010 award to Fiji Systems Inc., $50,000.
- Principal Investigator on AFRL SBIR Phase I 2010 award to Fiji Systems Inc., $99,999.
- Principal Investigator on NSF SBIR Phase I 2009 award to Fiji Systems LLC, $100,000.
- Best presentation, International Symposium on Memory Management 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. Spring, F. Pizlo, J. Privat, R. Guerraoui, J. Vitek. Reflexes: Abstractions for Integrating Highly Responsive Tasks into Java Applications. *ACM Transactions in Embedded Computing Systems (TECS), 2009.*

[2] J. Baker, A. Cunei, T. Kalibera, F. Pizlo, J. Vitek. Accurate Garbage Collection in Uncooperative Environments. *Concurrency and Computation: Practice and Experience,* 2008.

[3] 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. *ACM Transactions in Embedded Computing Systems (TECS)*, 2006.

Publications - Refereed Conferences

[4] F. Pizlo, L. Ziarek, P. Maj, A. L. Hosking, E. Blanton, J. Vitek. Schism: Fragmentation-Tolerant Real-Time Garbage Collection. *To appear in the ACM SIGPLAN 2010 Conference on Programming Language Design and Implementation (PLDI 2010).*

[5] F. Pizlo, L. Ziarek, E. Blanton, P. Maj, J. Vitek. High-level Programming of Embedded Hard Real-Time Devices. *ACM SIGOPS 2010 EuroSys Conference.* (Acceptance rate: 19%)

[6] T. Kalibera, F. Pizlo, A. L. Hosking, J. Vitek. Scheduling Hard Real-Time Garbage Collection. *IEEE Real-Time Systems Symposium (RTSS) 2009: 81-92* (Acceptance rate: 22%)

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Publications - Refereed Conferences (continued)

[7] T. Wrigstad, F. Pizlo, F. Meawad, L. Zhao, J. Vitek. Loci: Simple Thread-Locality for Java. *2009 European Conference on Object-Oriented Programming (ECOOP 2009).* (Acceptance rate: 21%)

[8] F. Pizlo, E. Petrank, B. Steensgaard. Path Specialization: Reducing Phased Execution Overheads. *2008 International Symposium on Memory Management (ISMM 2008)*

[9] F. Pizlo, E. Petrank, B. Steensgaard. A Study of Concurrent Real-time Garbage Collectors. *ACM SIGPLAN 2008 Conference on Programming Language Design and Implementation (PLDI 2008).* (Acceptance rate: 18%)

[10] F. Pizlo, J. Vitek. Memory Management for Real-time Java: State of the Art. *IEEE International Symposium on Object-oriented Real-Time Distributed Computing (ISORC),* May 2008.

[11] F. Pizlo, D. Frampton, E. Petrank, B. Steensgaard. Stopless: A Real-Time Garbage Collector for Modern Platforms. *2007 International Symposium on Memory Management (ISMM 2007)*

[12] F. Pizlo, A. Hosking, J. Vitek. Hierarchical Real-time Garbage Collection. *ACM SIGPLAN/SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'07).* (Acceptance rate: 27%)

[13] J. Spring, F. Pizlo, R. Guerraoui, J. Vitek. Reflexes: Programming Abstractions for Highly Responsive Systems. *2007 ACM International Conference on Virtual Execution Environments (VEE'07).* (Acceptance rate: 26%)

[14] J. Baker, A. Cunei, F. Pizlo, J. Vitek. Accurate Garbage Collection in Uncooperative Environments with Lazy Pointer Stacks. *Compiler Construction, 16th International Conference, CC 2007.* (Acceptance rate: 23%)

[15] F. Pizlo, J. Vitek. An Empirical Evaluation of Memory Management Alternatives for Real-time Java. *27th IEEE Real-Time Systems Symposium (RTSS 2006).* (Acceptance rate: 23%)

[16] J. Baker, A. Cunei, C. Flack, F. Pizlo, M. Prochazka, J. Vitek, A. Armbuster, E. Pla, D. Holmes. Real-time Java in Avionics Applications. *12th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2006).* (Acceptance rate: 29%)

[17] F. Pizlo, J. Fox, D. Holmes, J. Vitek. Real-time Java scoped memory: design patterns, semantics. *IEEE International Symposium on Object-oriented Real-Time Distributed Computing (ISORC'04).* (Acceptance rate: 20%)

Publications - Workshops

[18] F. Pizlo, L. Ziarek, J. Vitek. Real time Java on resource-constrained platforms with Fiji VM. *JTRES 2009: 110-119* (Acceptance rate: 69%)

