

Node-Level Performance Engineering

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Four-day online tutorial

High Performance Computing Center Stuttgart (HLRS)

June 18-21, 2024

<https://go-nhr.de/NLPE-HLRS>

Welcome to NLPE-HLRS 2024



H L R I S

High-Performance Computing Center | Stuttgart



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

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

Time	Day 3	Presenter
9:00	Optimal use of parallel resources: SIMD	JE
10:00	Hands-on: SIMD in MiniMD	
11:00	Coffee break	
11:15	Roofline case study: Sparse matrix-vector multiplication	GH
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	

Do not forget to fill out the feedback form **after the course**:

<https://survey.hlrs.de/index.php/668734?lang=en>

