

HPC and AI at HLRS

WSSP, Stuttgart, Germany, April 14, 2023

Michael Resch, HLRS, Stuttgart, Germany





35th WSSP



Our Mission

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Situation / KPIs of HLRS

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Issues

- **Topics**
 - Energy
 - Climate Change & The Environment
 - Health & The Aging Society
 - Mobility in the 21st Century
 - Digital Societies
- **Technologies**
 - AI/Data to Solution (D2S)
 - Cyber Security
 - High Performance Computing
 - Green-IT
- **Customer Base**
 - Research
 - Industry
 - **Public Agencies**



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Our Systems

- HPE Apollo 9000 (Hawk)
 - Technology
 - 720.896 cores AMD EPYC "Rome"
 - 1,44 PB Main Memory
 - ~26 PetaByte Disk
 - Performance
 - ~26 PetaFlops Peak
 - >2 PetaFlops Sustained
 - Network connectivity
 - Internal 200 Gbit/s
 - External 100 800 Gbit/s



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und Forschung

Bundesministerium für Bildung

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Baden-Württemberg MINISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND KUNST









- HLRS "Hawk" AI Extension
 - 24 HPE Apollo 6500 Gen10
 + systems
 - 192 NVIDIA A100 GPUs
 - ~120 Pflops AI Performance
- NEC SX-Aurora TSUBASA A300-8 @ 2.6 GHz
 - Number of nodes: 8
 - Memory per node: 192
 GBVector engines: 8 x
 NEC Type 10B @ 1.4 GHz
 - Vector engine memory:
 48 GB @ 1.2 T3/second

ACC

NEC



Hybrid Architecture Approach (orig. 2008)



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Organisation

- **Service Management and Business Processes**
- This department is advancing the convergence of highperformance computing and artificial intelligence, in particular with the goal of supporting hybrid HPC/AI workflows on a single infrastructure. This includes developing AI solutions, specifically in a business context, using cutting-edge technologies for big data, machine learning, and deep learning.



Head of Department: **Dennis Hoppe**

Research Projects

- CATALYST: researches methods for analyzing large datasets produced by modeling and simulation with the goal of implementing a framework that combines HPC and data analytics.
- CIRCE: will assess potential applications of highperformance computing (HPC) in crisis situations, and what organizational procedures are needed to ensure that HPC resources are immediately available.
- SEQUOIA: HLRS is developing new software for quantum computers and investigating ways to integrate them with conventional systems for high-performance computing and artificial intelligence.







Education & Training

- IKILEUS: HLRS is the coordinating center for this project to integrate artificial intelligence (AI) topics into curricula at the University of Stuttgart, and to implement AI technologies to improve instruction.
 - AI4Education
 - Education4AI
 - AI4Training

FUTURE OF HLRS

35th WSSP



Project SiVeGCS+ (Smart Scaling Strategy)

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NEW DATA CENTRE 2026/2027

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35th WSSP

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35th WSSP

April 14

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