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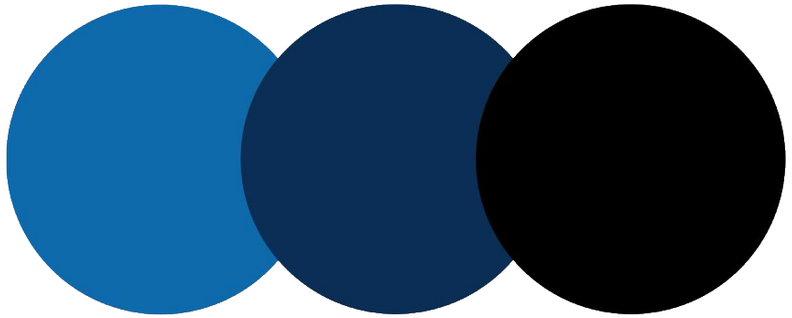

MUSICA

multi-site computer austria

Quantum Austria

- On the initiative of the Federal Ministry of Education, Science and Research, Austria is investing 107 million euros in the expansion of quantum research and technologies with funds from the NextGenerationEU development and resilience plan.
- The aim is to further strengthen competitiveness and European cooperation in this strategic key technology.
- Both basic research and the development of practical applications are funded. The research promotion agency FFG and the science fund FWF work closely together in the allocation of funding.
- Funding was started in November 2021.

Multi Site Computer Austria MUSICA

- This cooperative project under the consortium leadership of TU Wien and in cooperation with the Vienna Scientific Cluster aims to build up a powerful additional research infrastructure in the field of high-performance computing in Austria for the coming years.
- This new HPC infrastructure will be distributed over three locations in Austria (Vienna, Innsbruck, Linz), whereby it should be **a single system from the user's point of view.**
- The MUSICA part installed in Innsbruck together with a **quantum computer** from the QACI project will form a tightly coupled infrastructure for developing hybrid algorithms.
- In addition to the general strengthening of traditional HPC resources, the focus is on strengthening resilience and particularly on **supporting Artificial Intelligence** with dedicated accelerators.
- integrating cloud native applications on top of an on-premises cloud infrastructure.

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Multi Site Computer Austria MUSICA

- Project proposal MUSICA approved in April 2022
- Started in October 2022
- Project Partners:
  - Technische Universität Wien (lead, installation site)
  - Universität Innsbruck (installation site)
  - JKU Linz (installation site)
  - Universität Wien
  - Technische Universität Graz
  - BOKU – University for Natural Resources and Life Scienes
- Funding: € 20 million over 3 years + € 16 million Resilience funds

