Karlsruher Institut für Technologie

9th HPC Café

05.09.2025

Agenda HPC Café – 05.09.2025

Topics for today:

- **HoreKa 2**
- Further news from SCS
- Q&A about AI @ HPC

As usual this format is meant to be interactive.
Don’t hesitate to ask questions!

Karlsruher Institut für Technologie

Organizational details

- Official name: “HoreKa 2”
- **Tendering and procurement**
  - Start of tendering: April 2025
  - Contract: August 2025
- **Installation schedules**
  - Phase 1 (everything except GPU): End of Q4 2025
  - Phase 2 (GPU): Q2 2025 (?)
- **User operation schedule**
  - Decommissioning: HoreKa Blue + HoreKa Green
  - Commissioning: CPU HoreKa 2
  - Continued operation: HoreKa Teal + HoreKa Ruby + HoreKa Blue Extra Large Memory
  - Commissioning of GPU HoreKa 2

Technical Data: Overview

Compute

- 164 CPU nodes
  - Computing power: 15 PFlop/s
  - Bandwidth: 980 TB/s
- 75 GPU nodes (NVIDIA Superchip)
  - Computing power: 6.1 + 110 PFlop/s
  - Bandwidth: 650 + 7100 TB/s

Storage

- Home
  - Capacity: 6 PiB
  - Bandwidth r/w: 65/52 GB/s
- Work
  - Capacity: 14 PiB
  - Bandwidth r/w: 152/121 GB/s

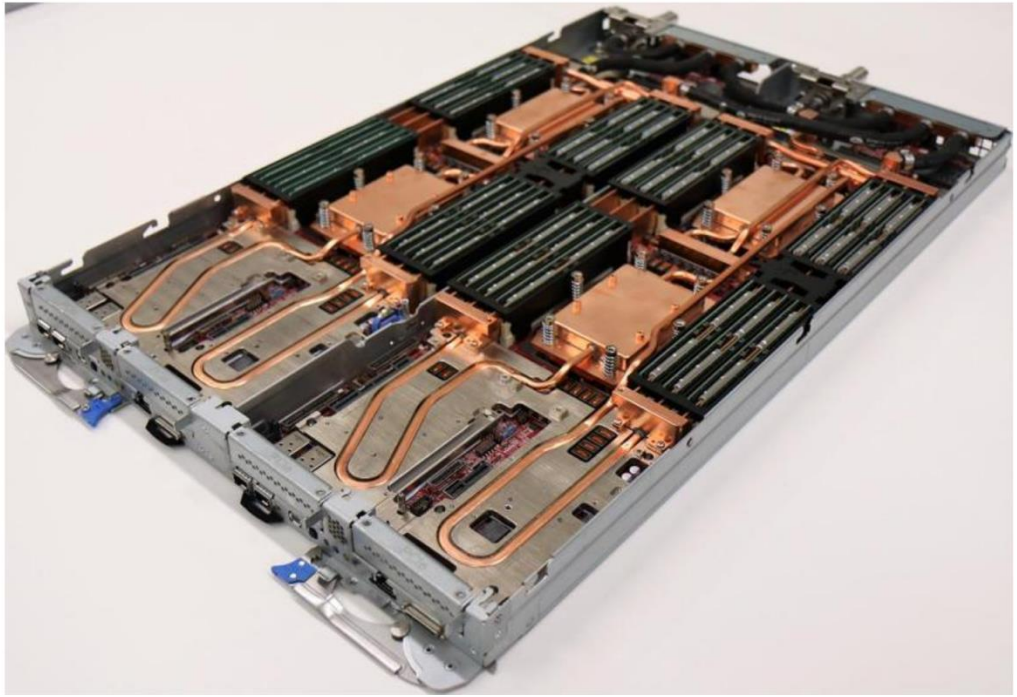
Power consumption and cooling

- ~600 kW water (85%)
- ~100 kW air (15%)

