



12th Annual Symposium on Future Trends in Service-Oriented Computing

Hasso Plattner Institute
Potsdam | April 26 - 28, 2017

Design IT. Create Knowledge.

Agenda

Wednesday, April 26, 2017 (Doctoral Symposium)

Room: [H.E-51](#) (Main Building)

- 9:30 - 10:00 **Keynote**
Prof. Dr. Melissa Densmore, Senior Lecturer, University of Capetown, South Africa
[Co-Design Across Borders](#)
- 10:00 - 10:15 **Coffee Break**
- 10:15 - 11:55 **Session DS-1**
Martin S. Krejca, PhD Student, Hasso Plattner Institute, Potsdam, Germany
[Estimation of Distribution Algorithms](#)
Ralf Rothenberger, PhD Student, Hasso Plattner Institute, Potsdam, Germany
[Thresholds of Non-Uniform Random k-SAT](#)
Sankalita Mandal, PhD Student, Hasso Plattner Institute, Potsdam, Germany
[Events in BPMN: The Racing Events Dilemma](#)
Toni Mattis, PhD Student, Hasso Plattner Institute, Potsdam, Germany
[Topic Models for Interactive Programming](#)
Thijs Roumen, PhD Student, Hasso Plattner Institute, Potsdam, Germany
[Grafter: Remixing 3D Printed Machines](#)
- 11:55 - 13:00 **Lunch**
- 13:00 - 13:30 **Poster & Ice Cream Session**
- 13:30 - 14:30 **Session DS-2**
Joan Byamugisha, PhD Student, University of Capetown, South Africa
[Ontology Verbalization in Runyankore](#)
Igor Smolyar, PhD Student, Technion, Haifa, Israel
[Eliminating non-uniform DMA using multi-PF I/O devices](#)
Tang Wenda, PhD Student, Nanjing University, China
[A Task Scheduling Method for Energy-Performance Trade-off in Clouds](#)
- 14:30 - 14:45 **Coffee Break**
- 14:45 - 16:05 **Session DS-3**
Amreesh Phokeer, PhD Student, University of Capetown, South Africa
[Towards a decentralized, trust-less end-to-end security architecture for community networks](#)
Lu Hengyang, PhD Student, Nanjing University, China
[Using Recurrent Neural Network for Short Text Topic Discovery](#)
Noam Shalev, PhD Student, Technion, Haifa, Israel
[WatchIT: Who watches your IT Guy](#)
Maya Arbel-Raviv, PhD Student, Technion, Haifa, Israel
[What Really Makes Concurrent Search Trees Tick](#)
- 16:20 **Social Event**
[Walking Tour: Red Berlin Walking City Tour](#)

Thursday, April 27, 2017 (Symposium with Industry & Academia)

Room: **HS 1, HS Foyer** (Lecture Building)

- 9:30 - 9:40 **Opening of the Symposium on Future Trends in Service-Oriented Computing**
Prof. Dr. Felix Naumann, Hasso Plattner Institute, Head of Information Systems Group
Prof. Dr. Andreas Polze, Hasso Plattner Institute, Speaker of the Research School
- 9:40 - 10:00 **Elevator Pitches**
HPI Research School "Service-oriented Systems Engineering", Potsdam, Germany
PhD Students Introduce Their Work
- 10:00 - 10:40 **Keynote**
Dr. Wolfgang Maier, Dir. HW Development IBM R&D Böblingen
Next Gen Computing: The IBM View
- 10:40 - 10:45 **Announcement of 2017 IBM Ph.D. Fellowship Award**
- 10:45 - 11:00 **Coffee Break**
- 11:00 - 12:30 **Session 1** Chair: Prof. Dr. Felix Naumann
Prof. Dr. Olaf Zimmermann, Professor and Institute Partner, Hochschule für Technik, Rapperswil (HSR FHO)
Service Design as a Set of Architectural Decisions: Paradigms, Principles, and Patterns
Prof. Dr. Ziawasch Abedjan, Juniorprofessor, TU Berlin, Big Data Management Group
Data Curation in the Wild: Limits and Challenges
Elazar Raab, PhD Student, Technion, Haifa, Israel
Acceleration of Fine-Grain Task-Based Parallelism
- 12:30 - 13:15 **Lunch**
- 13:15 - 13:45 **Keynote**
Holger Becker, PhD, CSO microfluidic ChipShop GmbH
You know nothing....Technologies for obtaining relevant data in Point-of-care diagnostics and the Life Sciences
- 13:45 - 15:15 **Session 2** Chair: Mirela Alistar
Prof. Dr. Toby Jenkins, Professor of Biophysical Chemistry, University of Bath, Department of Chemistry, Bath, United Kingdom
Development and initial ex-vivo testing of an infection detecting wound dressing
Prof. Dr. Dr. Fabian Theis, Head of Institute of Computational Biology, Group Leader Machine Learning, Helmholtz Zentrum München
Data science and network modeling in biomedicine
Maletšabisa Tšabi Molapo, PhD Student, University of Capetown, South Africa
Designing With Community Health Workers: Towards a Feedback Integrated Multimedia-Learning Platform For Rural Community Health
- 15:15 - 15:30 **Coffee Break**
- 15:30 - 16:30 **Session 3** Chair: Prof. Dr. Andreas Polze
Prof. Håkan Grahn, PhD, Professor, Blekinge Institute of Technology, Sweden
BigData@BTH - Scalable Resource-Efficient Systems for Big Data Analytics
Jan Renz, PhD Student, Hasso Plattner Institute, Potsdam, Germany
The Schul-Cloud project: Using microservices to handle heterogeneous infrastructures in German schools
- 16:30 - 16:45 **Coffee Break**

- 16:45 - 17:45 **Session 4** Chair: Thijs Roumen
 Lena Feinbube, PhD Student, Hasso Plattner Institute, Potsdam, Germany
Software fault injection for the masses
 Alexandra Ion, PhD Student, Hasso Plattner Institute, Potsdam, Germany
Digital Mechanical Metamaterials
- 18:30 - 22:45 **Social Event**
Boat tour to Museum Barberini (boat leaves 18:30 at Griebnitzsee landing)
Welcome reception, guided tour, and dinner at Museum Barberini (starts 19:30)

Friday, April 28, 2017 (Symposium with Industry & Academia)

Room: **HS 1, HS Foyer** (Lecture Building)

- 9:30 - 10:15 **Keynote**
 Prof. Dr. Yoav Etsion, Assistant Professor, Departments of Computer Science and Electrical Engineering, Technion, Haifa, Israel
Breaking Away from von Neumann: A Massively Multithreaded Dataflow Processor
- 10:15 - 10:30 **Coffee Break**
- 10:30 - 11:30 **Session 5** Chair: Prof. Dr. Tobias Friedrich
 Prof. Dr. Dimka Karastoyanova, Associate Professor of Data Science and Business Intelligence, Kühne Logistics University (KLU), Hamburg
Service-based, Collaborative, Dynamic and Complex Systems
 Dr. Peter Ulbrich & Peter Wägemann, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
From Electrons to Scheduling: System Software for Energy-Aware Real-Time Systems
- 11:30 - 11:45 **Coffee Break**
- 11:45 - 12:45 **Session 6** Chair: Prof. Dr. Emmanuel Müller
 Kateryna Kuksenok, PhD, Developer, Chairman Projects, SAP Innovation Center Potsdam
Usability, use, and reuse of software services: a human centered approach to understanding uptake resistance
 Prof. Dr. Chen Zhenyu, Professor, Nanjing University, China
The Future of Crowdsourced Testing
- 12:45 - 13:00 **Concluding Remarks**

Friday, April 28, 2017 (Ethical Principles for Service-Oriented Computing)

Room: **HS 1** (Lecture Building)

- 15:00 - 17:00 **Keynote on Free Software**
 Dr. Richard Stallman, Free Software Foundation
Ethical Principles for Service-Oriented Computing

Hasso Plattner Institute for Digital Engineering

The Hasso Plattner Institute for Digital Engineering in Potsdam is Germany's university excellence center for IT-Systems Engineering. HPI is the only university institution in Germany to offer the Bachelor's and Master's degree in "IT-Systems Engineering" – a practical and engineering-oriented alternative to a conventional computer science study program. Current enrollment is at approximately 500 students. It carries out research noted for its high standard of excellence in its twelve topic areas. Research work is also conducted at the HPI Research School for PhD candidates as well as at its branches in Cape Town, Haifa and Nanjing.

The HPI School of Design Thinking is Europe's first innovation school for university students. It is based on the Stanford d.school model and offers 240 places annually for a supplementary study program. Since 2012 the Hasso Plattner Institute has offered Massive Open Online Courses (MOOCs) at its own interactive platform, openHPI. The courses on IT topics have so far reached more than 140,000 users from over 180 countries. Free via the Internet, learners can access didactically prepared multi-media course materials and learn in close exchange with other course participants through social media.



The Symposium on Future Trends in Service-Oriented Computing

The Symposium on Future Trends in Service-Oriented Computing 2017 is the annual symposium of the HPI Research School and is taking place for the twelfth time. It outlines new trends in the area of Service-Oriented Computing and highlights recent work of select Research School members.

As the HPI Research School is an interdisciplinary undertaking of the HPI research groups, the Symposium on Future Trends in Service-Oriented Computing covers a wide range of topics concerning SOC, which include but are not limited to: cloud computing, software, platform, infrastructure as a service, service description, discovery and composition, service deployment, platform configuration and capacity planning, monitoring, service middleware, service-oriented architectures (SOAs), service management, information as a service, service development and maintenance, novel business models for SOAs, economical implications of web services and SOAs, service science, mobile and peer-to-peer services, data services, quality of service, exception handling, or service reliability and security.

Excellent speakers – both from industry and academia – leaders in their respective field of research, are invited to talk about their latest projects and resulting outcomes.



The HPI Research School

In October 2005, the HPI started its Research School on “Service-Oriented Systems Engineering”, a graduate school based on the model of the DFG (German Research Foundation) “Graduiertenkolleg”.

