

Anton Burtsev

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Research Interests

Operating systems: novel abstractions for structuring operating systems, microkernels, virtualization, decomposed and library kernels, security and verification of the kernel stack.

Security and access control: capability access control, practical least authority for virtualized environments and commodity operating systems, access control in datacenter and enterprise networks.

Operating system support for datacenter environments: low-latency system stacks, library operating systems, fast inter-process communication, software stacks for non-uniform high-density memory machines.

Academic Positions

Research Assistant Professor, School of Computing, University of Utah, 2015–present.
Research focus: secure operating systems, access control in datacenter networks.

Research associate, Flux Research Group, School of Computing, University of Utah, 2012–2015.
Research focus: operating systems security, datacenter security, deterministic systems analysis.

Education

PhD Computer Science, University of Utah, 2005–2013

Thesis: [Deterministic Systems Analysis](#)

Advisor: John Regehr

MS Applied Mathematics with honors, National Technical University of Ukraine (“Kyiv Polytechnic Institute”), 2000–2002

Thesis: [Distributed operating system architecture based on distributed shared objects](#)

Advisor: Yuriy Timoshenko

BS Applied Mathematics with honors, National Technical University of Ukraine (“Kyiv Polytechnic Institute”), 1996–2000

Thesis: Intelligent software agents

Advisor: Alexander Selin

Research Funding

National Science Foundation Cybersecurity Innovation for Cyberinfrastructure. *CapNet: Secure Scientific Workloads with Capability Enabled Networks*. Anton Burtsev (PI) and Jacobus Van der Merwe (co-PI). September 2015—August 2018. \$499,999.

National Science Foundation Secure and Trustworthy Cyberspace Program. *Deker: Decomposing Commodity Kernels for Verification*. Zvonimir Rakamarić (PI) and Anton Burtsev (co-PI). June 2015—May 2018. \$499,999.

NetApp Research Contract. *RAMStore: Decoupling application and storage stacks in a convergent store*. Anton Burtsev (PI). February 2015—January 2016. \$61,366.

National Science Foundation Secure and Trustworthy Cyberspace Program. *XCap: Practical Capabilities and Least Authority for Virtualized Environments*. Award CNS-1319076. John Regehr (PI) and Anton Burtsev (co-PI). October 2013—September 2016. \$499,912.

Pending Research Awards

National Science Foundation Computer Systems Research Program. *RAMEngine: Efficient Software Infrastructure for High-Density Memory Servers*. Anton Burtsev (PI) and Ryan Stutsman (co-PI). August 2016—July 2019. \$499,996.

National Science Foundation Smart and Connected Health Program. *HealthSec - A Secure Mobile Framework for Population Health Tracking*. John Geske, Kettering University (PI), Giuseppe Turini, Kettering University (Co-PI), Yunsheng Wang, Kettering University (Co-PI), Thomas Vanhecke, Genesys Regional Medical Center (Co-PI), Mark Vogel, Genesys Regional Medical Center (Co-PI), Kim Barber, Genesys Regional Medical Center (Co-PI), Jacobus Van de Merwe, University of Utah (Co-PI), Anton Burtsev, University of Utah (Co-PI). July 2016—June 2020. \$1,534,837 (\$533,964 allocated to the University of Utah).

Student Supervision

Current Students

Sarah Spall, MS. Interface definition language for the kernel.

Scotty Bauer, MS. Fast asynchronous IPC for multicore systems.

Charles Jacobsen, MS. Decomposing the Linux kernel.

Pankaj Kumar, MS. Capability system for Xen.

Abhiram Balasubramanian, MS. Decomposing NVMe subsystem.

Michael Quigley, MS. Composable primitives for asynchronous programming.

Myungho Jung, MS. Capability access control scenarios for virtual machines.

Past Students

Charles Jacobsen, BS. [Lightweight Capability Domains: Decomposing the Linux kernel](#). Summer 2015. Continues as an MS student.

Muktesh Khole, MS. Fast data structures for capability access control and support for composable asynchronous I/O for the kernel. Summer 2015. First employment: Microsoft OS kernel team.

Yathindra Naik. MS Project: [Xen-Cap: A Capability Framework for Xen](#). Summer 2013. Co-supervised with Robert Ricci. First employment: NetApp RAID team.

Nikhil Mishrikoti. MS Project: [Performance Analysis of Virtual Environments](#). Summer 2013. Co-supervised with Robert Ricci. First employment: Cisco.

Publications

Refereed Conference Publications

[Abstractions for Practical Virtual Machine Replay](#). Anton Burtsev, David Johnson, Mike Hibler, Eric Eide,

and John Regehr. In ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE16), April 2016.