[19] T. Kalibera, J. Hagelberg, F. Pizlo, A. Plsek, B. Titzer, J. Vitek. CDx: a family of real-time Java benchmarks. *JTRES 2009: 41-50* (Acceptance rate: 69%)

[20] T. Kalibera, F. Pizlo, J. Vitek, M. Prochazka, M. Zulianello, M. Decky. Real-Time Java in Space: Potential Benefits and Open Challenges. *Presented at Eurospace DASIA 2009.*

[21] F. Pizlo. First in, first out memory. *Presented at the 3rd Workshop on Java Technologies for Real-time and Embedded Systems (JTRes 2005).*

[22] F. Pizlo, M. Prochazka, S. Jaggannathan, J. Vitek. Transactional lock-free data structure for Real Time Java. *Workshop on Concurrency and Synchronization in Java Programs 2004.* (Acceptance rate: 55%)

Publications in Other Disciplines

[23] VERITAS collaboration. A connection between star formation activity and cosmic rays in the starburst galaxy M82. *Nature, Volume 462, pp. 770-772.*

[24] V. A. Acciari et al. VERITAS Observations of a Very High Energy γ-ray Flare from the Blazar 3C 66A. *Astrophysical Journal Letters, 2009.*

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Publications in Other Disciplines (continued)

[25] J. Holder et al. The first VERITAS telescope. *Astroparticle Physics, Volume 25, Issue 6, p. 391-401. July 2006.*

[26] 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.*

[27] 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.*

[28] 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 INC., Indianapolis, IN
Co-founder and CEO, 2009-present
Filip's work at Fiji Systems spans business development, marketing, software engineering, and management. He is the lead on Fiji System's core product, the Fiji VM.

S^3 Lab — PURDUE UNIVERSITY, West Lafayette, IN
Research Assistant, 2003-2009
PhD student, and core developer on OpenVM and Jikes RVM. Filip's 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
VERITAS is the world's most sensitive telescope in the TeV spectrum, and the largest of its kind in the northern hemisphere. Filip's work included the design and development of the data acquisition system, the real-time data analysis, and the standard data format. Filip continues to be involved with VERITAS on a volunteer basis.

Microsoft — MICROSOFT RESEARCH, Redmond, WA
Research Intern, Winter 2006-2007 and Summer 2007
Developed three algorithms for concurrent copying garbage collection and a new compiler optimization for improving garbage collector performance. The Stopless algorithm for concurrent copying was the world's first to support lock-freedom on multiprocessors while being fast enough for practical use.

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

Software Artifacts

FIJI VM — Chief architect and project lead. Directly responsible for the compiler, garbage collectors, locking implementation, and most of the runtime and OS interface. Implemented the ability to write kernel code in pure garbage collected Java while matching HotSpot 1.6 server performance. Implemented the world's fastest and most space-efficient real-time garbage collector, dubbed Schism.
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, leading to improved stability and performance. Added a novel biased locking infrastructure, which led to the highest ever recorded performance improvement in regressions. Also worked on fixes and improvements in the compilers and garbage collectors.
See `http://www.jikesrvm.org/` for more information about Jikes RVM.

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Software Artifacts (continued)

VERITAS	Responsible for the standard "VBF" data format, one of the main data analysis packages (namely, the Quicklook real-time analysis), and the Harvester back-end data acquisition system. Helped design the database, monitoring, and control infrastructure. Performed a variety of calibration tasks for optimizing telescope sensitivty and performance. Filip's software (over 150 KLoC of C++ code) is in use 24/7 for recording and analyzing the main VERITAS data stream and achieves a mean-time between failure of close to a year. 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. Helped implement the first (and so far only) open-source Metronome implementation, dubbed Minuteman. See `http://www.ovmj.org/` for more information about OpenVM.
BARTOK	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. Implemented the world's first high-throughput concurrent copying garbage collector for multiprocessors. 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	Designed and implemented the TSF (Typed Stream Format) 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 MULTI-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	Developed the original prototype X10 compiler using the Polyglot framework. See `http://www.research.ibm.com/x10/` for more information about X10.
MLTON	Contributed the Darwin/PPC port. See `http://www.mlton.org/` for more information about MLton.

Lectures - Talks at Universities

[1] Univeristy of California Los Angeles, March 2010

[2] Univeristy of California Santa Barbara, March 2010

[3] University of California Irvine, February 2010

Service - Conference Program Committees

[1] ISMM: ACM SIGPLAN International Symposium on Memory Management 2010

[2] VMIL: The 3rd workshop on Virtual Machines and Intermediate Languages 2009

Service - Reviewer for Journals

[1] TECS: ACM Transactions in Embedded Computing Systems