



# ROIHU

CSC's next supercomputer – coming 2026

# DL2026 program

- **User requirements and expectations are constantly evolving**
  - Invest in an ecosystem that is flexible and meets new requirements
  - Service and functionality in focus
- **Coherent overall infrastructure for Finnish research**
  - Complementary with LUMI and other platforms



Puhti and Mahti will  
be replaced by a  
new supercomputer:

**ROIHU**

**Cloud** and **Allas**  
**services** to be  
invested in and  
improved as well

# Roihu is an Eviden BullSequana XH3000 supercomputer





# ROIHU

System overview  
[docs.csc.fi/roihu](https://docs.csc.fi/roihu)



AGGREGATE HIGH-PERFORMANCE LINPACK

**34 PETAFLUPS**

33.9 x 10<sup>15</sup> operations per second

**486 CPU nodes**

2 x 192-core  
AMD Turin 9965

**132 GPU nodes**

4 x NVIDIA  
GH200 superchip

**Infiniband NDR interconnect**

200 Gbit/s per CPU node  
200 Gbit/s per GPU

EVIDEN XH3000 SUPERCOMPUTER

**9 RACKS**

Fully liquid cooled – over 1 MW of power

DDN EXASCALER

**6.5 PETABYTES**

Fully flash-based Lustre storage

Scratch disk

**6 PiB**

560 GB/s read perf  
280 GB/s write perf

Home & ProjAppl disk

**0.5 PiB**

120 GB/s read perf  
100 GB/s write perf

# Overview of solution – Roihu compute

- **Roihu is an Eviden XH3000 system**
  - Next generation of Mahti (XH2000)
- **CPU partition based on AMD Turin 9965**
  - 2 x 192 cores per node
  - AMD Zen 5 architecture has full AVX-512 support – twice the Flop rate vs. Mahti
- **GPU partition based on NVIDIA GH200**
  - 4 x H100 GPUs & 72-core Grace ARM CPUs per node
  - Best price/performance solution for HPC & AI
- **Special resources**
  - 4 x high memory (6 TiB) and visualization nodes (NVIDIA L40), each with 2 x 7.68 TB local disks
  - 307.2 TB disaggregate NVMe capacity

Roihu	
CPU compute nodes	486
CPU cores	186 624
Memory per node	768–1536 GiB
GPU compute nodes	132
GPUs	528
Memory per chip	120+96 GiB (CPU+GPU)
Scratch storage	6+ PiB
Home and ProjAppl	0.5 PiB
Node temp storage	960 GB
HPL aggregate perf.	33.9 PFlop/s

# Overview of solution – Roihu storage

## Fully flash-based Scratch storage for active data

- **10 times more bandwidth than Puhti Scratch**
  - Much better performance for difficult I/O patterns
- **6 PiB total capacity**
  - Can be expanded during lifetime of system
- **ProjData** – special disk area on Scratch filesystem for storing and sharing datasets

## Home and ProjAppl storage system

- Application installations and home folders
- **Separated from Scratch**
  - Ensures responsiveness even under heavy Scratch load
- **0.5 PiB total capacity**
  - Very fast performance (100+ GB/s)

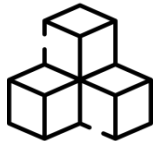
## Node local storage resources

- All nodes have 960 GB local disks
  - **For temporary files**, not high-performance I/O
- Hugemem and visualization nodes have 15.36 TB high-performance NVMe storage
- 307.2 TB disaggregated NVMe capacity
  - Appears as local scratch from within a Slurm job

# Features and functionality: what will **not** change

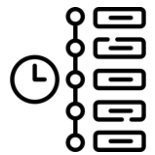


- **Roihu will have a web interface similar to Puhti & Mahti**



- **Pre-installed module environment**

- Comprehensive stack of scientific software available
- Programming environment will be similar to Mahti (GNU, AOCC, CUDA, OpenMPI, ...)



