Status of HPC in Siegen

WSSP, Stuttgart

09.10.2018

Universities in North Rhein-Westphalia

Center for Information and Media Technologies (ZIMT)
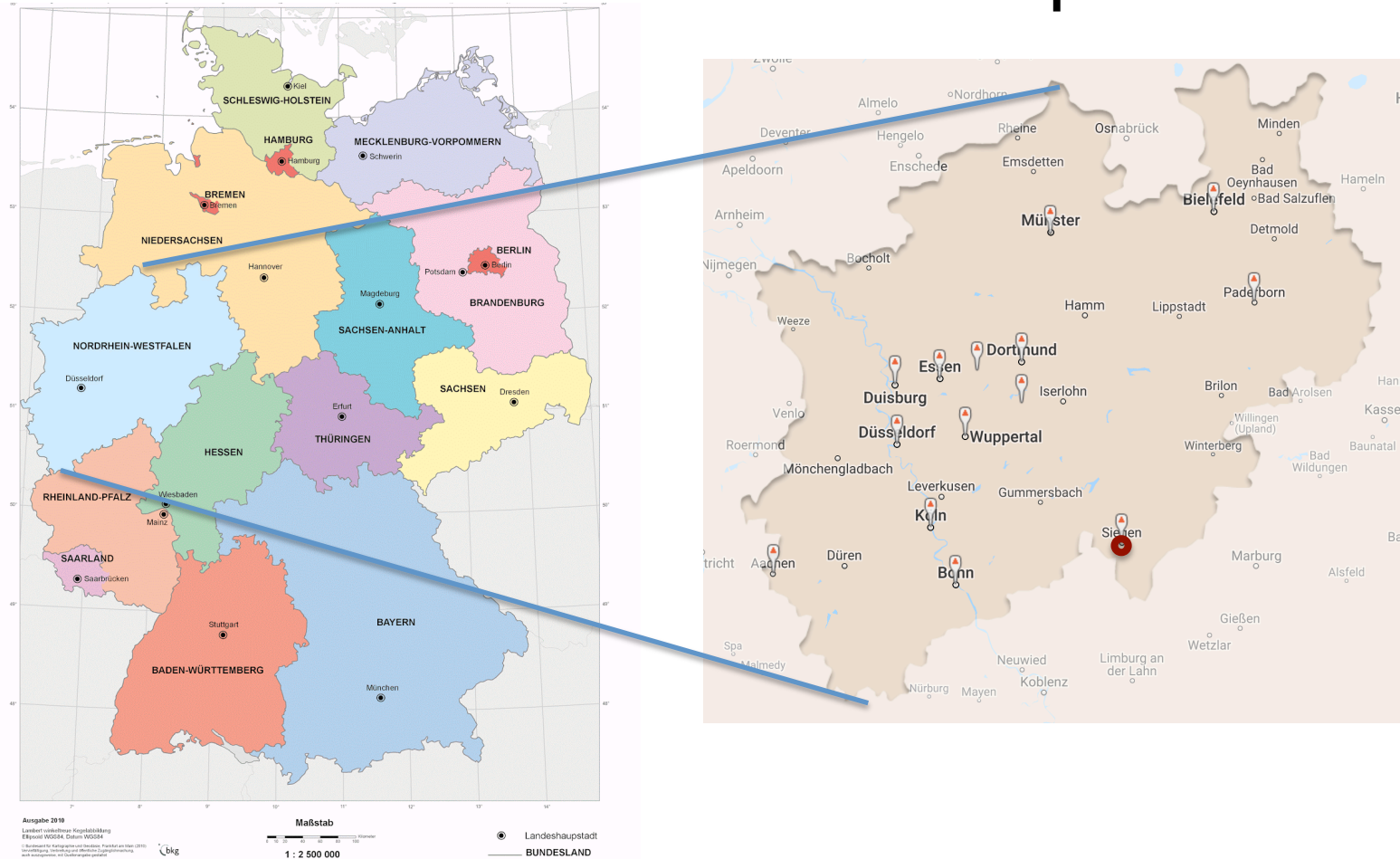
University of Siegen

- ~20.000 students, ~2-3.000 employees, 255 professors
- 4 + 1 faculties:

  1 Faculty of Arts (Philosophy, Humanities, Social Sciences),

  2 Education · Architecture · Arts (Pedagogics, Art&Music, Architecture),

  3 School of Economic Disciplines (Economc Science, Business Informatics, Business Law),

  4   Science and Technology (Math, Physics, Chemistry and Biology, Mechanical Engineering, Electrical Engineering and Computer Science, Civil Engineering)

  5 School of Life Sciences founded 2017, currently setup phase

Current cluster: HorUS (2012)

