

Tudor S. Marian

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- EMPLOYMENT** *Postdoctoral Associate* **2010 – 2011**
Department of Computer Science, Cornell University
Supervisor: Prof. Hakim Weatherspoon
- EDUCATION** *Ph.D.* in Computer Science, Cornell University **2004 – 2010**
Advisors: Prof. Hakim Weatherspoon and Prof. Ken Birman.
Minor in Applied Mathematics.
Obtained *M.Sc.* in Computer Science in March 2008.
Dissertation title: *Operating Systems Abstractions for Software Packet Processing in Datacenters*
- Diplomă (Combined B.S. and M.Eng.)*, Computer Science **1999 – 2004**
Technical University of Cluj-Napoca (UTCN), Romania.
 • GPA: 10.00 out of 10.00
- RESEARCH INTERESTS** Networking, operating systems, distributed systems.
- RESEARCH EXPERIENCE** *GeckoFS* *Postdoctoral Associate, Cornell*
with Hakim Weatherspoon **2010 – present**
GeckoFS is a file / storage system that saves power by spinning down hard disks. It overlays a log abstraction over a fault-tolerant, mirrored, multi-disk array. A log-structured storage system writes only to the log head, hence it continuously and sequentially writes to the same mirrored set of disks for long periods of time. Read requests are served from the primary disks, while the mirror disks can be powered down to trade off read throughput for power savings.
- Fmeter* *Postdoctoral Associate, Cornell*
with Hakim Weatherspoon **2010 – present**
Fmeter is a lightweight monitoring framework that produces low-level, formally indexable descriptions, or signatures, of systems at runtime. Unlike conventional monitoring techniques that perform statistical profiling based on sampling, Fmeter generates signatures by counting all operating system (i.e. kernel) function calls. The signatures are vectors of normalized function call frequencies that can be manipulated by conventional formal methods like clustering, classification through machine learning, and similarity based search against a database of labeled signatures.
- NetSlices and Featherweight Pipes (FwP)* *Graduate RA, Cornell*
with Hakim Weatherspoon **2009 – 2010**
Designed new operating systems abstractions for building high-speed packet processing applications, like software routers, in user-space. The NetSlice design takes advantage of multi-core processors and multi-queue network adapters to enable complex packet processors to scale linearly with the number of cores and operate at nominal 10Gbps network line speeds.
- Metronomix: Off-line Software Defined Network Adapter* *Graduate RA, Cornell*
with Daniel Freedman, Ken Birman, and Hakim Weatherspoon **2009 – 2010**
Designed and implemented a novel high-precision instrumentation apparatus to enable generation of extremely precise network traffic flows, and their capture and analysis. We generate and acquire analog traces in real-time directly off optical fiber, using typical physics laboratory equipment (oscilloscopes, lasers, etc.) and an off-line software (post-/pre-)processing stack. We

achieve six orders of magnitude improvement in timing precision over existing software end-host measurements and two to three orders of magnitude relative to prior hardware-assisted solutions.

Empirical Characterization of Uncongested λ -Networks Graduate RA, Cornell
with Daniel Freedman, Ken Birman, and Hakim Weatherspoon **2009 – 2010**
Performed an empirical characterization of uncongested lambda networks and 10GbE commodity endpoints.

Maelstrom Graduate RA, Cornell
with Mahesh Balakrishnan, Ken Birman and Hakim Weatherspoon **2007 – 2008**
Collaborated in designing and building Maelstrom, a transparent network gateway that uses Forward Error Correction to recover loss in high latency/high bandwidth links.

Smoke and Mirrors File System (SMFS) Graduate RA, Cornell
with Hakim Weatherspoon **2007 – 2008**
Designed and built abstractions enabling the SMFS mirroring file system to provide disaster fault tolerance with semi-synchronous performance and near-synchronous guarantees.

Tempest Graduate RA, Cornell
with Ken Birman and Robbert van Renesse **2006 – 2007**
Designed, built, and evaluated a runtime for storage and replication of service-level soft state. Data stored in *TempestCollections* is transparently replicated for availability and fault tolerance with zero effort from the developer.

