

**Present Address**

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RESEARCH INTERESTS	I'm interested in learning about and tackling hard problems by analyzing, designing, building and evaluating software systems. My current research focuses on systems protecting confidentiality and integrity.	
EDUCATION	<p>Ph.D. Candidate co-advised by Peter Druschel & Deepak Garg Max Planck Institute for Software Systems, Saarbruecken, Germany</p> <p>Ph.D. Candidate mentored by Holger Hermanns Saarland University, Graduate School, Saarbruecken, Germany</p> <p>Bachelor of Science in Applied Computer Science Baden-Württemberg Cooperative State University Stuttgart (DHBW Stuttgart) with IBM Germany Thesis: "Distributed Complex Query Processing for Informix Dynamic Server" GPA: 1.5 (scale 1.0 to 5.0), First Class, Top 10%</p> <p>Freie University of Berlin "Mathematic for Computer Scientist I" during Senior High School</p>	<p>2010 – Present</p> <p>2009 – 2010</p> <p>2006 – 2009</p> <p>2004</p>
SKILLS	C, Java, SQL, Distributed & Storage & Operating Systems, Secure System Design, Trusted Computing, SSD/Flash Memory, Processors, Linux, Database Systems	
ACADEMIC EXPERIENCE	<p>Ph.D. Candidate advised by Peter Druschel & Deepak Garg <i>ERIM: Secure and Efficient in-process isolation with Intel Memory Protection keys [arXiv, submitted]</i> Many applications benefit from isolating sensitive data in a secure library including isolating session keys in a web server. In such applications, the overhead of kernel-based or hypervisor-mediated domain switching is prohibitively high. We present ERIM, a novel technique that provides hardware-enforced isolation with low overhead, even at high switching rates (<1% for 100,000 switches per second). The key idea is to combine memory protection keys (MPKs) with binary inspection to prevent circumvention.</p> <p><i>Guardat: a foundation for policy-protected persistent data [EuroSys'15]</i> Designed, built and evaluated Guardat, an architecture that enforces rich data access policies at the storage layer. Users, application developers and system administrators can provide per-file policies to Guardat. Guardat enforces these policies and provides attestations about the state of stored files. With Guardat, the data integrity, confidentiality and access accounting rules for a collection of files can be stated as a single declarative policy. Policy enforcement relies only on the integrity of the Guardat controller and any external policy dependencies; it does not depend on correct software, configuration and operator actions in other parts of a system. A prototype implementation of Guardat shows experimentally that the space and time overhead of making policy checks is low.</p> <p><i>Protecting Data Integrity with Storage Leases [TechReport/Patent]</i> With storage leases we describe a new storage primitive. Data stored under a lease cannot be written for a pre-determined period. During the lease period, online data is protected from corruption due to security breaches, software errors, or accidental data deletion. Storage leases fill an important gap in the spectrum of data protection options because they combine strong integrity for online data with the ability to eventually reclaim storage.</p> <p>Ph.D. Candidate mentored by Holger Hermanns <i>A Verified Dependable Wireless Safety Critical Hard Real-Time Design [WoWMoM'11]</i> Wireless communication, hard real time requirements and safety criticality do not go well together. Our approach combines modeling, design, simulation, implementation and deployment of a small exemplary case that possesses all these features. State-of-the-art verification and simulation means are employed to ensure its proper operation.</p>	<p>2010 – Present</p> <p>2009 - 2010</p>