Technical Data: Details

CPU nodes

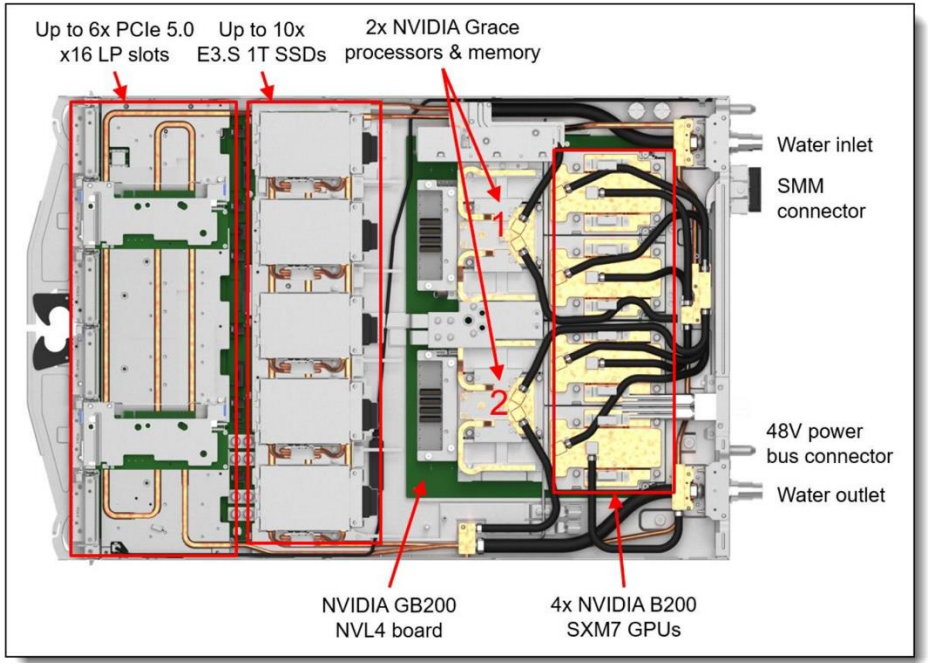
- 2x AMD EPYC 9655 with 96 cores
- 768 GiB RAM
- 1.92 TB NVMe
- 1x NDR OSFP400
- DLC



Technical Data: Details

GPU nodes

- 1x NVIDIA GB200 NVL4
- 2x Grace CPU and 4x B200 GPU
  - 72 cores and 480 GB RAM per Grace CPU
  - 186 GB VRAM per B200 GPU
- 15.36 TB NVMe
- 2x NDR200/HDR/200GbE
- DLC



Technical Data: Details

Storage

- IBM Storage Scale ESS 6000
- Home and Work
- NVMe + HDD Tier

Operational and User Aspects

- **2 host architectures**
  - x86 and ARM
  - Each with its own login nodes
  - Each with its own software stack
- **Please test and verify in advance**
  - Compiling
  - Commercial software
  - AI toolboxes

→ FTP-A64 ARM cluster*

*) https://www.nhr.kit.edu/userdocs/ftp/hardware/

NVIDIA Superchips

	Grace-Grace	Grace-Hopper
No. Nodes	6	2
CPU	2x Grace CPU Superchip	1x Grace CPU Superchip
Total Cores	144	72
CPU Clock	3.4 GHz	3.1 GHz
Instruction Set	ARMv9 + SVE2	ARMv9 + SVE2
Memory	480GB	480GB
Accelerator Type	-	GH200
No. Accelerators	-	1
Disk (useable)	3.8 TB	1.92 TB
Disk type	NVMe	NVMe
InfiniBand	200 GBit/s ConnectX-6	200 GBit/s ConnectX-6