The Vision of the Research School

Design and implementation of service-oriented architectures impose numerous research questions from the fields of software engineering, system analysis and modeling, adaptability, and application integration. Service-Oriented Systems Engineering represents a symbiosis of best practices in object orientation, component-based development, distributed computing, and business process management. It provides integration of business and IT concerns. Service-Oriented Systems Engineering denotes a current research topic in the field of IT-Systems Engineering with high potential in academic research as well as in industrial application. Supported by an internationally renowned grant, Ph.D. students at our college participate in joint activities such as lectures, seminars, winter schools and workshops.

The Members of the Research School

The professors of the HPI with their research groups are supporting pillars for our Ph.D. school. With its interdisciplinary structure, the research college on Service-Oriented Systems Engineering interconnects the HPI research groups and fosters close and fruitful collaborations.

In context of the Research School, the different groups at HPI work on the following topics:

Human Computer Interaction and Computer Vision as Service (Prof. Dr. Patrick Baudisch), Service-Oriented Geovisualization Systems (Prof. Dr. Jürgen Döllner), Algorithm Engineering for Service-Oriented Systems (Prof. Dr. Tobias Friedrich), Modeling and Verification of Self-Adaptive Service-Oriented Systems (Prof. Dr. Holger Giese), Tools and Methods for Software Engineering in Service-Oriented Systems (Prof. Dr. Robert Hirschfeld), Security Engineering of Service-Based IT-Systems (Prof. Dr. Christoph Meinel), Service-Oriented Knowledge Discovery and Data Mining (Prof. Dr. Emmanuel Müller), Service-Oriented Information Systems (Prof. Dr. Felix Naumann), Evolutionary Transition of Enterprise Applications to Service-Oriented (Prof. Dr. h.c. Hasso Plattner), Operating System Abstractions for Service-Oriented Computing (Prof. Dr. Andreas Polze); and Services Specification, Composition, and Enactment (Prof. Dr. Mathias Weske).

On the website of the Research School, please find latest information about the Ph.D. students, their research interests, joint projects, and events:

<https://hpi.de/en/research/research-school>

The Doctoral Symposium

Over the years the HPI Research School has been expanded to a state in which we are excited to – in addition to our members from **Hasso Plattner Institute Potsdam**, Germany – welcome colleagues from **University of Cape Town (UCT)**, South Africa; the **Technion**, Israel; and **Nanjing University**, China. In order to foster collaboration and information exchange, we organized a Doctoral Symposium, so that Ph.D. students from HPI, UCT, Technion, and NJU will get to know each other both on the social and the academic levels.

The event includes a mix of a social event, poster session, and demo presentations. The poster session that dives into the research topics of the attending Ph.D. students, will follow a more informal pattern: eating ice cream while exploring other people posters and explaining yours!



Social Event: Red Berlin Walking Tour

Experience the stories and monuments that mark East Berlin's Communist days and hear about the city's role in the Cold War. You will be strolling through Berlin's former Soviet Sector, a Cold War battleground and foundation of Communist East Berlin. You will learn about life behind the Iron Curtain, and see how the Stasi, the largest spy network the world has ever seen, kept an entire population under observation. During this tour you will be shown the Embassies of four Cold War Powers, the so-called Ghost stations, the Berlin Wall and the Death Strip, the Berlin Wall Crossing Points, and other places of interest.

Logistics: We depart all together from the main Symposium location at Potsdam Griebnitzsee by S-Bahn train towards Berlin Brandenburg Gate, where we meet our guides. The tour ends in the area of Berlin Alexanderplatz.

Tips: Bring shoes comfortable for long walks.

Straight after the tour, we will have a dinner in the area of Berlin Prenzlauerberg.

The HPI Future SoC Lab

The HPI Future SOC (Service-Oriented Computing) Lab is a cooperation of the Hasso Plattner Institute and the industrial partners EMC, Fujitsu, SAP and Hewlett Packard Enterprise. Its mission is to enable and promote exchange and interaction between the research community and the industrial partners.

The Lab provides researchers with free of charge access to a complete infrastructure of state of the art hard- and software. This infrastructure includes components, which might be too expensive for an ordinary research environment. The offerings address researchers particularly from but not limited to the areas of computer science and business information systems. Main areas of research include cloud computing, parallelization, and In-Memory technologies.

Future SOC Lab Day – Spring 2017

On Tuesday, April 25, 2017, the projects of the previous Future SOC Lab period get a chance to present the results of their research activities. Additionally, selected requesters of new projects can expand their ideas. You are welcome to hand in a project proposal and to apply for the usage of the lab's resources. More information: <https://hpi.de/future-soc-lab>

PROJECT PARTNERS

INDUSTRIAL PARTNERS

Speakers

Opening of the Symposium on Future Trends in Service-Oriented Computing

Felix Naumann studied mathematics, economy, and computer sciences at the University of Technology in Berlin. He completed his PhD thesis on “Quality-driven Query Answering” in 2000. In 2001 and 2002 he worked at the IBM Almaden Research Center on topics of data integration. From 2003 – 2006 he was assistant professor for information integration at the Humboldt-University of Berlin. Since then he holds the chair for information systems at the Hasso Plattner Institute at the University of Potsdam in Germany. He is editor-in-chief of the Information Systems journal; his research interests are in data profiling, data cleansing, and text mining.



Prof. Dr.
Felix Naumann

Head of the HPI Information Systems Group

Prof. Dr. Andreas Polze is the Operating Systems and Middleware Professor at the Hasso Plattner Institute at University Potsdam, Germany. He is also the speaker of the HPI Research School and member of the steering committee of HPI’s Future SOC Lab. Andreas received a doctoral degree from Freie University Berlin, Germany, in 1994 and a habilitation degree from Humboldt University Berlin in 2001, both in Computer Science. At HPI, his research focuses on architectures of operating systems, on component-based middleware, as well as on predictable distributed and cloud computing. Andreas Polze was visiting scientist with the Dynamic Systems Unit at Software Engineering Institute, at Carnegie Mellon University, Pittsburgh, USA, where he worked on real-time computing on standard middleware (CORBA) and with the Real-Time Systems Laboratory at University of Illinois, Urbana-Champaign. Current research interests include Predictable Service Computing, Adaptive System Configuration, and End-to-End Service Availability for standard middleware platforms. Together with Charité, GETEMED, and Deutsche Telekom, he has run the Fontane telemedicine project. Joint research with SAP has investigated porting HANA to new processor architectures.



Prof. Dr.
Andreas Polze

Speaker of the HPI Research School

Speakers



Prof. Dr.
Melissa Densmore

Senior Lecturer, University of
Capetown, South Africa

Co-Design Across Borders

Co-design as an approach suggests that are specific creativities that emerge from having trained designers work with people not trained in design. In a socio-economic development context, this becomes especially important, as our stakeholders and target users have specific knowledge necessary to the ongoing sustainability and relevance of designs. However, the greatly varied contexts of such work present distinctive challenges related to culture, power, languages and other factors. In this talk I explore several cases of co-design, paying special attention the methods, tools and values associated with the application of co-design across geographic, cultural and many other borders.

Densmore's research examines the ways in people choose and use information technologies, especially new information technologies. Prior work includes an ethnography of technology adoption in an NGO program in Uganda, a delay-tolerant tele-consultation system for doctors in Ghana and contributions to infrastructure for the Aravind Eye Hospital video-consultation network. Recipient of the 2008 Yamashita Foundations for Change Prize, she has been doing ethnographic fieldwork, systems design, and deployments in Ghana, India, Mexico, Rwanda, and Uganda since 2004. She completed her PhD at University of California, Berkeley in Information Management and Systems, has an MSc in Data Communications, Networks and Distributed Systems from University College London, and holds a BA in Computer Science from Cornell University.

Estimation of Distribution Algorithms

Evolutionary algorithms (EAs) are optimization techniques inspired by nature. They are a popular choice if the problem at hand is, for example, noisy or highly complex and cannot be well formalized but the quality of a single solution can be easily measured. Typically, EAs maintain a set of samples from the solution space, which is iteratively updated, keeping better solutions and discarding bad ones. An alternative and more direct approach that is also commonly used is to not store samples but a probability distribution over the search space that generates these samples. Such algorithms are called estimation of distribution algorithms (EDAs). In practice, EDAs are widely applied and perform very well. However, theoretical results on EDAs explaining this success are very scarce so far. We introduce an EDA framework we proposed, which subsumes many EDAs used for discrete domains, and we present our theoretical results for this framework. This includes robustness of EDAs to noise, restrictions on the way an EDA can update its distribution, and lower bounds of certain algorithms. We end by giving an outlook on how we want to extend our research.



Martin S. Krejca

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Martin S. Krejca received his B.S. and M.S. degrees in computer science from the University of Jena, Jena, Germany, in 2012 and 2014, respectively. He is currently pursuing the Ph.D. degree with the Algorithm Engineering Group at the Hasso Plattner Institute, Potsdam, Germany. His current research interests include the theoretical analysis of evolutionary algorithms, especially the analysis of estimation of distribution algorithms.



Ralf Rothenberger

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Thresholds of Non-Uniform Random k -SAT

Propositional satisfiability (SAT), the problem of deciding if a logical formula consisting of Boolean variables is satisfiable, is one of the most fundamental problems in computer science. Its worst-case hardness lies at the core of computational complexity theory, and the average-case analysis of SAT has triggered the development of sophisticated rigorous and non-rigorous techniques for analyzing random structures.

Despite a long line of research and substantial progress, nearly all theoretical work on random SAT assumes a uniform distribution on the variables. In contrast, real-world instances often exhibit large fluctuations in variable occurrence. This motivates us to study non-uniform random k -SAT. In this model, a formula is formed by drawing m clauses independently at random, while in each clause k out of n variables are drawn independently at random without repetition according to some arbitrary probability distribution.

In the context of non-uniform random k -SAT, we study the satisfiability threshold, i.e., the number of randomly drawn clauses at which random formulas go from asymptotically almost surely satisfiable to asymptotically almost surely unsatisfiable. Such a threshold is called sharp if it approaches a step function as n increases.

We derive sufficient conditions on the variable-probability distribution for the threshold to be sharp. This work generalizes a result by Friedgut from 1999.

