

Dr. Lena Oden

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“No computer is ever going to ask a new, reasonable question. It takes trained people to do that.” - Grace Hopper

Appointments

Fernuniversität Hagen

JUNIOR PROFESSOR FOR COMPUTER ARCHITECTURE AND COMPUTER ENGINEERING

- Accepted Tenure-Track Professorship, starting October 2018
- Responsible for teaching Computer Architecture, Computer Engineering and Virtual machines
- Research area: Energy efficient computing

Hagen, Germany

Start: October 2018

Jülich Research Center, Jülich Supercomputing Center

POSTDOCTORAL RESEARCHER/WISSENSCHAFTLICHE MITARBEITERIN

- Analysis of the performance of the storage systems of the pilot computing systems for the Human Brain Project
- Development of interfaces for transparent usage of new storage technologies, like Object storage or key value system
- Analysis of storage requirements of applications from the neuro science community
- optimization of applications from the human brain project for better storage usage

Jülich, Germany

April 2017- December 2018

Argonne National Laboratory

POSTDOCTORAL RESEARCHER

- Part of the MPICH-Development Team
- Co-Developer of the new CH4-lightweight communication layer
- Implementation of the UCX-support in MPICH
- Support for heterogeneous architectures
- Analysis of heterogeneous memory systems, especially the Intel's Knight Landing manycore architecture
- Development of a management and runtime library for heterogeneous memory systems

Lemont, IL, USA

April 2015-March 2017

Fraunhofer Institut für Techno-und Wirtschaftsmathematik (ITWM)

RESEARCH ASSISTANT/PHD SCHOLAR

- Development of Software for Cluster Computing
- Integration of GPUs into the GASPI standard and its implementation GPI
- Exploring different methods for optimizing GPU communication with standard interconnects

Kaiserslautern, Germany

January 2011- February 2015

Lawrence Berkeley National Laboratory

SUMMER INTERN

- Software Development in the field of astrophysics on GPUs
- Optimizing Astrophysical Codes for GPU computing

Berkeley, CA, USA

February 2013 - March 2013

University of Salzburg, University of Bremen, Furtwangen University

TEACHING ASSISTANT

- Summer universities
- Intensive Course in typesetting of scientific publications in LaTeX

Germany and Austria

2012-2014

Texas Instruments

INTERN, FULLTIME STUDENT WORKER

- Development on Embedded Platforms with Linux
- Device Driver development for Linux
- Development of a motor-control software for embedded systems
- Development of a graphical user interface with Qt

Freising, Germany

April 2009-Januar 2010

Education

Ruperto Carola Universität

DOCTORAL DEGREE IN COMPUTER SCIENCE

Title: *Direct communication in GPU-Accelerated Clusters*

Advisor: Professor Dr. Ulrich Brüning

Heidelberg, Germany

April 2014

RWTH Aachen University

DIPLOMA IN ELECTRICAL ENGINEERING

Thesis: *Examination of Real-Time Optimization Methods for High Performance Computing*

Fields of qualifying exams: information and communication technology

Aachen, Germany

October 2011

Research Grants

Exascale MPI

Co-PI (PI: PAVAN BALAJI, ARGONNE NATIONAL LABORATORY)

Department of Energy (DOE), Advanced Scientific Computing Research (ASCR), Exascale Computing Project (ECP), single institution Grand

\$5,130,900

October 2017 - November 2019

Maestro

KEY PERSON

European Union, Horizon 2020 Framework Programme, FETHPC-02-2017 — Transition to Exascale Computing

3,989,491€

September 2018-August 2021

Honors & Awards

2018 **Mentee**, TandemPlus Career Program for female PostDocs in STEM

RWTH Aachen,
Germany

2011-2014 **Ph.D. Fellowship**, Fraunhofer Gesellschaft

Kaiserslautern,
Germany

2014 **Student Travel Grant**, IPDPS

Phoenix, USA

2013 **Student Travel Grant**, ParCo Ph.D. Symposium

University of Munich

Academic Work

REVIEWER FOR JOURNALS

- Future Generation of Computer Systems
- Journal of Parallel and Distributed Computing
- Parallel Computing
- Concurrency and Computation, Practice and Experience

