

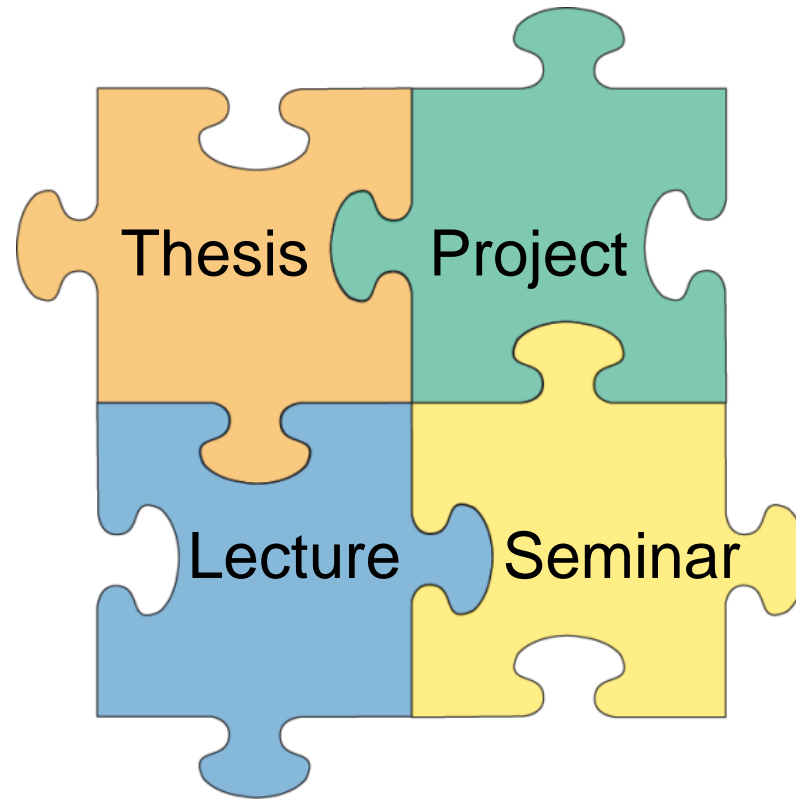
# Integrated Communication Systems

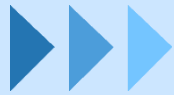
*Courses, Research, and Thesis Topics*

**Prof. Paul Müller**

University of Kaiserslautern  
Department of Computer Science  
Integrated Communication Systems ICSY  
<http://www.icsy.de>

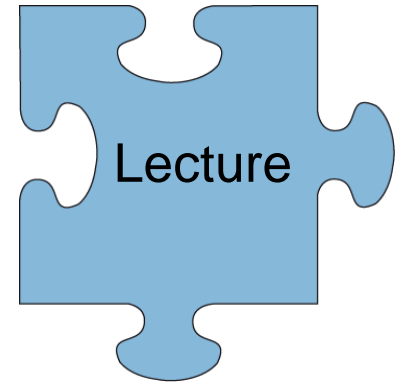
# Courses @ ICSY



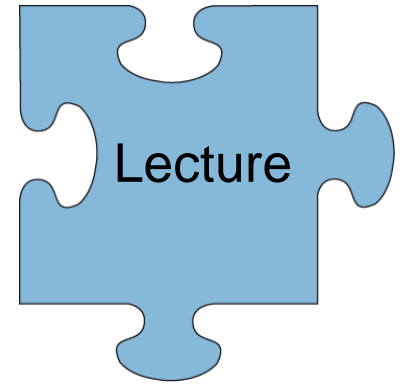


- ▶ Lectures (Summer Term)
  - Service-oriented Architectures (SOA)
  - Introduction to High Performance Computing
  
- ▶ Lectures (Winter Term)
  - Grid & Cloud Computing
  - Multimedia Systems
  - High Performance Computing on GPGPUs
  
- ▶ Project (Winter Term)
  - Service-oriented Computing
  
- ▶ Seminar (Summer Term)
  - Service-orientation in Communication and Applications

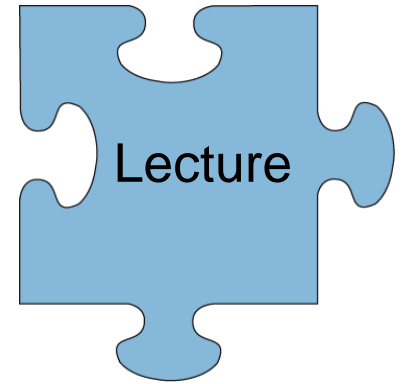
- ▶ Lecture (2C+1R), 4 CP
- ▶ Educational objectives:
  - Systematically understanding of SOA
  - Theoretical background
  - Overview of current technologies and standards
  - Design techniques for SOA-based applications
  - Approaches for the evolution of SOA based applications
- ▶ Content:
  - Theoretical background (communication, coordination, state, security)
  - Architecture (common principles, life-cycle of a service, analysis, design)
  - History of service-orientation
  - Technologies and standards (Web services, BPEL, WS-\*, ...)
  - Implementation with Java