Ralf Rothenberger received his B.S. and M.S. degrees in computer science from the Technical University of Ilmenau, Ilmenau, Germany, in 2010 and 2012, respectively. He is currently pursuing the Ph.D. degree with the Algorithm Engineering Group at the Hasso Plattner Institute, Potsdam, Germany. His research interests include random graphs and random satisfiability, especially analysis of scale-free structures and phase transitions.

Events in BPMN: The Racing Events Dilemma

Today, business process management is a key for companies to represent their operations using business process models. These business processes are executable using process engines. The process engines can produce and consume events for the completion of the processes. However, to receive the external events, we must rely on outer world sources such as a weather API, a traffic agency, an email from a different organization etc. While the digital world makes these message exchanges very convenient, there might still be some latency between the generation of an event and the detection of that event in a receiving process. This latency between the occurrence time and detection time of an event can cause a dilemma of choosing among the alternative paths triggered by the racing events constructs (e.g., boundary event or event-based gateway) in Business Process Model and Notation (BPMN). The dilemma might even lead to incorrect execution of a process. Though the problem remains as a general issue of distributed setup, some measures can be applied to mitigate its frequency and consequences from the aspect of business process management.



Sankalita Mandal

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Sankalita is a PhD student in the Business Process Technology Group at Hasso Plattner Institute, Potsdam since March 2015. After completing her Bachelor studies from Kolkata, India, she did Masters in Computer Science from TU Kaiserslautern. Right now, she is focused on using events for implementing and improving business processes.



Toni Mattis

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Topic Models for Interactive Programming

When programmers are faced with an unknown code base, much time is spent searching for clues suggesting where and how certain concepts are implemented, especially if documentation is insufficient. Lexical information, notably class and method names, helps programmers generate hypotheses on how responsibilities are distributed throughout code. The discipline of natural language processing has developed automated techniques, such as topic models, to mine relationships between abstract concepts and text in a corpus of documents. We use these techniques as a starting point to recover concepts and their respective keywords from code. This results in a map of where each concept is being used within the program. Since many programmers value interactive programming tools, including live debuggers, run-time inspection, or evaluation of code snippets inside the current execution context, we extend topic models to include run-time data alongside lexical features and extend the concept map to live data and interactions. The resulting model can be used to visualize, label, or recommend code and live objects based on topics. Additionally, it allows to identify design defects, such as poor modularity or ambiguous naming.

Toni Mattis is a doctoral researcher in the Software Architecture Group led by Prof. Dr. Robert Hirschfeld at HPI Potsdam. His research interests span interactive and live programming environments, program comprehension, software modularity, and the usage of machine learning in programming tools.

Grafter: Remixing 3D Printed Machines

Creating new objects by recombining models found in hobbyist repositories has been referred to as “remixing”. Several software systems support users in remixing decorative objects. In this paper, we explore how to support users in remixing objects that perform mechanical functions, aka machines. Our interactive system grafter allows users to extract mechanical elements from multiple parent models and recombine them into new machines. Grafter’s main contribution is its particular approach to remixing machines, which we call mechanism-based remixing. While our survey shows that makers tend to remix machines by recombining parts, we found this best practice to work poorly. The reason is that it commonly puts axles made by one maker into bearings made by another maker or meshes gears by one maker with gears by another maker; such re-combinations, however, require long series of tweaks and test-print until they fit. Grafter avoids this by instead affording the reuse of groups of elements that already work together, here axles and their bearings or pairs of gears—also known as “mechanisms”. This way, grafter preserves the mechanical properties of the remixed models and thus allows users to remix quickly and without tweaking.



Thijs Roumen

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Thijs Roumen has been a PhD student at the Hasso Plattner Institute for the last 2,5 years under supervision of Prof. Dr. P. Baudisch (Human Computer Interaction). He has a strong interest in digital fabrication and ways to use this technology. He has been involved in various projects and currently is focused on ways to make it easier to fabricate and design functional mechanisms



Joan Byamugisha

PhD Student, University of
Capetown, South Africa

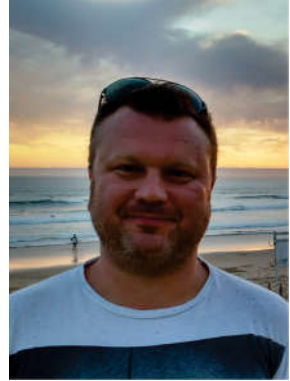
Ontology Verbalization in Runyankore

Natural Language Generation (NLG) is a growing field in computational linguistics and artificial intelligence. It has been widely applied to provide understandable information to end-users commonly in the areas of weather explanations, train schedule announcements, and personalized health information. However, the most widely applicable NLG technique-templates, where information is entered into predetermined slots-is inapplicable to Bantu languages, due to their characteristic agglutinative structure. We present here the work done to develop an NLG system for Runyankore, a Bantu language indigenous to Uganda, by applying the grammar engine NLG technique.

Joan Byamugisha is a PhD student in the Computer Science department at the University of Cape Town, South Africa. She is supervised by Dr. Maria Keet and Dr. Brian DeRenzi. She has a BSc in Computer Science and Economics from Uganda Martyrs University, Uganda, and an MSc in Software Engineering from De Montfort University, UK. Her research is in the area of Natural Language Generation (NLG) for Bantu languages, specifically, ontology verbalization in Runyankore (a Bantu language indigenous to Uganda).

Eliminating non-uniform DMA using multi-PF I/O devices

An I/O device is connected to memory through a single CPU, even if residing in a multi-CPU system. Therefore, nonuniform memory access (NUMA) activity hampers performance not only because cores address remote memory modules but also because I/O devices do the same via nonuniform DMA (NUDMA). Avoiding NUDMA penalties thus necessitates keeping I/O threads local to devices and potentially installing a different device for each CPU, complicating the programming model, increasing price, and causing inefficient resource utilization. We contend that NUDMA problems are inherently easier than NUMA problems, and that they can and should be resolved. We propose the IOctopus design, which provides devices with uniform access to all the memory in the system and thereby simplifies software, reduces hardware costs, and optimizes performance. We believe that IOctopus will allow systems to keep existing OS APIs in tact, while requiring only modest modifications to drivers and firmware of I/O devices.



Igor Smolyar

PhD Student, Technion,
Haifa, Israel

Igor Smolyar is a Computer Science PhD student at Technion—Israel Institute of Technology under the supervision of Professor Dan Tsafir and Professor Roy Friedman. His research interests include virtualization and cloud computing, practical aspects of operating systems, hardware-software interfaces, and system security.



Tang Wenda

PhD Student, Nanjing
University, China

A Task Scheduling Method for Energy-Performance Trade-off in Clouds

Energy consumption is an increasingly important issue for profit-driven cloud. Meanwhile, meeting users' expected response time is crucial for the real-time tasks. However, minimizing energy consumption may delay response time during task scheduling. Unfortunately, existing scheduling algorithms remain limit in balancing energy-saving and performance in elastic cloud environment. In view of this challenge, a task scheduling method for trade-off between energy and performance is proposed. Firstly, the energy-aware task scheduling problem in clouds is modeled by incorporating the virtualization technology. Then, an energy-aware resource provisioning algorithm is developed for generating available allocation plans for real time task by exploiting the elasticity of virtual resources. Finally, an energy-performance trade-off scheduling algorithm is designed for selecting final solution based on multi-objective optimization.

Wenda Tang received his B.S. degree in Software Engineering and M.S. degree in Computer Software and Theory focusing on computer networking from the Xidian University, China, in 2013 and 2016, respectively. He is a Ph.D. student in the Department of Computer Science and Technology of Nanjing University, China. His current research interests are in the area of parallel and distributed computing, network synchronization algorithm, real-time data stream processing and cloud computing, specifically on the mobile cloud computing.

Towards a decentralized, trust-less end-to-end security architecture for community networks

Establishing trust in an unregulated, decentralized, peer-to-peer network is a challenging problem as this is no central coordinating, trusted entity. Blockchain technologies are gaining much momentum in the domain of decentralized and trust-less applications. This project proposes to investigate how a blockchain-based security architecture can help in satisfying the different security requirements of a community network with regards to data transfer, service provisioning and data storage. This work would investigate the security principle of smart contract and its applications to security issues in edge cloud computing. The outcome of the research work will be a implementation of an end-to-end security framework based on blockchain technologies, which will be tested in an application scenario of edge caching and content delivery.



Amreesh Phokeer

PhD Student, University of
Capetown, South Africa

Amreesh's research interests are in network security and performance measurement. He is currently looking into how a blockchain-based security framework can provide a decentralised and trust-less security framework in community networks. Before joining UCT, he worked as a Research Engineer at the African Network Information Centre (AFRINIC), where he led the implementation of several security projects. In 2009, he worked as a Guest Researcher at the National Institute of Standards and Technology (NIST) in the field of Computational Biology. He graduated from an MSc in Information Security from Royal Holloway, University of London in 2013 and has an M.Eng in Computer Science from University of Lorraine, France, which he obtained in 2008.



Lu Hengyang

PhD Student, Nanjing
University, China

Using Recurrent Neural Network for Short Text Topic Discovery

In our daily life, short texts have been everywhere especially since the emergence of social network. There are countless short texts in online media like twitter, online Q&A sites and so on. Discovering topics is quite valuable in various application domains such as content recommendation and text characterization. Traditional topic models like LDA are widely applied for sorts of tasks, but when it comes to short text scenario, these models may get stuck due to the lack of words. Recently, a popular model named BTM uses word co-occurrence relationship to solve the sparsity problem and is proved effectively. However, both BTM and extended models ignore the inside relationship between words. From our perspectives, more related words should appear in the same topic. Based on this idea, we propose a model named RIBS-TM which makes use of RNN for relationship learning and IDF for filtering high-frequency words. Experiments on two real-world short text datasets show great utility of our model.

I received my B.Sc. degree in Computer Science and Technology from Nanjing University in 2014. Currently I am a member of IIP Group, led by Prof. XIE Junyuan and working toward the Ph.D. degree in the Department of Computer Science and Technology in Nanjing University. My research interests include text mining and machine learning.