Fido: Fast Inter-Virtual-Machine Communication for Enterprise Appliances, Anton Burtsev, Kiran Srinivasan, Prashanth Radhakrishnan, Lakshmi N. Bairavasundaram, Kaladhar Voruganti, and Garth R. Goodson. In USENIX Annual Technical Conference (USENIX ATC'09), June 2009.

Transparent Checkpoints of Closed Distributed Systems in Emulab, Anton Burtsev, Prashanth Radhakrishnan, Mike Hibler, and Jay Lepreau. In Fourth ACM SIGOPS/EuroSys European Conference on Computer Systems (EuroSys'09), Nuremberg, Germany, April 2009.

Refereed Workshop Publications

Lightweight Capability Domains: Towards Decomposing the Linux Kernel. Charles Jacobsen, Muktesh Khole, Sarah Spall, Scotty Bauer, and Anton Burtsev. In SIGOPS Operating Systems Review, Volume 49 Issue 2, December 2015.

Lightweight Capability Domains: Towards Decomposing the Linux Kernel. Charles Jacobsen, Muktesh Khole, Sarah Spall, Scotty Bauer, and Anton Burtsev. In 8th Workshop on Programming Languages and Operating Systems (PLOS 2013), October 2015.

Weir: A Streaming Language for Performance Analysis. Anton Burtsev, Nikhil Mishrikoti, Eric Eide, and Robert Ricci. In ACM SIGOPS Operating Systems Review: Volume 48 Issue 1, January 2014.

Weir: A Streaming Language for Performance Analysis. Anton Burtsev, Nikhil Mishrikoti, Eric Eide, and Robert Ricci. In 7th Workshop on Programming Languages and Operating Systems (PLOS 2013), November 2013.

Selected Posters

Lightweight Capability Domains: Decomposing the Linux Kernel. Charles Jacobsen, Sarah Spall, Muktesh Khole, John Regehr, Anton Burtsev. OSDI, October 2014.

A Replay-based Approach to Performance Analysis, Anton Burtsev, Eric Eide, and John Regehr. OSDI, October 2010.

Aggressive Server Consolidation through Pageable Virtual Machines, Anton Burtsev, Mike Hibler, and Jay Lepreau. OSDI, December 2008.

True Time-Sharing in Emulab through Preemption and Stateful Swapout, Anton Burtsev, Prashanth Radhakrishnan, Mike Hibler, and Jay Lepreau. NSDI, May 2007.

Time Travel for Closed Distributed Systems, Anton Burtsev, Prashanth Radhakrishnan, Mike Hibler, and Jay Lepreau. NSDI, May 2006.

Talks and presentations

Lightweight Capability Domains: Decomposing Commodity Kernels for Security. Samsung Research America, October 2015.

Weir: A Streaming Language for Performance Analysis. PLOS, November 2013.

Fido: Fast Inter-Virtual-Machine Communication for Enterprise Appliances. USENIX Annual Technical Conference, June 2009.

Transparent Checkpoints of Closed Distributed Systems in Emulab. Eurosys, April 2009.

XenTT: Deterministic Analysis in Xen. XenSummit North America 2012, San Diego, CA, 2012.

Manycores: Challenges for OS. Multi-Core Discussion Colloquium, School of Computing, University of Utah, October 2007.

Thesis Documents

Deterministic systems analysis. Anton Burtsev. PhD Thesis. University of Utah, 2013.

Distributed operating system architecture based on distributed shared objects. Anton Burtsev and Leonid Ryzhyk. M.Sc. Thesis, National Technical University of Ukraine “Kyiv Polytechnic Institute”, 2002.

Intelligent software agents. Anton Burtsev and Leonid Ryzhyk. B.Sc. Thesis, National Technical University of Ukraine “Kyiv Polytechnic Institute”, 2000.

Informal Reports

Time-Travel for Closed Distributed Systems, Anton Burtsev and Prashanth Radhakrishnan. Informal report, Flux Research Group, University of Utah, May 2006.

System measurement with the hardware performance counters, Anton Burtsev. Informal class report, University of Utah, May 2006.

Implementation of μ ITRON Embedded Operating System Specification on top of L4 Microkernel Anton Burtsev. Informal report, DiSy: Operating Systems, Embedded and Distributed Systems Research Group, University of New South Wales, Sydney, Australia, December 2004.

Earlier work published in Ukraine (2000-2004)

Architectural design of E1 distributed operating system, Leonid Ryzhyk and Anton Burtsev. System Research and Information Technologies International Scientific and Technical Journal, Kiev, Ukraine, October 2004.

