Anjo Vahldiek-Oberwagner

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D-66123 Saarbruecken, Germany

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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 of persistent and in-memory data.

EDUCATION

Ph.D. Candidate co-advised by Peter Druschel & Deepak Garg — 2010 – Present
Max Planck Institute for Software Systems, Saarbruecken, Germany

Ph.D. Candidate mentored by Holger Hermanns — 2009 – 2010
Saarland University, Graduate School, Saarbruecken, Germany

Bachelor of Science in Applied Computer Science — 2006 – 2009
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%

Freie University of Berlin — 2004
"Mathematic for Computer Scientist I" during Senior High School

SKILLS

C, Java, Distributed & Storage & Operating Systems, Secure System Design, Trusted Computing, SSD/Flash Memory, Linux, Database Systems

ACADEMIC HIGHLIGHTS

Ph.D. Candidate advised by Peter Druschel & Deepak Garg — 2010 – Present

ERIM: Secure, Efficient in-process isolation with Intel Memory Protection keys [arXiv, submitted]

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.

Guardat: Enforcing data policies at the storage layer [EuroSys'15]

In today's systems, policies protecting stored data and mechanisms for their enforcement are spread across many software components, increasing the risk of violation due to bugs, vulnerabilities and misconfigurations. We address this problem. Users, developers and administrators specify file protection policies declaratively, concisely and separate from code, and Guardat enforces these policies by mediating I/O in the storage layer. Thus, policy enforcement relies only on the integrity of the Guardat controller and any external policy dependencies. We show experimentally that the overhead is low.

Protecting Data Integrity with Storage Leases [TechReport/Patent]

Storage leases are a new storage primitive such that 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, because they combine strong integrity for online data with the ability to eventually reclaim storage.

INDUSTRIAL EXPERIENCE

Research Software Engineering Intern — Summer 2014
Microsoft Research, Redmond, WA

Research opportunities to overcome performance and flexibility issues with Trusted Platform Modules (TPM) using Intel's new Software Guard Extension (SGX). Build and evaluate a prototype implementation. Mentor: Ronald Aigner (Principal Research Engineer)

Software Engineering Intern /Bachelor Thesis

IBM, Boeblingen, Germany — Summer 2009

Analyze, design and implement a prototype to distribute complex queries to Informix Dynamic Servers (IDS), introduced new query statistics for workload distribution. Mentor: Keshava Murthy (IDS Optimizer Architect).

IBM, Austin, Texas, USA — Summer 2008

Designed, implemented and optimized a prototype framework for 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)

IBM, Boeblingen, Germany — Summer 2007

Analyzed binary search tree operations on Cell Broadband Engine processor increased performance of lookup tree operation by 35%.

PUBLICATIONS

PESOS: Policy Enhanced Secure Object Store
Robert Krahn, Bohdan Trach, Anjo Vahldiek-Oberwagner, Thomas Knauth, Pramod Bhatotia, Christof Fetzer
ACM EuroSys 2018

ERIM: Secure, Efficient In-process Isolation with Memory Protection Keys
Anjo Vahldiek-Oberwagner, Eslam Elnikety, Nuno O. Duarte, Deepak Garg, Peter Druschel
arXiv 2018 (under submission)

Light-Weight Contexts: An OS Abstraction for Safety and Performance
James Litton, Anjo Vahldiek-Oberwagner, Eslam Elnikety, Deepak Garg, Bobby Bhattacharjee, Peter Druschel
Usenix OSDI 2016

Thoth: Comprehensive Policy Compliance in Data Retrieval Systems
Eslam Elnikety, Aastha Mehta, Anjo Vahldiek-Oberwagner, Deepak Garg, Peter Druschel
Usenix Security 2016

Guardat: Enforcing data policies at the storage layer
Anjo Vahldiek-Oberwagner, Eslam Elnikety, Aastha Mehta, Peter Druschel, Deepak Garg, Rodrigo Rodrigues, Johannes Gehrke, Ansley Post
ACM EuroSys 2015

Protecting Data Integrity with Storage Leases
Anjo Vahldiek, Eslam Elnikety, Ansley Post, Peter Druschel, Rodrigo Rodrigues
Technical Report 2011-08, MPI-SWS, 2011 & **granted patent**

A Verified Dependable Wireless Safety Critical Hard Real-Time Design
Hernan Baro Graf, Holger Hermanns, Juhi Kulshrestha, Jens Peter, Anjo Vahldiek, Aravind Vasudevan
IEEE WoWMoM 2011

Evaluation of an Optimization for Object Tracking – Feedback-Based Head-Tracking
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

WIP/POSTERS

Thoth: Efficiently enforcing data confidentiality and integrity in large-scale distributed data processing systems
Eslam Elnikety, Anjo Vahldiek, Aastha Mehta, Deepak Garg, Peter Druschel
ACM SOSP'13 Work in progress

Trusted Storage
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