NHR FAU

FAU Friedrich-Alexander-Universität Erlangen-Nürnberg

Node-Level Performance Engineering

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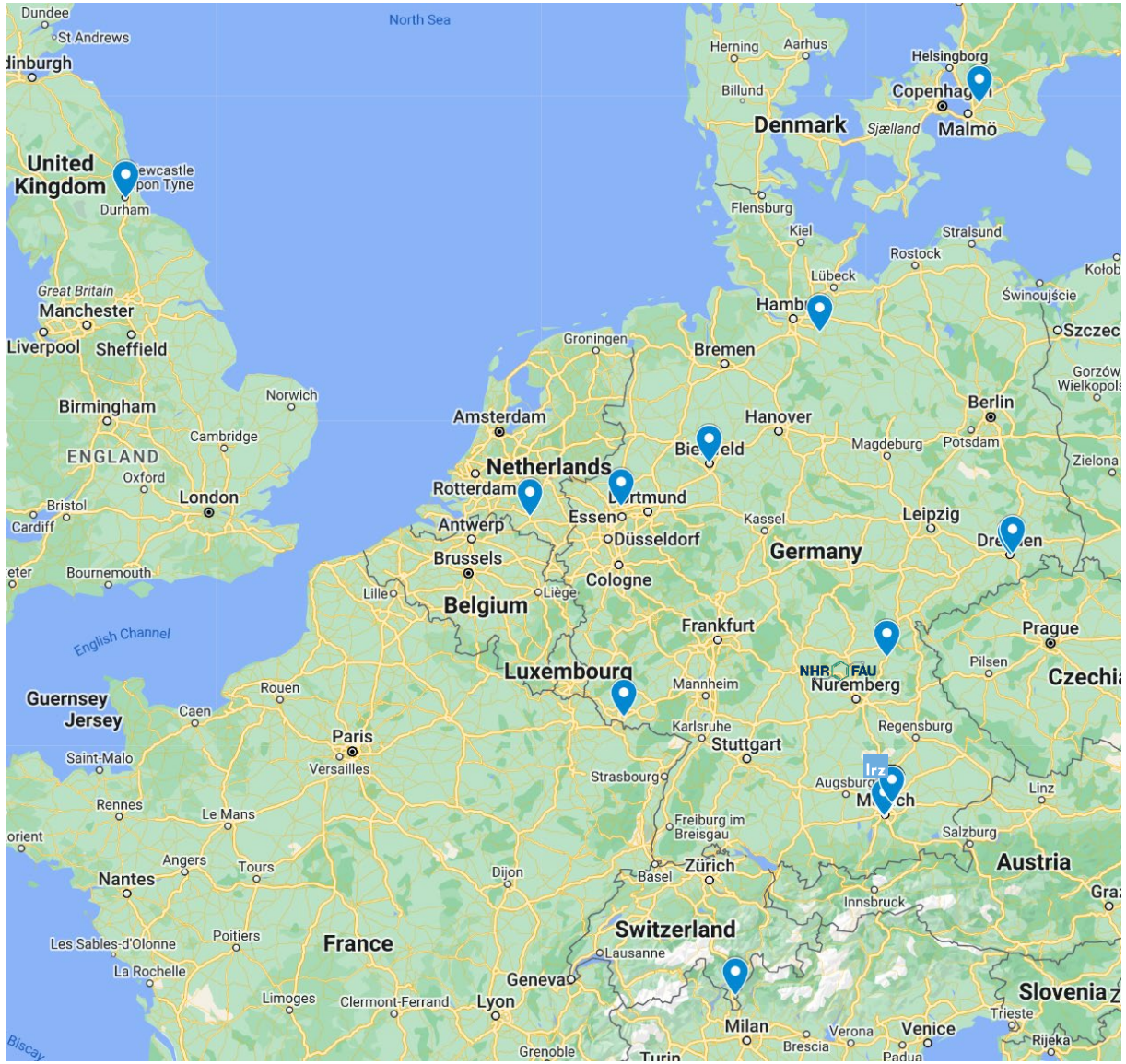
https://go-nhr.de/NLPE-LRZ

Three-day online tutorial

Leibniz Supercomputing Center (LRZ)

December 3-5, 2024

Welcome to NLPE-LRZ 2024



Course schedule day 1

https://go-nhr.de/NLPE-LRZ

Time	Day 1	Presenter
9:00	Welcome – Intro	GH
9:30	Computer architecture for software developers (1)	GW
10:15	Coffee break	
10:30	Computer architecture for software developers (2)	GW
11:00	Hands-on: Divide benchmark	
11:30	Tools: Topology and affinity, frequency	GH
12:00	Lunch Break	
13:00	Hands-On: topology, affinity	
13:45	Introduction to the Roofline Model	GW
14:45	Coffee break	
15:00	Tools: performance counters	GH
15:45-	Quiz/Q&A/open end	

Course schedule day 2

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Time	Day 2	Presenter
9:00	Roofline case study: Stencil smoothers	GW
9:45	Hands-on: performance counters and memory bandwidth	
10:45	Coffee break	
11:00	Performance Engineering: Basic skills	GH
11:45	Hands-on: Dense matrix-vector multiplication (I)	
12:30	Lunch	
13:30	Optimal use of parallel resources: ccNUMA	GW
14:00	Optimal use of parallel resources: SIMD	GH
15:00	Hands-on: SIMD in MiniMD	GH
15:30	Coffee break	
15:30-	Quiz/Q&A/open end	

Course schedule day 3

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Time	Day 3	Presenter
9:00	Hands-on: Dense matrix-vector multiplication (II)	
10:00	Roofline case study: Tall & skinny matrix-matrix multiplication	GW
10:30	Coffee break	
10:45	Roofline case study: Sparse matrix-vector multiplication	GW
12:15	Lunch	
13:15	Hands-on: Matrix-free CG solver	
14:45	Coffee break	
15:00	The ECM performance model	GH
16:00	Quiz/Q&A/open end	