PROGRAM COMMITTEE MEMBER

- International Conference on High Performance Computing (HiPC)
- Computing Frontiers
- EuroMPI
- International Conference on High Performance Computing and Communication (HPCC)
- International Conference of Supercomputing (ISC)
- International Workshop on Heterogeneous and Unconventional Cluster Architectures and Applications (HUCCA)
- Workshop on Runtime and Operating Systems for the Many-core Era (Rome) 2016 and 2017
- Workshop on Virtualization Solutions for High-Performance Computing (VisorHPC) 2017
- Workshop on Exascale MPI (ExaMPI)
- Workshop on General Purpose Processing using GPUs (GPGPU)
- Second International Workshop on OpenPOWER for HPC
- 8th CodeJam of the HumanBrain Project

- Co-Chair Ashes Workshop 2019
- Co-Publicity Chair IPDPS 2017 and 2018, 2019

Publications

- **Lena Oden** and Holger Fröning, "GGAS: Global GPU address spaces for efficient communication in heterogeneous clusters", IEEE International Conference Cluster Computing (Cluster 2013)
- **Lena Oden**, Benjamin Klenk, Holger Fröning "Energy-Efficient Collective Reduce and Allreduce Operations on Distributed GPUs", IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2014)
- **Lena Oden**, Holger Fröning, Franz-Joseph Pfreundt, "Infiniband-Verbs on GPU: A case study of controlling an Infiniband network device from the GPU", Workshop on Accelerators and Hybrid Exascale Systems (Ashes), at IDPDS 2014
- **Lena Oden**, "MPI2 for GPUs: A PGAS framework for efficient communication on hybrid clusters, International Conference on Parallel Computing (ParCo 2013)
- Benjamin Klenk, **Lena Oden** and Holger Frönig, "Analyzing Put/Get APIs for Threadcollaborative Processors", Workshop on Heterogeneous and Unconventional Cluster Architectures and Applications (HUCAA), at ICPP 2014

- Benjamin Klenk, **Lena Oden**, Holger Fröning "GPU-centric communication for improved efficiency", Workshop on Green Programming, Computing and Data Processing (GPCDP) in conjunction with International Green Computing Conference, 2014
- Benjamin Klenk, **Lena Oden**, and Holger Fröning. "Analyzing communication models for distributed thread-collaborative processors in terms of energy and time", International Symposium on Performance Analysis of Systems and Software (ISPASS), 2015 IEEE
- **Lena Oden**, Benjamin Klenk, Holger Fröning "Energy-Efficient Stencil Computations on Distributed GPUs Using Dynamic Parallelism and GPU-Controlled Communication"Energy Efficient Supercomputing Workshop, 2014
- **Lena Oden**, Benjamin Klenk, Holger Fröning, "Analyzing GPU-controlled communication with dynamic parallelism in terms of performance and energy", Parallel Computing, Volume 57, September 2016, Pages 125-134
- Nikela Papadopoulou, **Lena Oden** and Pavan Balaji, "A Performance Study of UCX over InfiniBand, International Symposium on Cluster, Cloud and Grid Computing, (CCGrid), 2017
- **Lena Oden** and Holger Fröning, "InfiniBand Verbs on GPU: a case study of controlling an InfiniBand network device from the GPU", The International Journal of High Performance Computing Applications, Online since 2015
- **Lena Oden** and Pavan Balaji, "Hexe: A Toolkit for Heterogeneous Memory Management", 2017 IEEE 23rd International Conference on Parallel and Distributed Systems (ICPADS), Shenzhen, 2017
- Kenneth Raffanetti, Abdelhalim Amer, **Lena Oden**, Charles Arche et.al, "Why is MPI so Slow? Analyzing the Fundamental Limits in Implementing MPI-3.1", Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC), 2017