HPC Education initiatives in Germany and Europe

Dirk Schmidl
### RWTH Aachen University: The Big Picture in Figures (2015)

<table>
<thead>
<tr>
<th>Category</th>
<th>Students</th>
<th>Professors</th>
<th>New enrolments</th>
<th>Employees (FTE)</th>
<th>International Students</th>
<th>Total budget in Mio. €</th>
<th>Graduates</th>
<th>Publications</th>
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</thead>
<tbody>
<tr>
<td>Students</td>
<td>42,298</td>
<td>533</td>
<td>8,190</td>
<td>8,737</td>
<td>7,056</td>
<td>893,6</td>
<td>5,915</td>
<td>6,931</td>
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<td>Graduates</td>
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42,298

13,483 \{ 32\% \text{ female students} \\
28,815 \{ 68\% \text{ male students} \\

Engineering 57\% \\
Natural Sciences 23\% \\
Humanities, Social Sciences and Economics 13\% \\
Medicine 7\%
Why studying HPC in Aachen?

• Because it is one of the best places in Germany:
  – HPC locations: 19 members of Gauß-Allianz
  – Technical Universities: 9 large technical universities (www.tu9.de)
  – Excellent universities: 11 universities in Germany

• Take the cross section:
  – TU Munich
  – TU Dresden
  – RWTH Aachen University
Option for Higher Education in CES/HPC

• Computational Engineering Sciences
  – study program at RWTH Aachen University (Faculty of Mechanical Engineering)
  – divided into a 7-semester Bachelor and a 3-semester Master course

• MSc in Simulation Sciences
  – 4 semester program at German Research School of Simulation Sciences (GRS), RWTH Aachen University
  – harmonization courses to integrate students from different background

• BSc Scientific Programming
  – Study program at University of Applied Sciences Aachen
  – In combination with MATSE integrated degree program
HPC Education

Lectures:
• Introduction to High-Performance Computing
• Parallel Programming
• Performance and Correctness Analysis of Parallel Programs
• Computational Differentiation
• High-performance matrix computations
• Combinatorial Problems in Scientific Computing
• Introduction to languages for scientific computing

Seminars:
• Current Topics in High-Performance Computing
• Basics of parallel programming models
• Topics in High-performance and Scientific Computing

Software Lab:
• Parallel programming with OpenMP
• Parallel Programming Models for Applications in the Area of High-Performance Computation
• Simulation Software Engineering
HPC Courses outside of the Curriculum

- **PPCES**
  - One week typically in March: Intro to Parallel Programming and Tools
  - 50 participants (in average)
  - Extensive hands-on exercises

- **aiXcelerate**
  - Half a week typically in October or November: Advanced HPC Programming
  - 25 participants (in average)
  - Bring-in your own code event

- **Fortran course**

- **Tutorials on OpenMP and Tools**
  - SC, ISC, various customers, Euro-Par, …
  - Virtual Institute – High Productivity Supercomputing (www.vi-hps.org)