WatchIT: Who watches your IT Guy

System administrators have unlimited access to system resources. As the Snowden case highlighted, these permissions can be exploited to steal valuable personal, classified, or commercial data. This problem is exacerbated when a third party administers the system - for example, a bank outsourcing its IT would not wish to allow administrators to access actual data.

In this work, we propose a strategy that increases the organizational information security by constraining IT personnel's view of the system and monitoring their actions. To this end, we introduce the abstraction of perforated containers - while regular Linux containers are too restrictive to be used by system administrators, by "punching holes" in them, we strike a balance between information security and required administrative needs. Our system predicts which system resources should be accessible for handling each IT issue, creates a perforated container with the corresponding isolation, and deploys it as needed for fixing the problem.

Under this approach, the system administrator retains his superuser privileges, while he can only operate within the container limits. We further provide means for the administrator to bypass the isolation, and perform operations beyond her boundaries. However, such operations are monitored and logged for later analysis and anomaly detection.

We provide a proof-of-concept implementation of our strategy, along with a case study on an IT database of a big company.



Noam Shalev

PhD Student, Technion,
Haifa, Israel

Noam Shalev is a PhD candidate at the Technion EE faculty, Israel. He was accepted to the prestigious PhD direct course, after graduating his Bachelor's degree Summa Cum Laude. His main interests are Operating Systems, Distributed Systems and Machine Learning. His record includes several paper publications in top tier venues and joint works with leading research groups in Microsoft Research and IBM Research. In the HPI Symposium on Future Trends in Service-Oriented Computing he will be presenting his project 'WatchIT', which is already being deployed in leading industry companies.



Maya Arbel-Raviv

PhD Student, Technion,
Haifa, Israel

What Really Makes Concurrent Search Trees Tick

Modern concurrent binary search trees (BSTs) obtain high performance by using read-only tree traversals, with synchronization performed only at the end of a traversal. We thus posit that the following traversals dominate (TD) principle should hold: a concurrent BST's performance is determined mainly by the performance of its traversals. Existing research, however, contradicts the TD principle, with significant performance differences reported for BSTs that implement traversals similarly, even on read-mostly workloads. This talk shows that the TD principle does hold, by uncovering and addressing the factors obscuring it. We further obtain new algorithmic insights about concurrent BSTs by applying it.

Maya Arbel-Raviv is a PhD student in the Computer Science department at the Technion, under the advisement of Prof. Hagit Attiya and Dr. Adam Morrison. Her research interest lie in the area of shared memory synchronization and concurrent data structures.

Speakers

PhD Students Introduce Their Work: Elevator Pitches

HPI Research School “Service-Oriented Systems Engineering”, Potsdam

Ahmad Samiei:	Product Matching
Andreas Grapentin:	Rack Scale Architectures: Leveraging TupleSpaces for Scalability
Ankit Chauhan:	Analysis of Algorithms Using Structural Properties of Real-World Networks
Anton Tsitsulin:	Graph Representation Learning
Christoph Matthies:	Emotions During Code
Davide Mottin:	Graph Exploration
Ekaterina Bazhenova:	Discovery of Decision Models Complementary to Process Models
Erik Scharwächter:	Anomaly Detection in Massive Time Series Collections
Francesco Quinzan:	Bio-inspired Randomized Search Heuristics
Johannes Wolf:	Mobile Mapping Point Cloud Analysis
Jossekin Beilharz:	A Middleware for the Internet of Things
Julian Risch:	Comparative Text Mining
Lan Jiang:	Keys Discovery from the Metadata
Mina Rezaei:	Instance Level Segmentation for Brain Lesions
Mirela Alistair:	Automatic Design of Biochips
Oliver Schneider:	Haptic Experience Design
Robert Kovács:	Truss Mechanisms: Creating Large-Scale Moving Truss Structures
Sona Ghahremani:	Utility-driven Modularized MAPE-K Loop Architectures For Self-adaptive Systems
Sören Discher:	Scalable Visualization of Massive 3D Point Clouds
Stefan Ramson:	Active Expressions: Basic Building Blocks for Reactive Programming
Thomas Brand:	Runtime Data-driven Software Evolution in Enterprise Software Ecosystems
Tobias Bleifuß:	Change Exploration: Analyzing Dynamic Data
Vladeta Stojanovic:	Interactive Visualization for Facility Management

The HPI Research School “Service-Oriented Systems Engineering” focuses on the design and implementation of service-based architectures. These architectures target various research problems from software engineering, system modeling and analysis, as well as the adaptability and integration of applications. It represents a synthesis of best practices in object orientation, component-based development, distributed computing, and business process management. The topics of the HPI Research School thus have a unique potential not only in terms of academic research but also in industrial application.



Dr. Wolfgang Maier

Dir. HW Development IBM
R&D Böblingen

Next Gen Computing: The IBM View

With the on-going digitisation of the global industries new emerging topics like AI, IoT, Robotics etc. become more and more attention. These areas gain momentum quickly, which is proven by aspects like number of new applications, media hype, scientific publications but also by taking remarkable revenue share from the existing IT budgets. While there is a mature ecosystem build around CMOS based compute systems, which first and foremost is utilizing implementations of the incumbent von Neumann architecture, it is questionable if the assumption that advancing with the conventional technology strides is sufficient to face the challenges which are implied by these new type of applications. One reason for doubt is the insight that after 50 years of solid prediction, Moore's law is slowing down rapidly. Less famous, but going hand in hand with Moore's law is Dennard's law, which stood for a similar equation stating that power consumption of semiconductor chips won't be a limiting factor. Also efficiency of parallelised systems is limited with growing numbers of resources. Applications in AI, IoT etc. mainly differ from classical applications. While classical applications usually have a stronger focus on structured data the newer set of applications is denoted by a much higher affinity towards so called unstructured data. As a consequence it would be beneficial if alternative approaches would be applicable.

There are promising new compute paradigms which made huge steps forward recently. Particularly cognitive systems and quantum computing are standing out as examples. Both approaches require a distinct understanding of their attributes in order to evolve their capabilities in the best way. The presentation will refelct on the current situation and give insights into the evolution of this new technologies.

Wolfgang Maier is Director of Hardware Development at the german sited IBM R&D lab close to Stuttgart. His career with IBM started as design engineer for Mainframe Firmware in 1996 with focus on the employment of industry standard IO technologies in IBM high end servers. During his international assignment in Austin (Tx) he directed the first implementation of the Infiniband technology for the IBM POWER line. After his return to germany he headed the development of IO hardware as well as mainframe and POWER CMOS processors emphasizing workload optimization and power efficiency. He is also leading the european business development of the OpenPower foundation. His current focus in innovation is on Cognitive Systems and Quantum Computing. Wolfgang Maier obtained his PhD in Laserphysics from the University of Tuebingen in 1996. He enjoys to spend his spare time with his family, loves skiing and motorbikes.

Service Design as a Set of Architectural Decisions: Paradigms, Principles, and Patterns



**Prof. Dr.
Olaf Zimmermann**

Professor and Institute
Partner, Hochschule für
Technik, Rapperswil
(HSR FHO)

Service-oriented computing is a key enabler for major trends such as cloud computing, Internet of things, and digital transformation. About a decade after the first wave of Service-Oriented Architecture (SOA) patterns and platforms reached a plateau of maturity and market saturation, microservices are currently emerging as a state-of-the-art implementation approach to SOA that leverages recent advances in software engineering and agile practices such as domain-driven design, continuous delivery and deployment automation. Due to the invariant intricacies and fallacies pertaining to distributed systems, service interface design remains a wicked problem irrespective of currently trending service decomposition paradigms and other market dynamics. Hence, service designers and API managers seek design guidance and reusable architectural knowledge for this problem domain. This presentation first recapitulates selected SOA principles and establishes seven corresponding microservices tenets. It then reports on the ongoing compilation of a service design pattern catalog that complements previous such approaches, and discusses related tool support. It concludes with a reflection on open research challenges and problems.

Olaf Zimmermann is a professor and institute partner at the University of Applied Sciences in Rapperswil, Switzerland (HSR FHO). His areas of interest include Web-based integration architectures, SOA and cloud design, and architectural knowledge management. Previously, Olaf was a senior principal scientist at ABB and a research staff member at IBM Research. From 1999-2005, Zimmermann worked as a solution architect, helping international clients in multiple industries build enterprise-scale SOA/Web services and JEE solutions on professional services projects. Zimmermann is a certified Distinguished (Chief/Lead) IT Architect and a member of the editorial board of IEEE Software. He is a regular conference speaker and a book author who for instance contributed to the first IBM Redbooks on Eclipse and Web services.



Prof. Dr.
Ziawasch Abedjan

Juniorprofessor, TU Berlin,
Big Data Management Group

Data Curation in the Wild: Limits and Challenges

According to the recent surveys, data scientists spend most of their time collecting, curating, and organizing data from heterogeneous and often dirty sources. In this process, datasets have to be cleaned from errors, equal entities from different data sources have to be matched, and data values have to be transformed into a common desired representation. In this talk, I will share our experience in using data curation systems in the wild. I will first report on our recent findings from testing state-of-the-art data cleaning systems on real world data and point out the limitations of current cleaning algorithms. Then, I will discuss the difficult task of data transformation discovery by presenting our data transformation discovery system, DataXFormer. Finally, I will shed light on our vision for future data curation systems and on how we intend to overcome the current limitations.

Ziawasch Abedjan is an assistant professor and the head of the "Big Data Management" (BigDaMa) Group at the TU Berlin in Germany and a Principal Investigator in the Berlin Big Data Center. Prior to that, Ziawasch Abedjan was a postdoctoral associate at MIT CSAIL where he worked on various data integration topics. He received his PhD from the Hasso Plattner Institute in Potsdam, Germany. His current research focuses on data integration and data profiling. He is the recipient of the 2014 CIKM Best Student Paper Award, the 2015 SIGMOD Best Demonstration Award, and the 2014 Best Dissertation Award from the University of Potsdam.