Operating system architecture based on distributed objects, Anton Burtsev, Leonid Ryzhyk, and Yuriy Timoshenko. Scientific Bulletin of NTUU “KPI”, #4, pp.5-12, Kiev, Ukraine, 2002.

Operating system architecture with process migration support, Anton Burtsev, Leonid Ryzhyk. 3rd International Conference on Programming “UkrProg2002”, Kyiv, Ukraine, pp.516-521, 2002.

Teaching Experience

Organizer (with Ryan Stutsman), [Low-Level Systems Reading Group](#), University of Utah, Spring 2016.

Instructor, [Operating Systems](#), mixed undergraduate and graduate class, 130 students, University of Utah, Spring 2014.

Organizer (with Cody Cutler), [Malware Analysis Seminar](#), University of Utah, Summer 2012.

Organizer, [Compilers Reading Group](#), University of Utah, 2011-2012.

Organizer, [Computer Systems Lunch Seminar](#), University of Utah, 2007-2008.

Work Experience

Research Assistant Professor, [School of Computing](#), University of Utah, 2015–present.

Research in the areas of secure operating systems, access control in datacenter and enterprise networks, and fast inter-process communication mechanisms.

Research associate, [Flux Research Group](#), School of Computing, University of Utah, 2012–2015.

Research in the areas of operating systems security, datacenter security, capability access control, low-latency networking, and domain specific languages for performance analysis.

Research associate (part-time), [Flux Research Group](#), School of Computing, University of Utah, 2011–2012.

Research in the areas of deterministic replay, virtual machine introspection, and performance analysis of virtual systems.

Research assistant, [Flux Research Group](#), School of Computing, University of Utah, 2005–2011.
Research in the areas of transparent checkpointing of distributed systems.

Research intern, [Advanced Technology Group](#), NetApp, Inc., 2008–2009.

Microkernelization of the network attached storage stack; design and implementation of the fast virtual machine communication primitives for the Xen virtual machine monitor.

Research intern, [Trustworthy Systems Research Group](#), University of New South Wales, Sydney, Australia, August–November 2004.

Advisors: Gernot Heiser and Ihor Kuz.

Implementation of the μ ITRON real-time embedded operating system on the L4 microkernel.

Software developer (part-time), [WestGate Software Security](#), 1999–2005.

Design and development of software solutions in the area of hardware-based software protection, digital rights management, and organizational access control.

Service

PPoPP'13. External reviewer.

NSDI'13. Shadow committee chair.

SOSP'09. Member of the shadow committee.

IEEE/ACM Transactions on Networking. Reviewer.

Software Artifacts

Weir imperative streaming language for performance analysis, 2013. [Project repository](#).

Deterministic replay infrastructure for the Xen virtualization platform, 2012. [Project repository](#).

Transparent distributed checkpointing system for a network of virtual machines, part of the Emulab software, 2008. [Project repository \(changeset: eccab716bd46\)](#).

E1 distributed operating system, research prototype, 2005. [Project web site](#).

Implementation of the μ ITRON embedded operating system specification on top of the L4 microkernel, 2004. [Source](#).

Skills

Programming languages: C, assembler, C++, Java, Haskell, Scala, SQL, PHP, Unix Shell.

Operating system hacking: Xen hypervisor (9 years) (hypervisor, guest kernels, device drivers, xm/xl control plane, live checkpointing); L4 microkernel (2 years) (core microkernel, operating systems on top of L4, IPC mechanisms); Linux (2 years) (core kernel, device drivers, storage layer, IPC mechanisms); FreeBSD (1 year) (IP firewall, virtual memory management).

Honors, Awards, & Scholarships

ACM Student Grant to attend the SOSP'09 conference, October 2009.

USENIX Student Grant to attend the OSDI'08 conference, December 2008.

USENIX Student Grant to attend the NSDI'08 conference, March 2008.

ACM Student Grant to attend the SOSP'07 conference, October 2007.

USENIX Student Grant to attend the HotOS'07 workshop, April 2007.

USENIX Student Grant to attend the OSDI'06 conference, November 2006.

NICTA International Internship Scholarship, University of New South Wales, August 2004.

MS Diploma with Honors in Applied Mathematics, National Technical University of Ukraine ("Kyiv Polytechnic Institute"), 2002.

BS Diploma with Honors in Applied Mathematics, National Technical University of Ukraine ("Kyiv Polytechnic Institute"), 2000.

Last updated: February 23, 2016