- Hardware
  - 136 + 20 dual socket Intel Westmere nodes
  - 20 dual socket Intel Haswell nodes
- Operating system
  - CentOS Linux
- Job scheduler
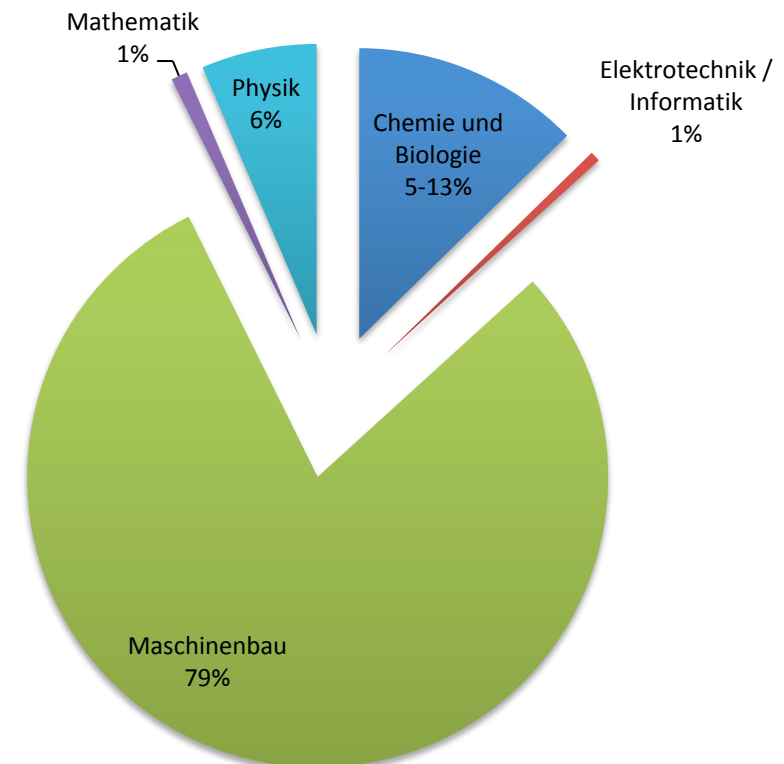 - Slurm
- Storage
  - BeeGFS
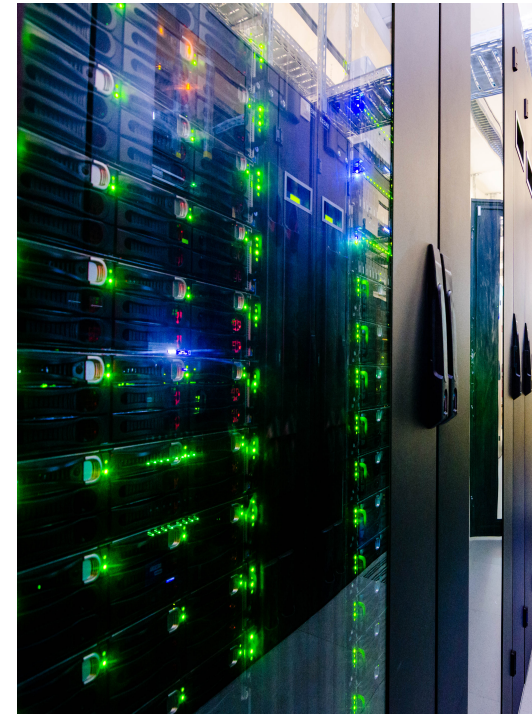
Usage distribution: current and future

Changes in usage

- Generally: increasing number of simulations instead/in addition to experiments
- 3 pillars: theory, experiment, simulation

- Chemistry grown since 2014 from <5% to 13%
- Mechanical engineering also growing
- Mathematics from 1% to 4%
- Growing need in Computer Science with new professors in Visual Computing

- New: Big Data as 4. pillar

Distribution of usage by disciplines

Mathematik 1%
Physik 6%
Chemie und Biologie 5-13%
Elektrotechnik / Informatik 1%
Maschinenbau 79%

Percentage and changes per disciplines

Discipline	Percentage old	Percentage new
Mech. Eng.	79 %	68%
Physics	6 %	13%
Chemistry	5-13%	11%
Fak III (Big Data)		4%
Mathematics	1%	3%
ETI	1%	2%

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Next cluster

- DFG proposal
  - 3.5 M€
  - Ca. 250-350 nodes
  - Submitted Q1/2018
  - Approved last week, start of tender Oct/Nov 2018
  - Installation planned Q2/2019, production Q3/2019

- Requirements in addition to HPC
  - Worldwide LHC Computing Grid participation
  - Big data application
   - Drives storage requirements

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HPC

WLCG /LHC

Big Data

User

Cluster-Manager (Software Layer)

Manage

Partition 1   Partition 2   Partition 3

Node   Node   Node   ...   Node   Node   Node   Node   ...   Node   Node

Core Core   Coe Core   Core Core AC1   Core Cor AC2 Core Core   Core Core   Core Core   Core Core   Core Core

Core Core   Core Core   Core Core   Core Cire   Core Core   Core Core   Core Core   Core Core   Core Core

Compute

Interconnect (High Performance Network)