Acceleration of Fine-Grain Task-Based Parallelism

Computational workloads require scaling of computing resources. However, increasing the number of cores in a computer system reduces the volume of tasks available for each core. In addition, many modern applications use irregular data structures which limit the tasks "horizon". While such applications may have many independent tasks, the tasks are produced gradually as the data processing progress. In such cases there is limited parallelism and the available tasks require short computation time. Unfortunately, the overhead of dispatching such tasks diminish the parallelism speedup gains. Offloading to accelerators takes longer than the parallel execution speedup, and dispatching of such tasks to thread pools of general purpose processors takes longer than the task execution time. Under these conditions, applications suffer from limited strong scaling which affects the user experience as expressed by request-response latency. To address this problem, in our study we wish to extend general purpose processor architecture to efficiently execute narrow parallelism of fine-grain tasks. We suggest processor mechanisms that can address this problem and enhance strong scaling as well as acceleration of irregular data structures processing.



Elazar Raab

PhD Student, Technion,
Haifa, Israel

Elazar Raab is a student in the PhD. program of the Faculty of Electrical Engineering at Technion, Haifa, Israel. He is conducting his research as part of the research group of Prof. Yoav Etsion at the Technion Computer Engineering (TCE) center. His research focus on programming model and advanced computer architecture for heterogeneous systems. Elazar received his Bsc. (Cum Laude) and MSc. (Summa Cum Laude) in 1997 and 2000, respectively - both from the Faculty of Electrical Engineering at Technion. He has almost 15 years of professional experience as a software architect and a system engineer in several Israeli high-tech companies in the fields of high-speed networking, digital cameras and embedded systems security.



Holger Becker, PhD

CSO microfluidic ChipShop
GmbH

You know nothing...Technologies for obtaining relevant data in Point-of-care diagnostics and the Life Sciences

The life sciences and diagnostics currently undergo a development similar to electronics 60 years ago. The need to obtain better information faster and ideally generated at the point of interest, e.g. at the patient's bedside, the doctor's office or a remote landfill site drives the technical development, with miniaturization and fully functional integration being the key performance factors. The key enabling technology behind this development is microfluidics a.k.a. lab-on-a-chip technology. Being introduced conceptually in academia more than 25 years ago, it now has reached a level of maturity where it actually can fulfill many of the promises made 25 years ago and has therefore started to generate large industrial impact and has become an integral part of practically any new product development in diagnostics and the life sciences. This talk will review the basic principles and gives an overview on application areas and key technologies. I will discuss the current trends in this field such as mobile diagnostics and highlight the technological challenges ahead.

Holger Becker is co-founder and CSO of microfluidic ChipShop. He has physics degrees from the University of Western Australia and the University of Heidelberg (PhD 1995), followed by a postdoc at Imperial College. In 1998 he joined Jenoptik Mikrotechnik. Since then, he founded several companies in the field of microsystem technologies in medicine and the life sciences, for which he received various awards, most notably a nomination for the "Deutscher Gründerpreis". He led the Industry Group of the German Physical Society and serves on the Advisory Board of "Lab-on-a-Chip", the Editorial Boards of "Microelectronic Engineering" and "Micro and Nanosystems" as well as on the Board of Trustees of "Physik Journal". In 2014, he became Fellow of The Royal Society of Chemistry.

Development and initial ex-vivo testing of an infection detecting wound dressing

The early detection of wound infection is of increasing clinical and scientific interest, especially with the increase in antimicrobial resistant bacteria and concern about the absence of new antibiotics in the development pipeline. The team at the University of Bath and the Bristol Royal Hospital for Children have developed a prototype wound dressing which changes colour when a wound becomes critically colonized with *Staphylococcus aureus* and / or *Pseudomonas aeruginosa*.

The dressing consists of an array of hydrogel wells containing a patented formulation of hollow spheres (diameter 200 nm) comprised of phospholipids and fatty acids and encapsulating a fluorescent dye. Toxins released by infective bacteria permeabilise the fatty acid / phospholipid membranes of the spheres, releasing the dye which becomes visible on release and dilution in the surrounding hydrogel. The project has reached a phase where patient samples are being tested on the dressings: wound dressings are removed from patient's bacteria removed and cultured on burned porcine skin. Once the bacteria have grown, dressings are placed on top and the dressing response measured.

In this talk I will describe both the underpinning science of how our dressing works, its response to bacteria and the development of an ex-vivo wound model; our clinical study and the future development plan including my early idea to potentially integrate the dressing result with smartphone technology to provide a more objective measure of dressing switch on in the future.

Professor Toby Jenkins is Professor of Biophysical Chemistry at the University of Bath since his appointment as a lecturer in 2000. Prior to coming to Bath he was an Alexander-von-Humboldt fellow at the Max-Planck-Institut für Polymerforschung in Mainz. His research interest is in developing novel materials for both detecting and treating bacterial infection with particular focus on wound and bladder (catheter associated) infections. He is Principal Investigator (PI) on the Medical Research Council funded programme, Smartwound, which is funding both the current development phase. He has been UK PI on two large EC-FP7 grants, EMBEK1 and Bacteriosafe within which the fundamental research for the current programme was undertaken.



Prof. Dr. Toby Jenkins

Professor of Biophysical
Chemistry, University of Bath,
Department of Chemistry,
Bath, United Kingdom



**Prof. Dr. Dr.
Fabian Theis**

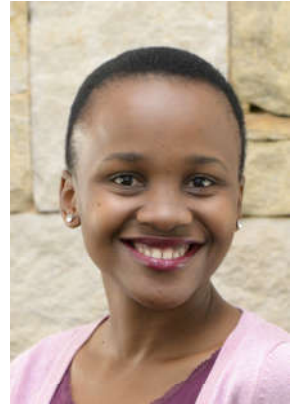
Head of Institute of
Computational Biology, Group
Leader Machine Learning,
Helmholtz Zentrum München

Data science and network modeling in biomedicine

In modern high-throughput biomedicine, large and complex data sets are being generated, in particular from the 'omics and imaging fields. The analysis and integration of these data sets is daunting but crucial, not only for research but also for envisioned clinical use e.g. for precision medicine. Big data is a challenge both for infrastructure as well as for analysis. In this talk I will focus on the latter, showing three examples for data-based modeling on different scales, from machine learning on transcriptomics data to network analyses of metabolite expressions to detailed but large-scale mechanistic signaling models.

Fabian Theis received PhD degrees in Physics and Computer Science in 2002 and 2003, respectively. After working as postdoc at Regensburg, Tokyo and Tallahassee, he took up a position as Bernstein fellow at the Max-Planck Institute for Dynamics and Self-Organisation at Göttingen. He later joined the Helmholtz Zentrum Munich, first as group leader and since 2013 as director of the Institute of Computational Biology; he is also full professor for Biomathematics at the Department of Mathematics of the Technical University of Munich. His research interests include machine learning applied to biological questions, in particular for modeling single cell heterogeneities, and multi-omics data integration in the context of systems medicine.

Designing With Community Health Workers: Towards a Feedback Integrated Multimedia-Learning Platform For Rural Community Health



**Maletšabisa Tšabi
Molapo**

PhD Student, University of
Capetown, South Africa

There continues to be an alarming number of preventable deaths and ailments in rural areas of sub-Saharan Africa. The problem is complex and multifaceted, but one primary cause is limited health knowledge. Many people fail to prevent infection and manage their ailments with low-cost or freely available treatments because they are not aware of, or fail to understand correct healthcare practices. In the mobile health education project discussed in this talk, we explored ways to enable health education in rural communities using mobile multimedia. We investigated how to best co-design, with Community Health Workers in these areas, a feedback mechanism atop the basic health education model, enabling their voices in the design process and in the feedback mechanism itself. This talk chronicles this inclusive design and research process, a 30-month study that spanned three sub-studies: an 18 months' process to co-design the feedback mechanism with CHWs, a 12 months' deployment study of the feedback mechanism, and overlapping with the feedback deployment study, a 17 months' study looking at the consumption patterns of the educational videos.

Maletsabisa Molapo is completing a PhD in Computer Science at the University of Cape Town. Her research interests are in ICT4D, Data Science, and UX Research. She designed, deployed and evaluated a public health learning platform for rural communities in Lesotho, Southern Africa. Her work contributes to the growing knowledge around the practice of co-design with people with low technical literacy. Beyond research, she is interested in enabling educational opportunities for high potential African girls, who, due to poverty, do not have access to high school education. She holds BEng/MSc degrees in Computer Engineering/Computer Science. She is a previous recipient of The Mandela Rhodes Scholarship, The Google Anita Borg Memorial Scholarship, and The Queen's Young Leaders Award, among others.



Prof. Håkan Grahn, PhD

Professor, Blekinge Institute of Technology, Sweden

BigData@BTH - Scalable Resource-Efficient Systems for Big Data Analytics

Data will be generated at an ever-increasing rate for the foreseeable future. Added value and cost savings can be obtained by analyzing big data streams. The analysis of large data sets requires scalable and high-performance computer systems. In order to stay competitive and to reduce consumption of energy and other resources, the next generation systems for scalable big data analytics need to be more resource-efficient. The research profile, Scalable resource-efficient systems for big data analytics, combines existing expertise in machine learning, data mining, and computer engineering to create new knowledge in the area of scalable resource-efficient systems for big data analytics. The value of the new knowledge will be demonstrated and evaluated in two application areas (decision support systems and image processing).

The needs and interests of our 9 industrial partners are grouped into industrial challenges. Based on these challenges and in cooperation with our partners we have defined sub-projects grouped into four research themes: Big data analytics for decision support, Big data analytics for image processing, Core technologies (machine learning), and Foundations and enabling technologies. For more information, see <https://www.bth.se/bigdata/>

Dr. Håkan Grahn is a Professor of Computer Engineering at Blekinge Institute of Technology, Sweden. He received a M.Sc. degree in Computer Science and Engineering in 1990 and a Ph.D. degree in Computer Engineering in 1995, both from Lund University. His main interests are computer architecture, multicore systems, parallel computing, data analytics, and performance evaluation. He has published more than hundred papers on these subjects. During 2011-2013, he served as Research Dean at Blekinge Institute of Technology. Currently, he is heading a 6-year research effort on big data analytics, BigData@BTH.