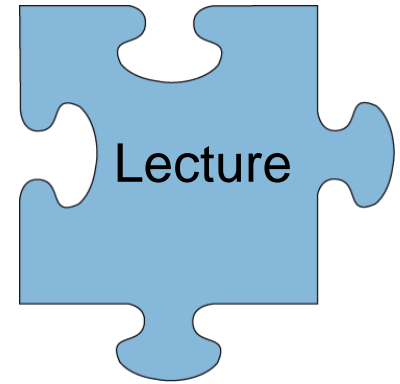
- ▶ Lecture (2C+1R), 4 CP
- ▶ Educational objectives:
  - Basics, techniques and tools for Grid & Cloud Computing
  - The distributed access to any kind of heterogeneous resources over a network using open standards
- ▶ Contents:
  - Foundations of service-oriented architectures
  - Architecture of a Grid middleware (OGSA)
  - Accessing Grid resources (WSRF)
  - Quality of Service, Virtual Organisations, Service-level Agreements, monitoring, accounting, and billing
  - Cloud Stack: IaaS, PaaS, SaaS,...
  - Virtualization Techniques
  - Cloud Applications



- ▶ Lecture (2C+1R), 4 CP
- ▶ Educational objectives:
  - In-depth understanding of goals and requirements of multimedia systems
  - Components and boundary conditions for the development of modern multimedia systems
- ▶ Content:
  - Introduction to the topic "Multimedia" (from ASCII to graphical user interfaces)
  - Aspects of distribution in multimedia systems (end-to-end QoS,...)
  - Compression techniques (introduction to information theory; entropy coding, source coding, and hybrid coding; audio/video coding)
  - System requirements (synchronisation, scheduling, ...)
  - Applications (CSCW, tele-conferencing, tele-immersion, ...)



- ▶ Lecture (2C+2R), 5 CP
- ▶ Educational objectives:
  - Basics of High Performance Computing
  - Basics of Shared Memory Programming (Threads) and Message Passing
  - Accessing High Performance Clusters
- ▶ Content:
  - Architectures of High Performance Computers: past, present and future
  - Accessing remote computers and writing batch scripts
  - Programming and compiling on LINUX systems
  - Parallel programming with OpenMP on all kernels of one CPU
  - Parallel programming with MPI on several CPUs



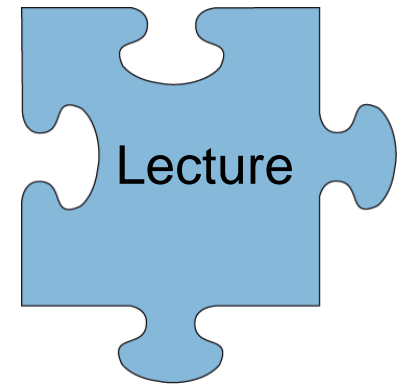
▶ Lecture (3C+1R), 6 CP

▶ Educational objectives:

- Understanding of the programming model for Graphical Processing Units
- Foundations of Graphical Processing Units
- Parallel programming on GPUs with CUDA

▶ Content:

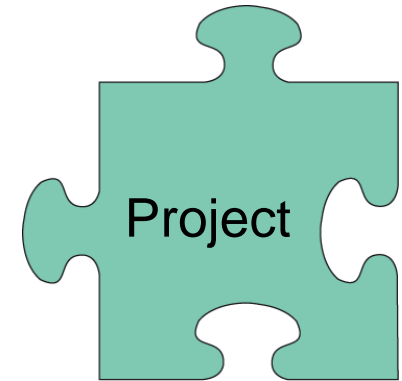
- SIMD programming model
- Memory hierarchies on GPUs
- Programming GPUs with CUDA
- OpenACC and new programming paradigms for accelerators





# Service-oriented Computing

- ▶ Project (4P), 8 CP
- ▶ Duration: 3 Months
- ▶ Minimum number of participants: 6
  
- ▶ Applying Service-Orientation
  - Service-Oriented Architectures
  - Service-oriented analysis and design
  - SOA Infrastructures & Tools
  - SOA Integration
- ▶ Programming with Java
- ▶ Deployment of distributed services
- ▶ Tests and evaluation
  
- ▶ Cooperation with Software AG , Darmstadt

The logo for Software AG, featuring a stylized white 'S' icon followed by the text "software AG" in white on a dark blue rectangular background.