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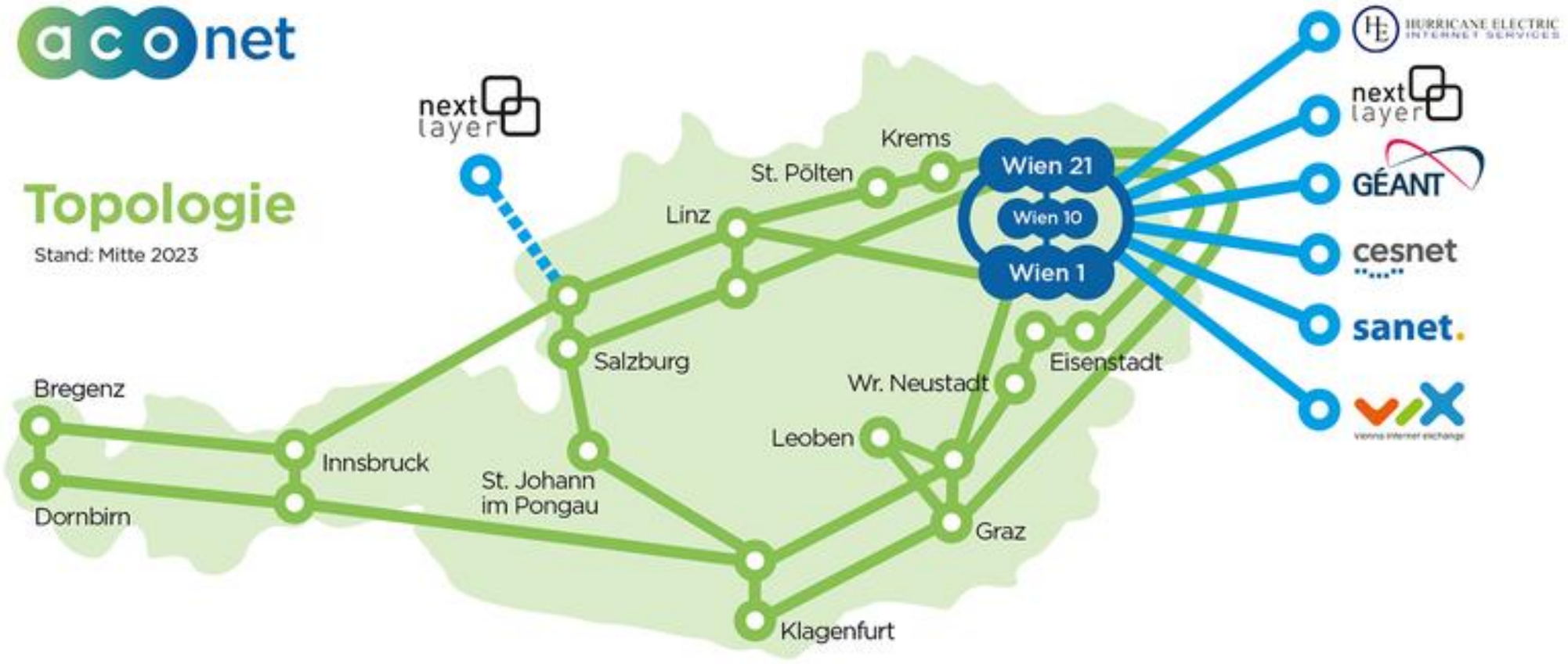
MUSICA - ACOnet Connectivity



MUSICA – Private Network

- Implementing a private network between VSC, JKU and UIBK
  - Using ”dark fibre” links from network provider (A1)
  - Routing is done only on border routers on the three sites
- No Firewalls and no VPN in the internal network
  - Eliminating performance bottlenecks
  - Sensitive data will be encrypted on application level

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MUSICA - Challenges

- Operation as a single system
  - Deployment (single source)
  - Authentication (single user basis)
  - Scheduling (SLURM)
- Resilience
  - Each partition (site) can be operated independently
  - Fail over for selected tasks/jobs
- Storage – single name space
  - Evaluation of kalray/engenea and IBM/AFM
- Running both traditional HPC and Cloud Services
- On premises cloud stack

MUSICA - Specifications

- Compute: Lenovo
  - CPU nodes: 48 / 48 / 72
    - 2x AMD EPYC 9654, 192 cores, 768 GB
    - 1 x NDR 200 Infiniband
  - GPU nodes: 80 / 80 / 112
    - 2x AMD EPYC 9654, 192 cores, 768 GB
    - 4x Nvidia H100 94 GB
    - 4 x NDR 200 Infiniband
  - Management/Ceph for all 3 locations
- Storage: MEGWARE
  - 3 Weka® Data Platform, each 4 PB
    - 2 x NDR400 InfiniBand
    - 1.800 GB/s read, 750 GB/s write

MUSICA - Performance

- Two sites currently set-up in Vienna, test-operations, will be split later
- Pos. 50 in Top-500 ranking
  https://top500.org/lists/top500/list/2024/11/

Rank	System	Cores	Rmax (PFlop/s)	Rpeak (PFlop/s)	Power (kW)
50	**Phase 1** - ThinkSystem SD665-N V3, AMD EPYC 9654 96C 2.4GHz, Nvidia H100 SXM5 94Gb, Infiniband NDR200, RHEL, Lenovo MUSICA Austria	161,280	24.22	37.52	

- Third site to be set up mid-2025

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MUSICA @ Vienna