The Schul-Cloud project: Using microservices to handle heterogeneous infrastructures in German schools



Jan Renz

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Digitalization is transforming our education system. At the same time, schools are inadequately prepared to meet the changes taking place. Overwhelmed teachers, poorly equipped infrastructures in the classroom, and insufficient computer networks reflect the current situation. Instead of facilitating digital education, outdated hard- and software only hinder innovative teaching and learning. A “future-proof” approach involves the transfer of educational content in schools from the computer to the cloud.

Modern education requires state-of-the-art technology and a future-oriented infrastructure. The School Cloud can help to achieve digital transformation in schools and to enhance interdisciplinary lessons with digital content. Such a cloud opens new possibilities for pupils and teachers: easy access to the latest, professionally maintained applications; interconnectivity of different learning venues; optimal lesson preparation; and differentiation.

School Cloud provides an important foundation for the introduction of cloud-based infrastructures and educational services. This talk will highlight architectural and conceptual ideas, as well as discuss things we have done different after building and maintaining a Service Orientation Application for over 4 years in production.

Jan Renz is a researcher at the Hasso Plattner Institute (HPI) in Potsdam Germany and part of the knowledge tech group at the Internet-Technologies and Systems chair. Before entering the academic world, he spent more than 10 years working as a CTO of an internet agency. For six years, he has taught students on- and offline. In 2013 he joined the HPI and is working on improving the learners experience in MOOCs. Most of his work is based on SOA. His research focusses on the user-centric optimization of large scale e-learning applications. Recent paper publications have dealt with mobile learning, gamification, interactive coding exercises, social learning and learning analytics. Non-code related activities involve running and riding motorcycle.



Lena Feinbube

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Software fault injection for the masses

Software fault injection (SFI) is a method for experimentally evaluating a system's dependability. It is versatile and scales better than exhaustive dependability evaluation techniques such as formal methods. Nevertheless, SFI is not yet widely applied in software engineering practice.

This talk proposes an approach to incorporate software fault injection into existing software development processes. The method, which spans multiple layers of abstraction, is designed to yield well-defined, repeatable and automatable fault injection experiments which maximize dependability stress. Proof-of-concept implementations on real-world software projects are presented.

Lena Feinbube is a Ph.D. student at the Operating Systems and Middleware Group since 2014. Her research focus lies on dependability of software systems, specifically how it can be evaluated experimentally using model-based fault injection.

Digital Mechanical Metamaterials

In this paper, we explore how to embody mechanical computation into 3D printed objects, i.e., without electronic sensors, actuators, or controllers typically used for this purpose. A key benefit of our approach is that the resulting objects can be 3D printed in one piece and thus do not require assembly. We are building on 3D printed cell structures, also known as metamaterials. We introduce a new type of cell that propagates a digital mechanical signal using an embedded bistable spring. When triggered, the embedded spring discharges and the resulting impulse triggers one or more neighboring cells, resulting in signal propagation. We extend this basic mechanism to implement simple logic functions. We demonstrate interactive objects based on this concept, such as a combination lock. We present a custom editor that allows users to model 3D objects, route signals, simulate signal flow, and synthesize cell patterns.



Alexandra Ion

PhD Student, Hasso Plattner
Institute, Potsdam, Germany

Alexandra is a Ph.D. student at the human computer interaction lab at the Hasso Plattner Institute (Potsdam, Germany) of Patrick Baudisch. She is interested in computational aspects of mechanical material properties in fabrication and in haptic feedback systems.

Speakers



Prof. Dr. Yoav Etsion

Assistant Professor,
Departments of Computer
Science and Electrical
Engineering, Technion,
Haifa, Israel

Breaking Away from von Neumann: A Massively Multithreaded Dataflow Processor

The von Neumann model of computing targets a control-based stream of instructions that interact through a bulletin board, namely the register file. This model imposes two intertwined limitations: The dynamic control embedded in the instruction stream and the need to dynamically fetch, decode, and schedule instructions limit the rate in which instructions are available for execution. In addition, communicating intermediate values through the register file (a bulletin board) limits the rate in which operands can be delivered to the functional units.

In this talk, I will present my group's effort to break away from the von Neumann model. In particular, I will present our design for a massively multithreaded, coarse-grain, reconfigurable array (MT-CGRA) that is free from the inherent limitations of the von Neumann model. First, the static configuration of instructions in the reconfigurable array rids the hardware from the need to manage a dynamic instruction stream; and second, enabling direct communications between functional units eliminates the operand bandwidth imposed by a centralized register file. I will show how the proposed MT-CGRA processor, which executes CUDA code, delivers massive thread-level parallelism and outperforms modern GPGPUs while consuming less energy.

Yoav Etsion is an Assistant Professor at Technion – Israel Institute of Technology, where he is a member of both Electrical Engineering and Computer Science departments. Previous to that, he was a Senior Researcher at the Barcelona Supercomputing Center (BSC-CNS). Prof. Etsion received his PhD from the Hebrew University in 2010, and he is a member of the ACM and IEEE. His research interests include computer architecture, HW/SW interoperability, operating systems, and parallel programming models.

Service-based, Collaborative, Dynamic and Complex Systems

The development of complex distributed systems spanning multiple organizations is significantly facilitated by service orientation. Different application areas like service networks and business transactions in the business domain, pervasive computing and eScience approach such systems in domain-specific ways, focusing on particular aspects relevant only for their application types. Our research shows however that the requirements in all these application domains overlap whereas the solutions produced are diverging and do not take into account potential synergies between the domains and existing technologies. As a result, we observe a very fragmented landscape of service-oriented systems, which does not enable collaboration across organizations. In this talk the concept of Collaborative, Dynamic and Complex (CDC) systems will be introduced as an approach to facilitate synergies and reuse of solutions and technologies, and enable collaboration. A life cycle comprising the steps of modelling, provision and execution of CDC systems will be presented and supported by a corresponding architecture, the concept of flexible choreographies and a software implementation leveraging service-oriented and Cloud-related technologies. The relevance of the approach will be highlighted in the context of new business models from the field of logistics.



Prof. Dr.
Dimka Karastoyanova

Associate Professor of Data
Science and Business
Intelligence, Kühne Logistics
University (KLU), Hamburg

Dimka Karastoyanova is an associate professor of Data Science and Business Intelligence and the Kuehne Logistics University, Hamburg, Germany. The focus of her research is on data-driven, runtime process performance improvement on the interface between data analytics, BPM and workflows, and service orientation from the perspective of service adaptation. Before joining the KLU she has been a junior professor in Simulation Workflows in the scope of the Excellence Cluster SimTech and at the Institute of Architecture of Application Systems (IAAS), University of Stuttgart. She has received her doctoral degree in Computer Science from Technische Universität Darmstadt. She was in the research and management team of European Projects such as Network of Excellence S-Cube, IP SUPER and FET ALLOWEnsamblés.



**Dr. Peter Ulbrich &
Peter Wagemann**

Friedrich-Alexander-
Universität
Erlangen-Nürnberg, Germany

From Electrons to Scheduling: System Software for Energy-Aware Real-Time Systems

For decades, real-time systems were primarily defined by their temporal characteristics. As technology advances, a new problem class has come into focus: energy-aware real-time systems. In our talk we will highlight upcoming challenges at the prototype of the I4SolarCopter, an energy-neutral quadrotor, and take a tour from the solar beam that energizes the system up to analysis techniques that are used to verify its temporal behavior. In a first step, we will discuss the quadrotor's design and its energy management. Here, the concepts of energy interrupts and energy modes are introduced, which are used to influence the energy consumption and control dynamics of the system. Subsequently, we will present the use of these mechanisms within the Energy-neutral Operating System (EnOS) before moving along to the system's static analysis in order to verify its non-functional properties: energy and time. The latter concludes the talk by taking an in depth view into the SysWCET approach, an integrated worst-case response-time analysis approach that covers the entire system, including the operating system and interrupts.

Peter Ulbrich is research associate and lecturer at the Chair of Distributed Systems and Operating Systems at FAU Erlangen-Nürnberg, Germany. He received his diploma and Ph.D. (Dr.-Ing.) from FAU in 2007 and 2014, respectively. His research interests are mainly focused on real-time and dependable systems as well as control/OS co-design. Dr. Ulbrich is a member of GI, ACM, and IEEE.

Peter Wagemann is a PhD student at the Chair of Distributed Systems and Operating Systems at FAU Erlangen-Nürnberg, Germany. He received his master's degree in computer science from FAU in 2014. His research interests are energy-aware real-time systems and their static analyses.

Usability, use, and reuse of software services: a human centered approach to understanding uptake resistance



Kateryna Kuksenok,
PhD

Developer, Chairman Projects,
SAP Innovation Center
Potsdam

In some situations, a group of professionals can agree that they can and should adopt a particular software component, approach, or tool, but nevertheless delay or resist adoption. Why and when does this happen, what can we learn from it, and what methodological tools help to understand it? Although many of the barriers to software uptake involve limited money or time, a more detailed explanatory model is needed to understand observed uptake behaviors. This talk focuses on the scientific software development domain. Although not necessarily representative of all software development environments, this domain provides a basis for study of diverse and rapidly-changing programming practices. Furthermore, recent vocational shifts have further blurred the line between scientists as end-users vs developers of software. Based on findings from a qualitative study, this talk will describe how scientists use and produce software in a way that deliberately mitigates the potential pitfalls of their programming practice. In particular, the object and method of scientific visualization is subject to restraint intended to prevent accidental misuse. This serves as a case, contextualized by further quantitative studies, of how qualitative methodologies can help to interpret a puzzling dynamic.

Dr. Kateryna Kuksenok joined the Chairman Projects in team at SAP Innovation Center Potsdam in January 2017 as a software developer. She completed her PhD in Computer Science & Engineering from the University of Washington in May 2016 and subsequently held a post-doctoral position in the Software Architecture Group at the Hasso-Plattner-Institute. Her research aims to bridge sociotechnical study of software development and use with software engineering research. Prior research projects have focused on scientific software production, particularly among oceanographers working with complex time and spatial data. This talk will draw on studies of scientific software production conducted during doctoral and postdoctoral studies, with final reflections and future directions informed by initial insights from experiences at SAP Innovation Center Network.



