

IRENE Y. ZHANG

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EDUCATION	<p>University of Washington Seattle, WA Ph.D. in Computer Science and Engineering Advisors: Hank Levy and Arvind Krishnamurthy</p> <p>University of Washington Seattle, WA M.S. in Computer Science and Engineering December 2013 Advisors: Hank Levy, Arvind Krishnamurthy, and Steve Gribble Thesis: <i>Simplifying Mobile/Cloud Applications with Sapphire</i></p> <p>Massachusetts Institute of Technology Cambridge, MA M.Eng. in Electrical Engineering and Computer Science June 2009 Advisor: M. Frans Kaashoek Thesis: <i>Efficient File Distribution in a Flexible, Wide-area File System</i></p> <p>Massachusetts Institute of Technology Cambridge, MA S.B. in Computer Science and Engineering June 2008</p>
INTERESTS	Operating systems, distributed systems, virtualization and networking
RESEARCH	<p>Building Consistent Transactions with Inconsistent Replication TAPIR – the Transactional Application Protocol for Inconsistent Replication – provides externally consistent transactions using a replication protocol with <i>no consistency guarantees</i>. Unlike conventional protocols that use Paxos, TAPIR does not require a Paxos leader or coordination between replicas in a shard. Thus, TAPIR can commit a transaction <i>in a single round-trip</i> and eliminate the bottleneck at the Paxos leader.</p> <p>Customizable and Extensible Deployment for Mobile/Cloud Applications Sapphire is a new distributed programming platform providing customizable and extensible deployment of mobile/cloud applications. The key concept is an architecture that supports <i>deployment managers</i>, which solve complex distributed systems tasks, such as code-offloading and caching. Rather than writing distributed systems code, programmers compose a custom deployment to meet their application’s needs.</p> <p>User-controlled Privacy for Mobile/Cloud Applications Agate is a new trusted distributed runtime system that gives users control over how mobile/cloud applications share sensitive user data collected on mobile devices (e.g., photos, GPS location). Agate combines aspects of access control and information flow control to allow applications to share user data in application-specific ways, while enforcing user policies without trusting the application or the application programmer.</p> <p>Arrakis: The Operating System is the Control Plane Arrakis is a new operating system that provides high performance I/O by taking advantage of hardware virtualization technology. Hardware virtualization technologies are designed to eliminate the hypervisor from fast-path I/O operations. Arrakis takes this technology a step further by using it to eliminate the operating system as well, allowing applications to directly access the hardware during normal execution and providing significantly better performance, reliability and customizability.</p> <p>Improving VM Checkpoint Restore Performance With collaborators at VMware, I developed two techniques for improving the performance of restoring checkpointed virtual machines. The first estimates and prefetches the working set of the checkpointed VM on restore, improving the responsiveness of the VM during restore. The second groups memory pages together on disk that are likely to be accessed together, improving disk efficiency during restore.</p>