Diaspora Graduate RA, Cornell
with Robbert van Renesse **2007**
Conceived and built Diaspora, a system that makes information available across federated domains. It also provides seamless site fail-over backup.

Scalable Services Architecture (SSA) Graduate RA, Cornell
with Ken Birman and Robbert van Renesse **2005 – 2006**
Designed, built, and evaluated a framework for porting non-transactional high performance applications onto clusters. We show that two simple yet powerful primitives (chain replication and epidemic protocols) can uniformly support a significant class of scalable, fault-tolerant services.

Mobile Agent Behavior Design Patterns Undergraduate RA, UTCN
with Ioan Salomie and Mihaela Dinşoreanu **2003 – 2004**
Designed, built, and evaluated a framework for building mobile agents based on behavioral patterns tailored for virtual learning environments.

CONED: Virtual University Undergraduate RA, UTCN
with Ioan Salomie and Mihaela Dinşoreanu **2002 – 2003**
Participated in the design and development of a web-based virtual university for UTCN.

PUBLICATIONS

- [1] **Tudor Marian.** *Operating Systems Abstractions for Software Packet Processing in Datacenters.* PhD Dissertation, Cornell University, Department of Computer Science, August 24 2010.
- [2] **Tudor Marian,** Ki Suh Lee, and Hakim Weatherspoon. *NetSlices: Scalable Multi-Core Packet Processing in User-Space.* In submission.

- [3] Mahesh Balakrishnan, **Tudor Marian**, Ken Birman, Hakim Weatherspoon, and Lakshmi Ganesh. *Maelstrom: Transparent Error Correction for Communication between Data Centers*. To appear in IEEE/ACM Transactions on Networking (ToN).
- [4] Daniel A. Freedman, **Tudor Marian**, Jennifer H. Lee, Ken Birman, Hakim Weatherspoon, and Chris Xu. *Instrumentation for exact packet timings in networks*. To appear in Proceedings of the 2011 IEEE International Instrumentation and Measurement Technology Conference (I2MTC), May 2011, Binjiang, Hangzhou, China.
- [5] Daniel A. Freedman, **Tudor Marian**, Jennifer H. Lee, Ken Birman, Hakim Weatherspoon, and Chris Xu. *Exact Temporal Characterization of 10 Gbps Optical Wide-Area Network*. To appear in Proceedings of the 10th Internet Measurement Conference (IMC'10), November 2010.
- [6] **Tudor Marian**, Daniel Freedman, Ken Birman, and Hakim Weatherspoon. *Empirical Characterization of Uncongested Lambda Networks and 10GbE Commodity Endpoints*. In Proceedings of the 40th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN-PDS '10), June 2010.
- [7] Hakim Weatherspoon, Lakshmi Ganesh, **Tudor Marian**, Mahesh Balakrishnan, and Ken Birman. *Smoke and Mirrors: Reflecting Files at a Geographically Remote Location Without Loss of Performance*. In Proceedings of the 7th USENIX Conference on File and Storage Technologies (FAST '09), February 2009.
- [8] **Tudor Marian**, Mahesh Balakrishnan, Ken Birman, and Robbert van Renesse. *Tempest: Soft State Replication in the Service Tier*. In Proceedings of the 38th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN-DCCS '08), June 2008.
- [9] Mahesh Balakrishnan, **Tudor Marian**, Ken Birman, Hakim Weatherspoon, and Einar Wollset. *Maelstrom: Transparent Error Correction for Lambda Networks*. In Proceedings of the 5th USENIX Symposium on Networked Systems Design and Implementation (NSDI '08), April 2008.
- [10] Ken Birman, Mahesh Balakrishnan, Danny Dolev, **Tudor Marian**, Krzysztof Ostrowski, and Amar Phanishayee. *Scalable Multicast Platforms for a New Generation of Robust Distributed Applications*. In Second International Conference on Communication System Software and Middleware (COMSWARE '07). IEEE Computer Society, January 2007.
- [11] **Tudor Marian**, Ken Birman, and Robbert van Renesse. *A Scalable Services Architecture*. In Proceedings of the 25th IEEE Symposium on Reliable Distributed Systems (SRDS '06). IEEE Computer Society, October 2006.
- [12] **Tudor Marian**, Bogdan Dumitriu, Mihaela Dinsoreanu, and Ioan Salomie. *A Framework of Reusable Structures for Mobile Agent Development*. In Proceedings of the 8th IEEE International Conference on Intelligent Engineering Systems, September 2004.