Prof. Dr. Chen Zhenyu

Professor, Nanjing
University, China

The Future of Crowdsourced Testing

The term crowdsourcing—a compound contraction of crowd and outsourcing—is a new paradigm for utilizing the power of crowds of people to facilitate large-scale tasks that are costly or time consuming with traditional methods. In this talk, I will introduce mooctest.net, a platform offers software companies the possibility to outsource their testing activities to crowdsourced testers who have various testing facilities and environments, as well as different levels of skills and expertise. The mooctest has many new features of swarm intelligence, which show the future of crowdsourced testing.

Zhenyu Chen is currently a full professor at Software Institute, Nanjing University. He is the founder of mooctest.net. His research interests focus on software analysis and testing. He has about 90 publications at major venues including TOSEM, TSE, ICSE, FSE, ASE, ISSTA etc. He has served as a PC co-chair of QRS 2016, TSA 2016, QSIC 2013, and AST2013. He serves the associate editor of IEEE Transactions on Reliability.

Speakers

Ethical Principles for Service-Oriented Computing

When users run programs on their own computers, the ethical criterion is simple: to avoid doing wrong to them, the programs must be frei (under the control of the users). Service-oriented computing raises different issues, of which the most important one is: which jobs are legitimate for servers to do, and with what kinds of interaction with users?



Dr. Richard Stallman

Free Software Foundation

Dr. Richard Stallman launched the free software movement in 1983 and started the development of the GNU operating system (see www.gnu.org) in 1984. GNU is free software: everyone has the freedom to copy it and redistribute it, with or without changes. The GNU/Linux system, basically the GNU operating system with Linux added, is used on tens of millions of computers today. Stallman has received the ACM Grace Hopper Award and the ACM Software and Systems Award, a MacArthur Foundation fellowship, the Electronic Frontier Foundation's Pioneer Award, and the the Takeda Award for Social/Economic Betterment, as well as several doctorates honoris causa, and has been inducted into the Internet Hall of Fame.

International Branches

International cooperation enables the HPI to extend its research scope and to provide its international partners with an opportunity for close exchange and with access to the HPI's international research contacts. Junior researchers work at their home universities, but receive their scholarships from the HPI in Germany. While being mentored jointly by their home university professors, they will be integrated into the Potsdam HPI Research School's research activities and participate in joint conferences and symposia.

Nanjing University, Nanjing, China

In November 2011 the "HPI Research School at Nanjing University" was opened.

Technion, Israel Institute of Technology, Haifa, Israel

Since April 2010 there is a HPI Research School at Haifa in cooperation with Technion – Israel Institute of Technology too. The Ph.D. students are working at the "HPI Research School at Technion, Haifa" within the HPI Research School team.

University of Cape Town, Cape Town, South Africa

In April 2009, the HPI Research School launched a "branch" in South Africa. The "HPI Research School at University of Cape Town" is mainly researching information and communication technologies that are relevant for developing and emerging countries.



Expansion of the Research School

Annually, the Institute's Research School seeks talented junior researchers and accordingly offers

8 Ph.D. Scholarships and 2 Postdoc Scholarships

The HPI Research School focuses on the foundation and application of large-scale, highly complex and interconnected IT systems. With its interdisciplinary and international structure, the Research School interconnects the HPI research groups as well as its international branches at Cape Town University, Technion – Israel Institute of Technology and Nanjing University. The HPI Future SOC Lab, a state-of-the-art computer center, enriches the academic work at the HPI Research School.

The HPI professors and their research groups ensure high quality research and will supervise Ph.D. students in the following topic areas: Human Computer Interaction, Prof. Dr. Patrick Baudisch; Computer Graphics Systems, Prof. Dr. Jürgen Döllner; Algorithm Engineering, Prof. Dr. Tobias Friedrich; System Engineering and Modeling, Prof. Dr. Holger Giese; Software Architecture, Prof. Dr. Robert Hirschfeld; Internet Technologies and Systems, Prof. Dr. Christoph Meinel; Knowledge Discovery and Data Mining, Prof. Dr. Emmanuel Müller; Information Systems, Prof. Dr. Felix Naumann; Enterprise Platform and Integration Concepts, Prof. Dr. h.c. Hasso Plattner; Operating Systems and Middleware, Prof. Dr. Andreas Polze; and Business Process Technology, Prof. Dr. Mathias Weske.

If you have prior experience in any of these areas, you are invited to submit a full application with the following documents: curriculum vitae and copies of certificates / transcripts, brief research proposal, work samples / copies of relevant scientific work (e.g. master's thesis), and a letter of recommendation.

Applications must be submitted by August 15th of the respective year. Positions are usually available at the beginning of October. Please send your applications to:

research-school-application@hpi.de

For more information on HPI and its HPI Research School see:

https://www.hpi.de/research_school

Social Event - Dinner at Museum Barberini

With the Museum Barberini a new cultural attraction came to Potsdam. Exhibitions range from the Old Masters to contemporary art with a focus on impressionism. Based on works from the collection of Hasso Plattner, the museum's founder and patron, the Museum Barberini presents three temporary exhibitions each year with major loans from international private collections and museums.

The exhibitions are prepared at academic conferences with international curators and researchers. In addition, Art Stories as rotating presentations place prominent works in a new context and increase awareness of original artworks. Barberini Digital also ties into this. This virtual experience provides additional context and new aspects of the artworks and engages virtually with the original artwork.

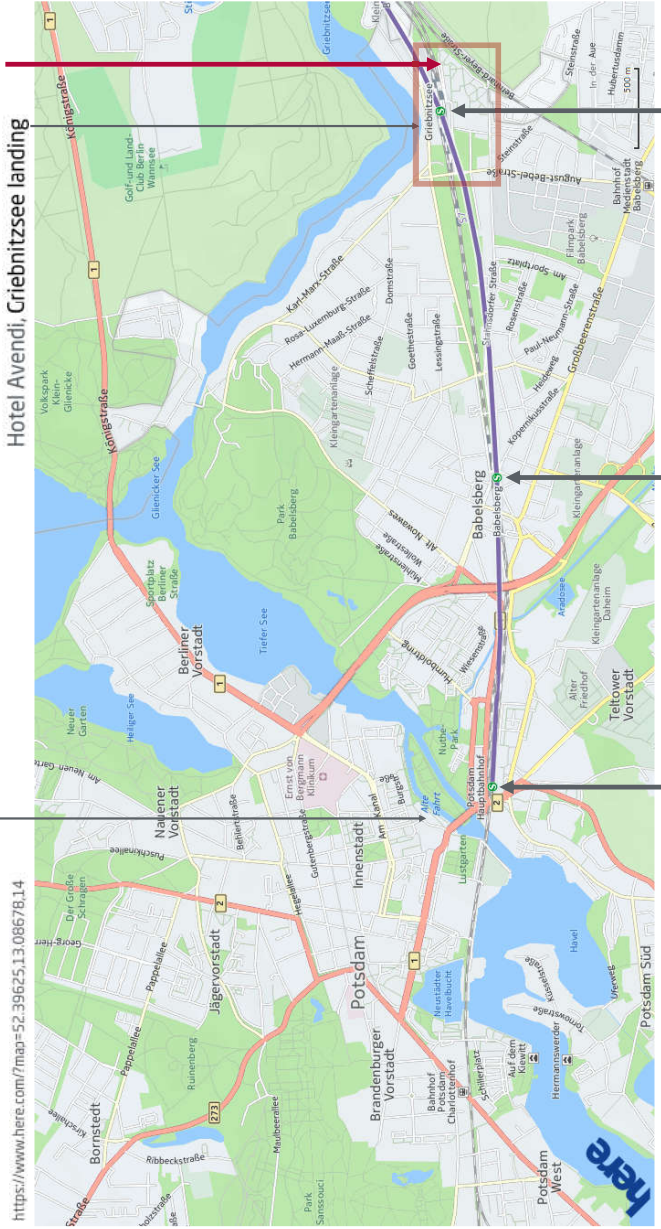
The Museum Barberini in the reconstructed palace is located in the historic center of Potsdam on the square Alte Markt near the Stadtschloss (City Palace) where the Brandenburg Parliament meets. The building's courtyard opens onto Alte Fahrt with access to the Havelterrassen and a view of the Freundschaftsinsel on the opposite bank. Both the ambitious reconstruction project and the operation of the museum are funded by the Hasso Plattner Stiftung.



View of the historic center of Potsdam with the Museum Barberini, 2016, photo: Helge Mundt, © Museum Barberini

Museum Barberini
(Thursday's social event)