IN SUBMISSION	<p>I. Zhang, N. K. Sharma, A. Szekeres, D. R. K. Ports, A. Krishnamurthy. <i>Building Consistent Transactions with Inconsistent Replication</i>.</p> <p>A. Szekeres, I. Zhang, I. Ackerman, F. Roesner, D. R. K. Ports, A. Krishnamurthy, H. Levy. <i>User-controlled Privacy: Enforcing Privacy Policies on Mobile/Cloud Applications</i>.</p>
CONFERENCE PUBLICATIONS	<p>I. Zhang, A. Szekeres, D. Van Aken, I. Ackerman, S. D. Gribble, A. Krishnamurthy, H. Levy. <i>Customizable and Extensible Deployment for Mobile/Cloud Applications</i>. In Proc. of OSDI '14.</p> <p>S. Peter, J. Li, D. Woos, I. Zhang, D. R. K. Ports, A. Krishnamurthy, T. Anderson, T. Roscoe. <i>Arrakis: The Operating System is the Control Plane</i>. In Proc. of OSDI '14. Best Paper Award.</p> <p>S. Peter, J. Li, D. Woos, I. Zhang, D. R. K. Ports, T. Anderson, A. Krishnamurthy, M. Zbikowski. <i>Towards High-Performance Application-Level Storage Management</i>. In Proc. of HotStorage '14.</p> <p>I. Zhang, T. Denniston, Y. Baskakov, A. Garthwaite. <i>Optimizing VM Checkpointing for Restore Performance in VMware ESXi</i>. In Proc. of USENIX ATC '13. San Jose, CA. June 2013.</p> <p>I. Zhang, A. Garthwaite, Y. Baskakov, K. C. Barr. <i>Fast Restore of Checkpointed Memory Using Working Set Estimation</i>. In Proc. of VEE '11. Newport Beach, CA. March 2011.</p> <p>D. R. K. Ports, A. Clements, I. Zhang, S. Madden, B. Liskov. <i>Transactional Consistency and Automatic Management in an Application Data Cache</i>. In Proc. of OSDI '10. Vancouver, Canada. October 2010.</p> <p>J. Stribling, Y. Sovran, I. Zhang, X. Pretzer, J. Li, M. F. Kaashoek, R. Morris. <i>Flexible, Wide-Area Storage for Distributed Systems with WheelFS</i>. In Proc. of NSDI '09. Boston, MA. April 2009.</p>
POSTERS & EXTENDED ABSTRACTS	<p>I. Zhang, N. K. Sharma, A. Szekeres, D. R. K. Ports, A. Krishnamurthy. <i>Optimistic, Replicated Two-Phase Commit</i>. Poster at APSys '14. Beijing, China. June 2014.</p> <p>I. Zhang, A. Szekeres, D. Van Aken, I. Ackerman, S. D. Gribble, A. Krishnamurthy, H. Levy. <i>Customizable and Extensible Deployment for Mobile/Cloud Applications</i>. Work-in-Progress talk at SOSP '13. Farmington, PA. November 2013.</p> <p>I. Zhang, A. Garthwaite, Y. Baskakov, K. C. Barr, J. Pool, K. Christopher. <i>Fast Restore of Checkpointed Memory Using Working Set Estimation</i>. Poster at SOSP '09. Big Sky, MT. October 2009.</p> <p>I. Zhang, K. C. Barr. <i>Improving VMware Workstation Restore using Working Set Estimation</i>. Poster at VMworld '08. Las Vegas, NV. September 2008.</p>
PATENTS	<p>US Patent App. 12/559,484. Saving and Restoring State Information for Virtualized Computer Systems. I. Zhang, K. C. Barr, G. Venkitachalam, I. Ahmad, A. Garthwaite, J. Pool.</p> <p>US Patent App. 13/710,185. Method for Saving Virtual Machine State from a Checkpoint File. A. Garthwaite, Y. Baskakov, I. Zhang, K. Christopher, J. Pool.</p> <p>US Patent App. 13/710,215. Method for Restoring Virtual Machine State from a Checkpoint File. A. Garthwaite, Y. Baskakov, I. Zhang, K. Christopher, J. Pool.</p>

HONORS & AWARDS	National Science Board Annual Board Meeting Student Panel	2013
	National Science Foundation Fellowship	2013
	ARCS Foundation Fellowship	2012
	Jeff Dean and Heidi Hopper Endowed Regental Fellowship	2012
	VMware Academic Program Top Intern Project	2008
	CRA Outstanding Undergraduate Award, Honorable Mention	2008
	Northern Telecom/BNR Award for Best Undergrad. Lab Project	2006
SERVICE	UW Conference on Potentially Computer Science (PoCSci) Program Co-chair	2015
	UW Graduate Student Committee	
	Graduate Women's Event Coordinator	2014-2015
	Graduate Visit Days Committee Co-chair	2013-2014
	Graduate Student Mentor	2013-2014
	VMware Women's Outreach and Recruiting	2009-2012
	Eta Kappa Nu EECS Honor Society Officer	2008-2009

TEACHING	Introduction to Operating Systems (CSE 451)	
	Tutor, UW Department of CSE	Fall 2014
	Tutor, UW Department of CSE	Spring 2014
	Tutor, UW Department of CSE	Fall 2013
	The Hardware/Software Interface (CSE 351)	
	Tutor, UW Department of CSE	Winter 2014
	Tutor, UW Department of CSE	Winter 2013
	Operating Systems Engineering (6.828)	
	Teaching Assistant, MIT Department of EECS	Fall 2008
	Intro. to Digital Systems Lab (6.111)	
	Teaching Assistant, MIT Department of EECS	Spring 2008
WORK EXPERIENCE	Computation Structures (6.004)	
	Lab Assistant, MIT Department of EECS	Spring 2007
	Intro. to Computer Science and Programming (6.00)	
	Lab Assistant, MIT Department of EECS	Fall 2006
	VMware, Inc.	Cambridge, MA
	MTS, Virtual Machine Monitor Group	Jan 2010 - Feb 2013
	VMware, Inc.	Cambridge, MA
	R&D Intern, Virtual Machine Monitor Group	Jul - Dec 2009
	VMware, Inc.	Cambridge, MA
	R&D Intern, Core Performance Group	Jun - Aug 2008
	Quickware Engineering and Design	Waltham, MA
	Engineering Intern	Jun - Aug 2007
	Cummins, Inc.	Columbus, IN
	Engineering Intern, Analysis Led Design	Jun - Aug 2005
	Cummins, Inc.	Beijing, China
	International Business Intern	Jun - Jul 2004
	ArvinMeritor, Inc.	Columbus, IN
	Web Development Intern	Aug 2003 - May 2004