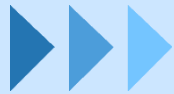
software AG

- ▶ Seminar (2P), 4 CP
- ▶ Minimum number of participants: 3
- ▶ Wide range of topics relevant for the scope of
  - Service-oriented Architectures (SOA)
  - Grid & Cloud
  - Future Network Architectures
- ▶ Organization
  - Paper work
  - Presentation



# Research @ ICSY



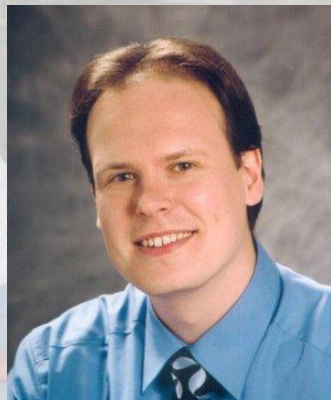


# Inter-Faces



**Prof. Dr. Paul Müller**  
Head of the research group

**Dr. Bernd Reuther**  
Branch of  
Future Internet Technologies



**Joachim Götze**  
Branch of Service-orientation  
and Cloud Technologies

## ▶ Focus

- Flexible network architectures
  - Ability to adapt to application requirements and network constraints
  - Ability to evolve to a new Internet
- Experimentation in real networks

## ▶ Areas of Interest

- Service Oriented Network Architectures
  - Service Description
  - Service Selection
  - Service Composition
- Topology management tools

## ▶ Focus

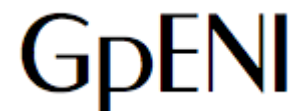
- Flexible service-based applications
  - Development strategies and implementation technologies
  - Quality of Service
- Internet of Services

## ▶ Areas of Interest

- Service composition and deployment
- Reliability and dependability of service-based applications
- SOA evolution management
- Monitoring, accounting, and billing

# Current Projects

- ▶ iGreen (Intelligent Knowledge Management in Agriculture)
- ▶ IESE Transfer Project (SCA in the Cloud)
- ▶ G-Lab (Future Internet Research and Experimentation)
- ▶ G-Lab Deep-G (Deepening G-Lab for Cross-Layer Composition)
- ▶ G-Lab Ener-G (Improving the Sustainability of G-Lab Through Increased Energy Efficiency)
- ▶ PRUNO (Prospects for Realizing User-centric Network Orchestration)
- ▶ Euro-NF (European Network of Excellence)
- ▶ GpENI (Great Plains Environment for Network Innovation)

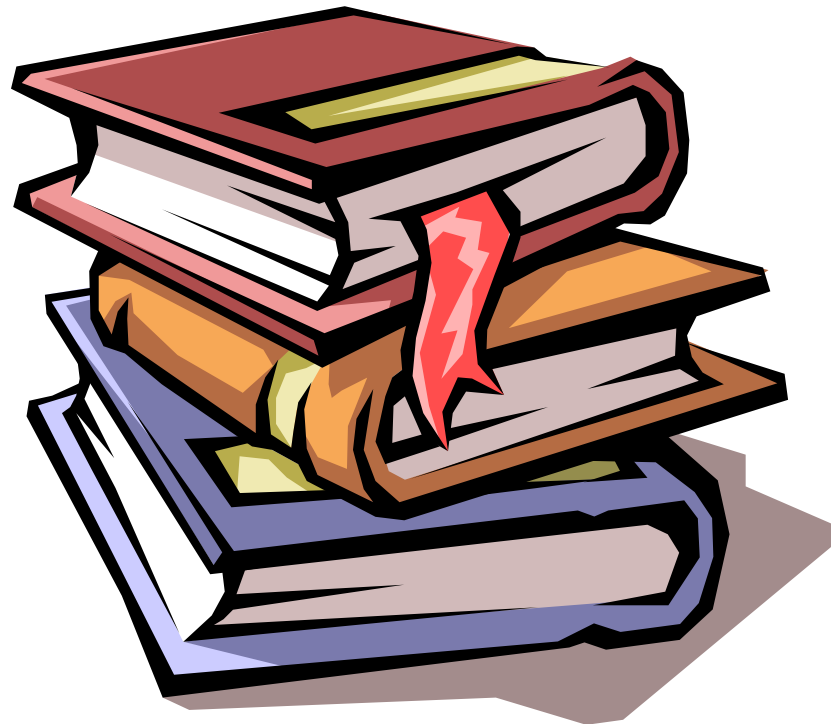


# A Selection of Current Partners





# Thesis @ ICSY



# Bachelor and Master Theses

- ▶ Short list of available theses topics online
- ▶ Visit our staff for more topics
- ▶ You may also discuss your own ideas with our staff

SOA & Grid	Future Internet	Multimedia	HPC on GPUs
Monitoring	Service Composition	E-Learning	Compiling on GPUs
Accounting	Workflows	Live Streaming	Benchmarking
Content Distribution	Protocol Prototypes	Collaboration	Application programming
Workflows	Network Emulation		
Life-cycle Management	Benchmarking		
Evolution Support			



# Questions?