INDUSTRIAL EXPERIENCE	<p>Research Software Engineering Intern Summer 2014 Microsoft Research, Redmond, WA Research opportunities to overcome performance and flexibility issues with Trusted Platform Module (TPM) Intel's new Software Guard Extension (SGX) instructions. Build and evaluate a prototype implementation. Mentor: Ronald Aigner (eXtreme Computing Group)</p>
INDUSTRIAL EXPERIENCE	<p>Software Engineering Intern/Bachelor Thesis Summer 2009 IBM, Boeblingen, Germany Investigated the possibilities to distribute complex queries to Informix Dynamic Servers (IDS), introduced new query statistics for workload distribution. Mentor: Keshava Murthy (IDS Optimizer Architect).</p> <p>IBM, Austin, Texas, USA Summer 2008 Designed, implemented and optimized a prototype library & framework of dynamic compute kernel fusion for Cell Broadband Engine Processor to reduce the data movement between processor cores and main memory improving performance particularly for chained matrix operations. Mentor: Dean J. Burdick (Multicore Software Architect)</p> <p>IBM, Boeblingen, Germany Summer 2007 Analyzed binary search tree operations on Cell Broadband Engine processor – using parallel programming – increased performance of lookup tree operation by 35%.</p>
PUBLICATIONS	<p><i>PESOS: Policy Enhanced Secure Object Store</i> Robert Krahn, Bohdan Trach, Anjo Vahldiek-Oberwagner, Thomas Knauth, Pramod Bhatotia, Christof Fetzer ACM EuroSys 2018</p> <p><i>ERIM: Secure and Efficient In-process Isolation with Memory Protection Keys</i> Anjo Vahldiek-Oberwagner, Eslam Elnikety, Nuno M. Duarte, Deepak Garg, Peter Druschel arXiv 2018 (under submission)</p> <p><i>Light-Weight Contexts: An OS Abstraction for Safety and Performance</i> James Litton, Anjo Vahldiek-Oberwagner, Eslam Elnikety, Deepak Garg, Bobby Bhattacharjee, Peter Druschel Usenix OSDI 2016</p> <p><i>Thoth: Comprehensive Policy Compliance in Data Retrieval Systems</i> Eslam Elnikety, Aastha Mehta, Anjo Vahldiek-Oberwagner, Deepak Garg, Peter Druschel Usenix Security 2016</p> <p><i>Guardat: A foundation for policy-protected data</i> Anjo Vahldiek-Oberwagner, Eslam Elnikety, Aastha Mehta, Peter Druschel, Deepak Garg, Rodrigo Rodrigues, Johannes Gehrke, Ansley Post ACM EuroSys 2015</p> <p><i>Protecting Data Integrity with Storage Leases</i> Anjo Vahldiek, Eslam Elnikety, Ansley Post, Peter Druschel, Rodrigo Rodrigues Technical Report 2011-08, MPI-SWS, 2011 & granted patent</p> <p><i>A Verified Dependable Wireless Safety Critical Hard Real-Time Design</i> Hernan Baro Graf, Holger Hermanns, Juhi Kulshrestha, Jens Peter, Anjo Vahldiek, Aravind Vasudevan IEEE WoWMoM 2011</p> <p><i>Evaluation of an Optimization for Object Tracking – Feedback-Based Head-Tracking</i> Anjo Vahldiek, Ansgar Schneider, Stefan Schubert, Dirk Reichard Fifth Annual Meeting on Information Technology and Computer Science of the Baden-Wuerttemberg Cooperative State University, 2009</p>

WiP/POSTERS	<i>Thoth: Efficiently enforcing data confidentiality and integrity in large-scale distributed data processing systems</i>	
	Eslam Elnikety, Anjo Vahldiek, Aastha Mehta, Deepak Garg, Peter Druschel ACM SOSP'13 Work in progress	
	<i>Trusted Storage</i>	
	Anjo Vahldiek, Eslam Elnikety, Ansley Post, Peter Druschel, Deepak Garg, Johannes Gehrke, Rodrigo Rodrigues Usenix FAST'12 Work in progress	
Teaching	TA for Distributed Systems	Winter 2014
	TA for Operating Systems	Summer 2011
HONORS	Max Planck Society, PhD Scholarship	2010 - 2016
	Saarland University, Graduate School PhD Scholarship	2009
	IBM International Internship Scholarship	2007
Recent Activities	Co-Develop WelcomeHelp.de Refugee Volunteer Tool	2015
	Student Admission Volunteer MPI-SWS	2012
	General Student Meeting Coordinator MPI-SWS	2010