Network

...   HDD   SSD

Storage

Several applications and requirements can be supported in a single system

HPC-related activities

- Testbeds (Software + Hardware):
  - CRAY ARM Evaluation System
  - NEC SX-Aurora TSUBASA (Seeding Program)

- HPC support (2 research employees)
  - Train inexperienced users
    - Basics, best practices
  - Support experienced users
    - Performance optimization
  - Support users who want to use higher tier resources

Motivation:

- Permeability between Tier 3 and higher tiers

  – Code development on Tier 3 – productive runs on Tier 1

  – Less experienced users

  – Cheaper resources

  → **Start early**
  → **Get people onto Tier 3**
  → **Facilitate movement to higher tiers**

Tier 1
National/
International

Tier 2
National/
Federal

Tier 3
Federal/Local
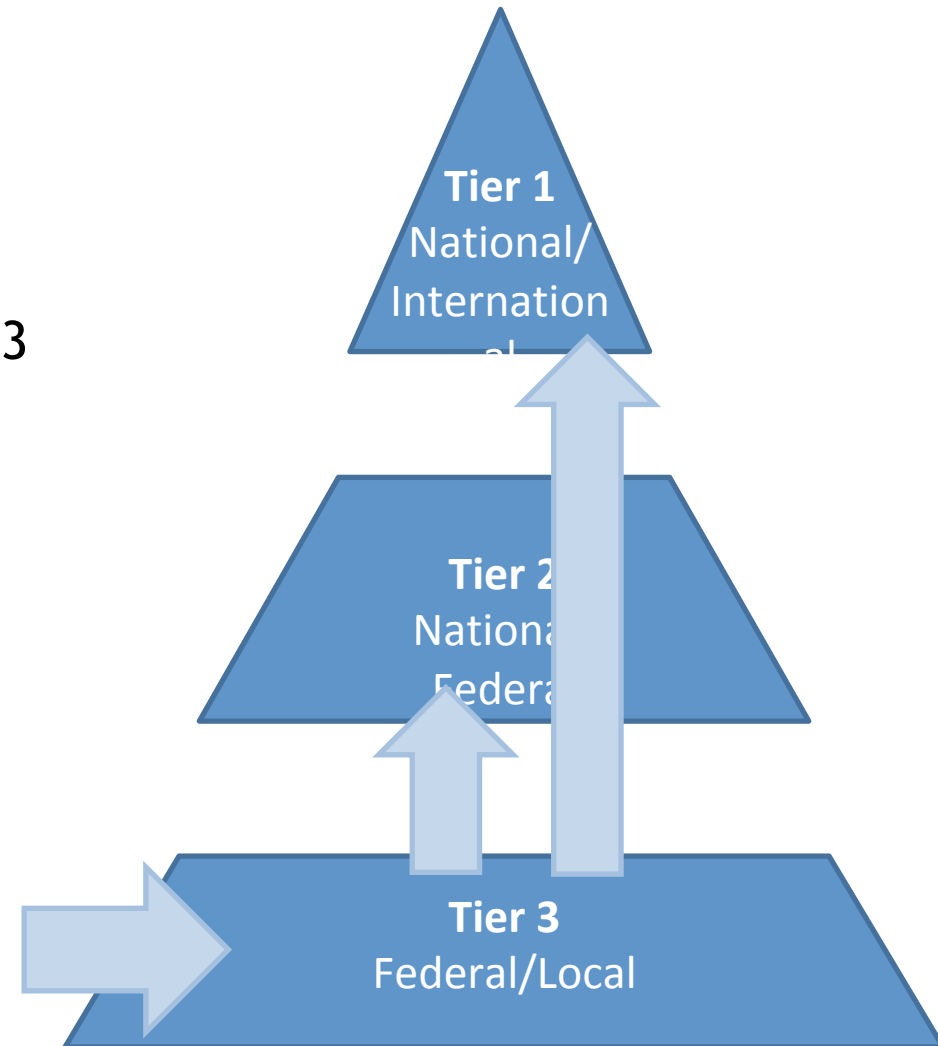
Areas of HPC support

Teaching and Training	Performance Analysis	Third-party Code Support	Tier Change Support	Knowledge Transfer
Beginner code developers	Experienced code developers	Users of comm-ercial/open-source codes	Dev teams who want to apply for higher tier hardw.	All HPC users
• Hold classes • Advise on external courses • Gauge demand for new courses	• Performance reviews • Performance measurement tools	• Support in finding optimal settings • Find most suitable hardware	• Find most suitable hardware • Test and evaluation of software	• Re-design and maintain website • Organize networking workshops

Summary

- Last year: "reach people on social level"

- Routinely meet people who:
  - Have problems but don't report them
  - Use cluster wrong without knowing
  - Use cluster but we are not aware of them

- Interviews a crucial tool
  - Example: supervisor could not add student (wrong user ID), found oversight in documentation by coincidence during phone call

THANK YOU FOR YOUR KIND ATTENTION.