Karlsruher Institut für Technologie

Further news from SCS

Commissioning HoreKa Ruby

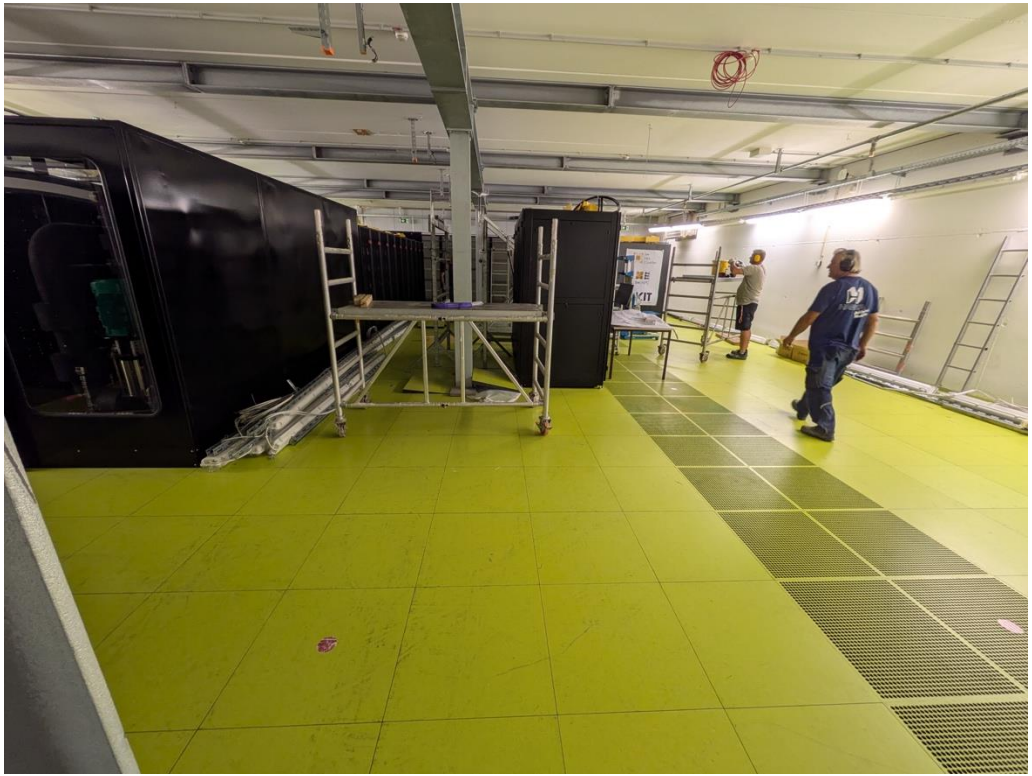
- originally “HoreKa-KI”
- In operation since 08/2025*

- 12 GPU nodes
- 2x AMD EPYC 9454 with 48 cores
- 768 GB RAM
- 4x NVIDIA HGX H200
  - 141 GB VRAM per H200
- 15.36 TB NVMe
- 4x NDR400

*) https://www.scc.kit.edu/ueberuns/18577.php

Power supply

- Upgrade of power distribution
- Up to 1.8 MW per double rack row
- Clean separation of AV/UPS power



Short queues on bwUniCluster 3.0

- 19 nodes
- 2x Intel Xeon Gold 6248R with 24 cores
- 384 GiB RAM
- 4x NVIDIA A100 à 40 GiB VRAM
- Available in gpu_a100_short
- Runtime: 30 minutes

- Reasoning
  - VIP mode
  - Alternative to dev-queues
  - Checkpointing ;)

Karlsruher Institut für Technologie

SCC

3. Questions and Answers

3.1 AI @ HPC

- Operational and Business Model
  - Collaboration vs. housing
    - Minimum investment levels
      - Sub node level?
      - capacity limits/needs,
      - Action items: price list, legal framework
  - Spontaneous vs. instantaneous access
  - Centralized vs. decentralized mngt./scheduling

- Resource Planning & Teaching
  - Classroom: Kubernetes / bwJupyter
  - Graduate/Lab teaching: X GPUs?

3.1 AI @ HPC

- Sensitive Data Handling
  - Onsite processing required for personal data; offsite only if fully anonymized
- Data Growth
  - Foundation model data requirements are rapidly increasing
    - Expected to double every 1–2 years