# PATC GPU PROGRAMMING COURSE 2018
## COURSE OVERVIEW

23 April 2018 | Andreas Herten | Forschungszentrum Jülich

JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

# Welcome!

Welcome to

*GPU Programming with CUDA*

Course 2018!

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# Jülich Supercomputing Centre



- Forschungszentrum Jülich
- Part of Institute for Advanced Simulation (IAS)
- Operates supercomputers and connected infrastructure
- Researches in next-gen supercomputers
- Supports applications leveraging machines
- Supercomputers
    - JUQUEEN
    - JURECA
    - DEEP
    - JURON/JULIA
    - Former: JUROPA, JUGENE, JUDGE

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# CUDA Course

- Since 2010
- There are other *many-core* courses
  - OpenACC: 29 – 30 October 2018
  - ~~OpenCL~~

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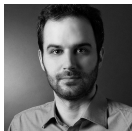Forschungszentrum

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# CUDA Course

- Since 2010
- There are other *many-core* courses
  - OpenACC: 29 – 30 October 2018
  - ~~OpenCL~~
- Tutors of this course



**Andreas Herten**
NVIDIA Application Lab
at Jülich, JSC



**Jiri Kraus**
NVIDIA Application Lab
at Jülich, NVIDIA



**Jochen Kreutz**
Division
Technology, JSC



**Jan Meinke**
Division
Computational Science, JSC

# Timetable

| Session | Day 1 | Day 2 | Day 3 |
|---|---|---|---|
| M1 | Introduction to CUDA<br>*Andreas* | Matrix Multiplication 1<br>*Jochen* | Matrix Multiplication 2<br>*Jochen* |
| *B* | | *Coffee Break (10:30 - 11:00)* | |
| M2 | Introduction to CUDA<br>*Andreas, Jan* | Performance Tuning<br>*Jiri* | Matrix Multiplication 3<br>*Jochen* |
| *B* | | *Lunch Break (12:30 - 13:30)* | |
| A1 | CUDA Tools, Unified Memory<br>*Andreas* | Multi-Node Programming<br>*Jiri* | CUDA Coop Groups, CUDA C++<br>*Andreas, Jan* |
| *B* | | *Coffee Break (15:00 - 15:30)* | |
| A2 | CUDA Tools, Unified Memory<br>*Andreas* | Multi-Node Programming<br>*Jiri* | CUDA C++, CUB, Wrap-Up<br>*Jan* |

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# Organizationals

- Please sign Attendance List!
- Coffee breaks: One floor up (thanks to PATC!)
- Lunch breaks: In canteen (*Casino*)
  - External guests: Lunch cards from us
  - Jülich employees: Pay for yourself
- Interactive course!
  - Lots of hands-on in different tasks!
  - Feel free to ask questions, also during lectures

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# More Technicalities

- Supercomputer for this course: **JURON**
- JURON: **Usage agreement needed!**
- Infrastructure for tasks
  - Each person has login: `train051` - `train080`
  - Login valid for local computers **and** supercomputer
  - Password given on sheet of paper, valid for login and SSH key
  - Sheet of paper in return for signed usage agreement
- Tasks
  - Tasks are in home directory of supercomputers
  - Sorted by session
  - Solutions are always given, you decide how long you tinker before peaking into solutions
    (Hint: The later, the more benefit you will get from this course!)
  - There's a cheat sheet for the most important commands!

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# Let's Get Started!

Questions?

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