<https://www.here.com/?map=52.39625,13.08678,14>

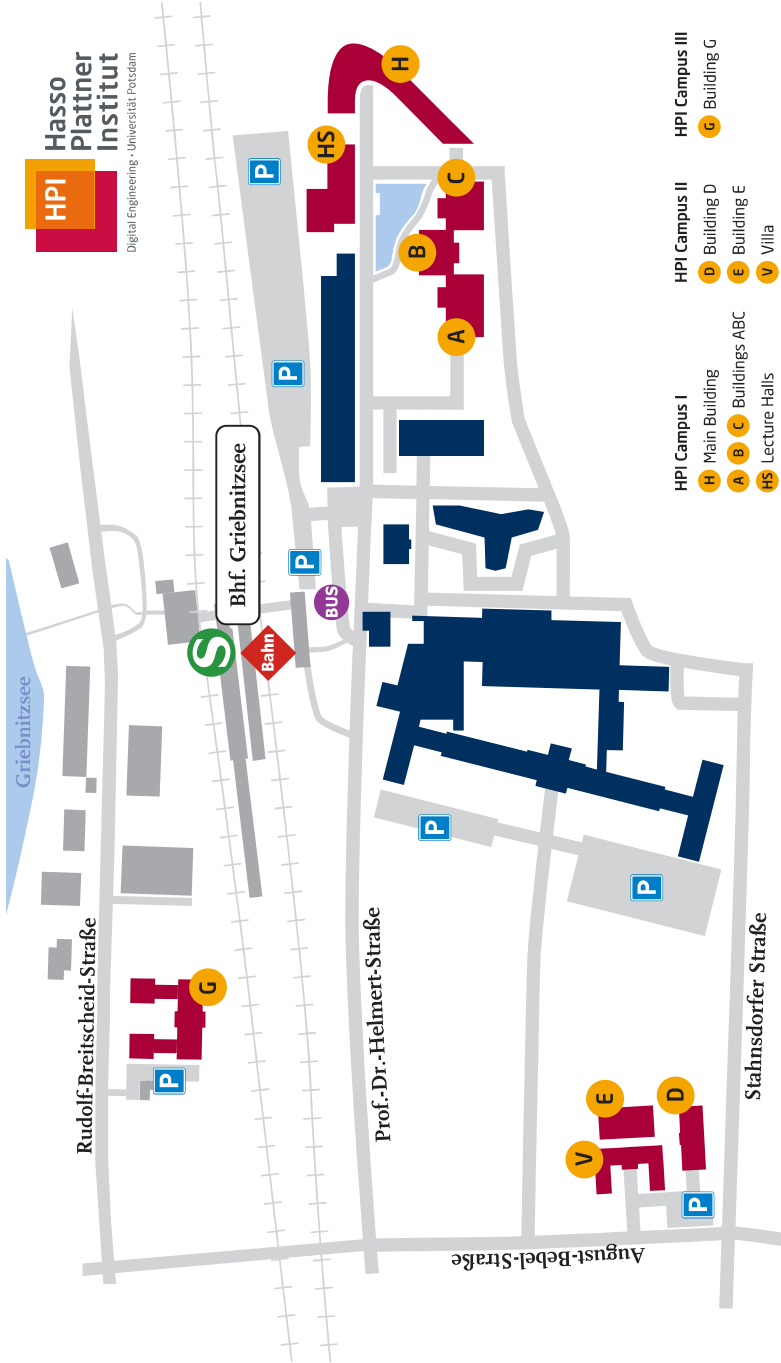


Potsdam Hauptbahnhof (Central Station)

Babelsberg

Griebnitzsee

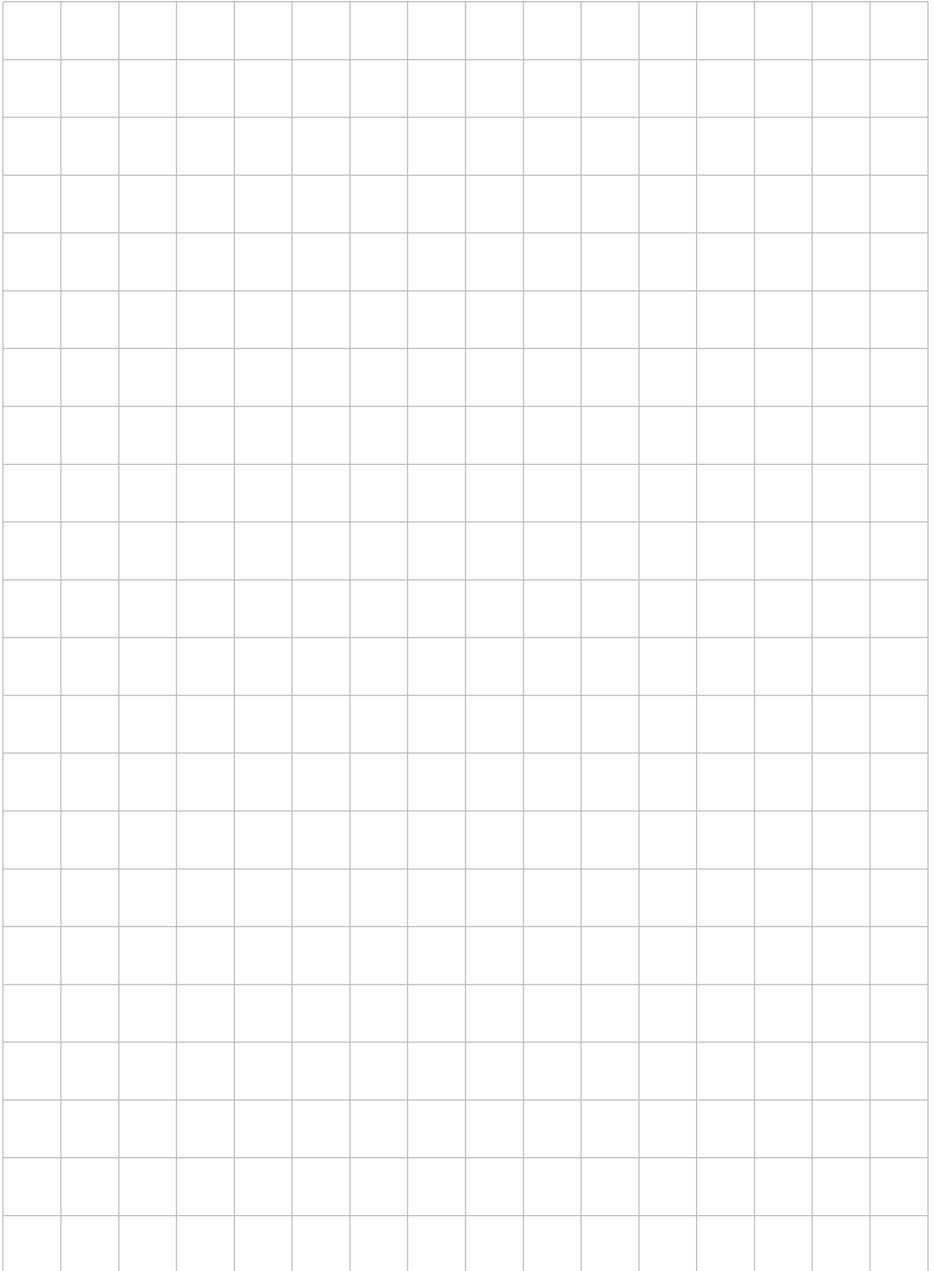


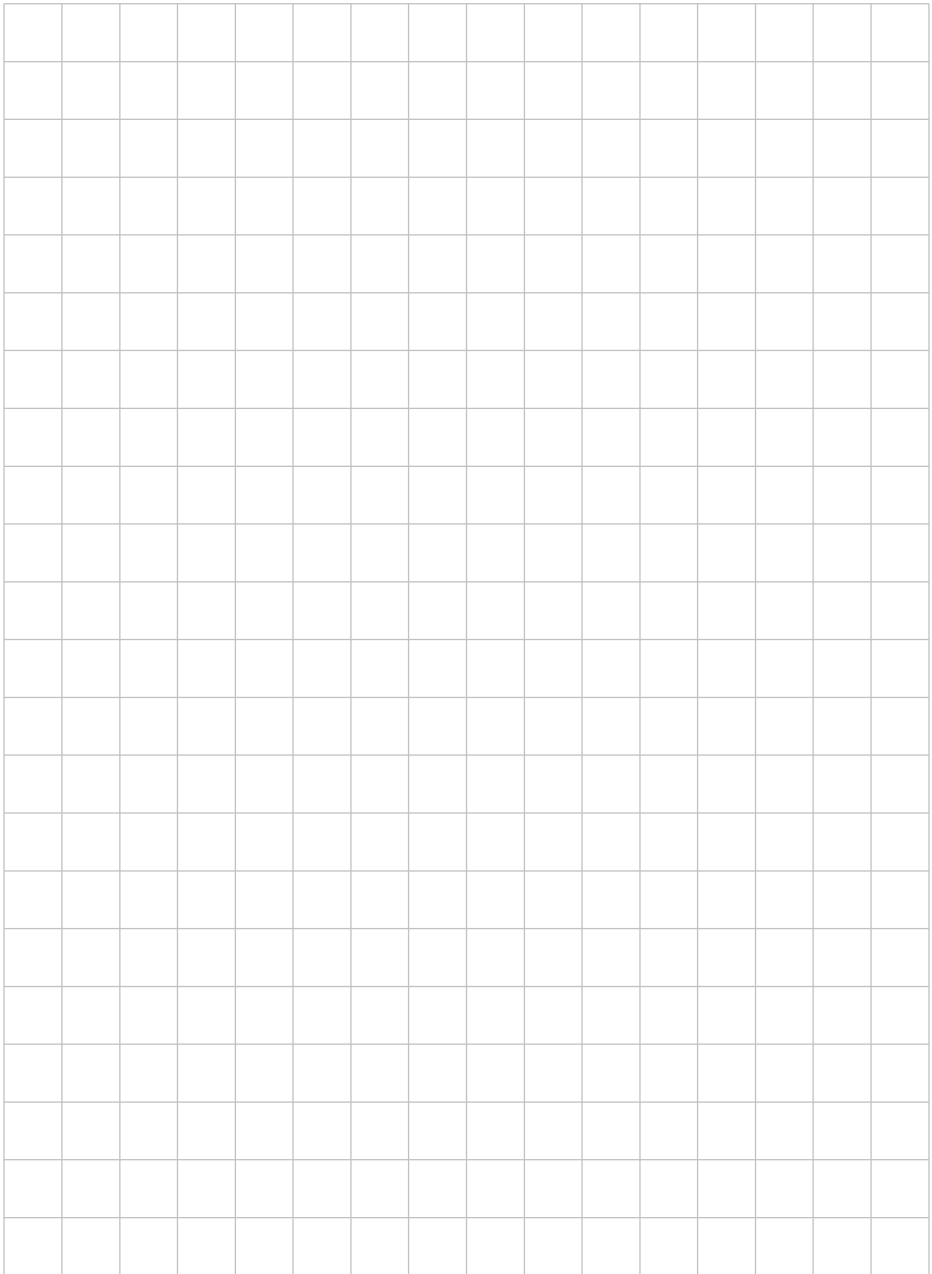


HPI
Hasso Plattner Institut
 Digital Engineering · Universität Potsdam

- HPI Campus I**
 - H Main Building
 - A B C Buildings ABC
 - HS Lecture Halls
- HPI Campus II**
 - D Building D
 - E Building E
 - V Villa
- HPI Campus III**
 - G Building G

Notes





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