POSTERS

- [13] **Tudor Marian**, Hakim Weatherspoon, Mahesh Balakrishnan, Ken Birman. *FwP: Featherweight User-Mode Processes with Fast Reflexes*. In Proceedings of the 5th USENIX Symposium on Networked Systems Design and Implementation (NSDI '08), April 2008, Poster Session.
- [14] **Tudor Marian**, Ken Birman, Robbert van Renesse. *Diaspora: Join and Strengthen Information Across Administrative Domains*. In Proceedings of the 21st ACM Symposium on Operating Systems Principles (SOSP '07), Poster Session.

TECHNICAL REPORTS

- [15] **Tudor Marian** and Bogdan Dumitriu. *Coned: A Web Based Virtual University*. Technical report, Technical University of Cluj-Napoca, Cluj-Napoca, 2003.

PROFESSIONAL ACTIVITIES

External Reviewer for NSDI 2008. Member of IEEE and ACM.

SELECTED PRESENTATIONS

LADIS 2008: FwP – poster session.
DSN 2008: Tempest: Soft State Replication in the Service Tier.
NSDI 2008: FWP: Featherweight User-Mode Process with Fast Reflexes – poster session.
SOSP 2007: Diaspora – poster session.
SRDS 2006: A Scalable Services Architecture.
Cornell Systems Seminar: Presented selected papers on four occasions.

TEACHING EXPERIENCE

CS6464 Advanced Distributed Storage Systems *Teaching Assistant*
Instructor: Hakim Weatherspoon **Spring 2009**
Designed the lab assignments (a file system atop Amazon’s S3 storage back-end using FUSE and an asynchronous TCP proxy), held office hours, and guided students in completing class projects.

CS514 Intermediate Computer Systems *Teaching Assistant*
Instructor: Ken Birman **Spring 2007**
Held office hours, guided students in completing class projects.

CS211 Computers and Programming *Teaching Assistant*
Instructors: Keshav Pingali, Jai Shanmugasundaram, David I. Schwartz **Fall 2004**
Taught weekly sections, held office hours and wrote several homework assignments and exams.

SUPERVISED STUDENTS

Ki Suh Lee – pursuing Ph.D. degree at Cornell University.
Taiyang Chen – pursuing Ph.D. degree at Cornell University.
Abhishek Sagar, M.Eng. – now at Microsoft.
Supriya Vadlamani, M.Eng. – now at Amazon.
Santhosh Selvaraj, M.Eng. – now at Oracle.
Abhishek Behl, M.Eng. – now at World Evolved Services, LLC.
Jong Hwi Lee – pursuing undergraduate degree at Cornell University.

COURSE WORK

Cornell University
CS681 Analysis of Algorithms, *CS411* Programming Languages, *CS614* Advanced Systems, *CS612* Compiler Design for High-Performance Architectures, *CS481* Automata Theory, *CS421* Numerical Analysis and Differential Equations, *CS615* Peer-to-Peer Systems, *CS616* Self Stabilization Systems, *CS687* Cryptography, *CS678* Advanced Topics in Machine Learning, *CS787* Cryptography Seminar, *CS685* The Structure of Information Networks, *NBA507* Entrepreneurship for Scientists and Engineers.

HONORS

Travel grant award for DSN-DCCS 2008 **2008**
Performance state distinction fellowship **2001-2004**
Merit state distinction fellowship **1999-2001**

REFERENCES

Prof. Hakim Weatherspoon Department of Computer Science 4105C Upson Hall, Cornell University Ithaca, NY 14853 Phone: 607-254-1257 Fax: 607-255-4428 hweather@cs.cornell.edu	Prof. Ken Birman Department of Computer Science 4119B Upson Hall, Cornell University Ithaca, NY 14853 Phone: 607-255-9199 Fax: 607-255-4428 ken@cs.cornell.edu
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