- **Slurm batch job scheduler**

- Queues will have characteristics of both Puhti & Mahti



- **Apptainer containers and Tykky supported**

- Improved documentation, base containers and container registry
- Tykky will remain available and supported

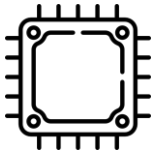


- **Disk cleaning policy**

- Will be enforced from the start, similar to current process on Puhti
- CSC will provide improved tools for moving data to/from Allas



# Features and functionality: upcoming changes

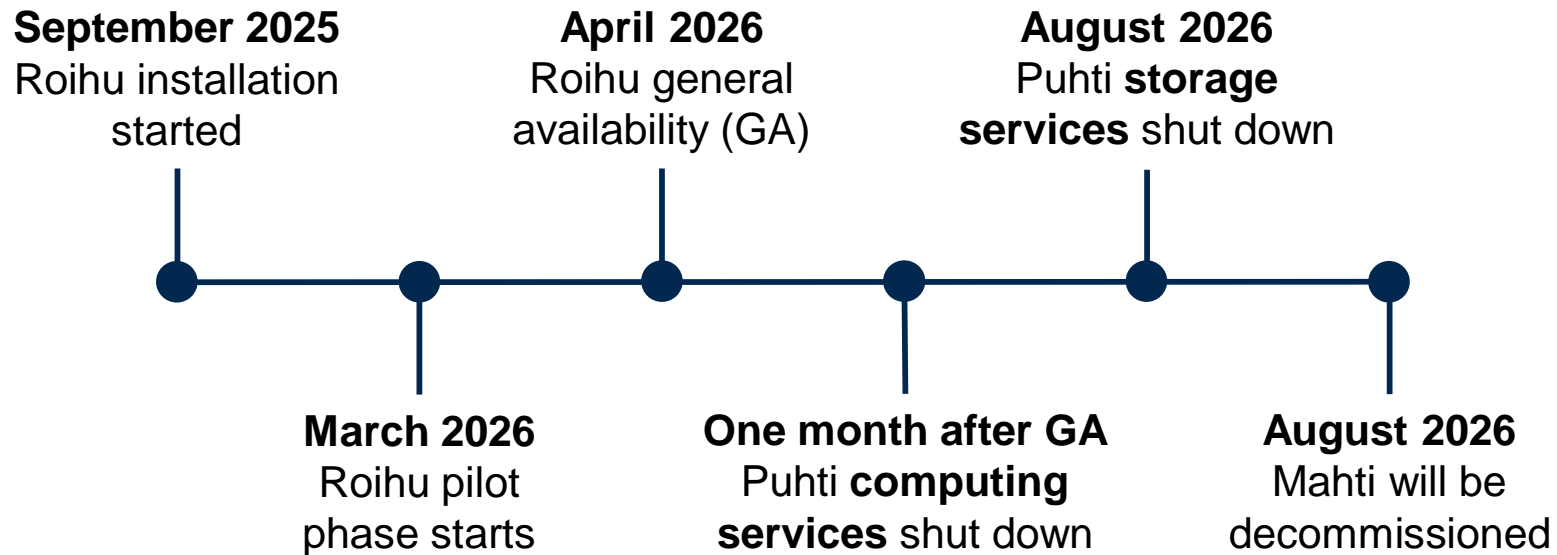


- **New hardware and OS (RHEL9)**
  - Intel vs. AMD, GPU nodes will have ARM CPUs (Grace)
- **Smaller, but much faster storage than Puhti & Mahti combined**
  - Capacity to be expanded during Roihu lifetime
- **Disaggregated fast storage service**
  - Users can request local disk mounts from centralized storage
- **Increased security**
  - Short-term certificates required for SSH access
  - Optional login nodes with per-user container isolation
- **Support for confidential data computing will be developed**
  - Integration with Sensitive Data services
- **FirecREST API for accessing Roihu compute and storage**
  - Integrate workflows and web services to HPC





# Roihu timetable (tentative)



- Roihu installed in same datacenter as LUMI – will be brought up without disturbing Puhti & Mahti
- Aim is to enable users to migrate to Roihu without any break in HPC access

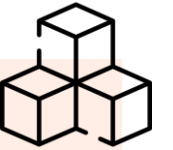
# How to prepare for Roihu migration?

## Data migration



- Clean up your data before migration:  
**only move what you really need!**
  - Roihu has less disk space than Puhti & Mahti combined, and stricter criteria for granting extended quotas
  - Existing quota extensions will not be automatically moved to Roihu
- **As a general rule, data should be moved directly to Roihu (not via Allas)**
  - Familiarize with data transfer utilities in advance: [docs.csc.fi/data/moving](https://docs.csc.fi/data/moving)
  - Detailed Roihu migration guide coming later

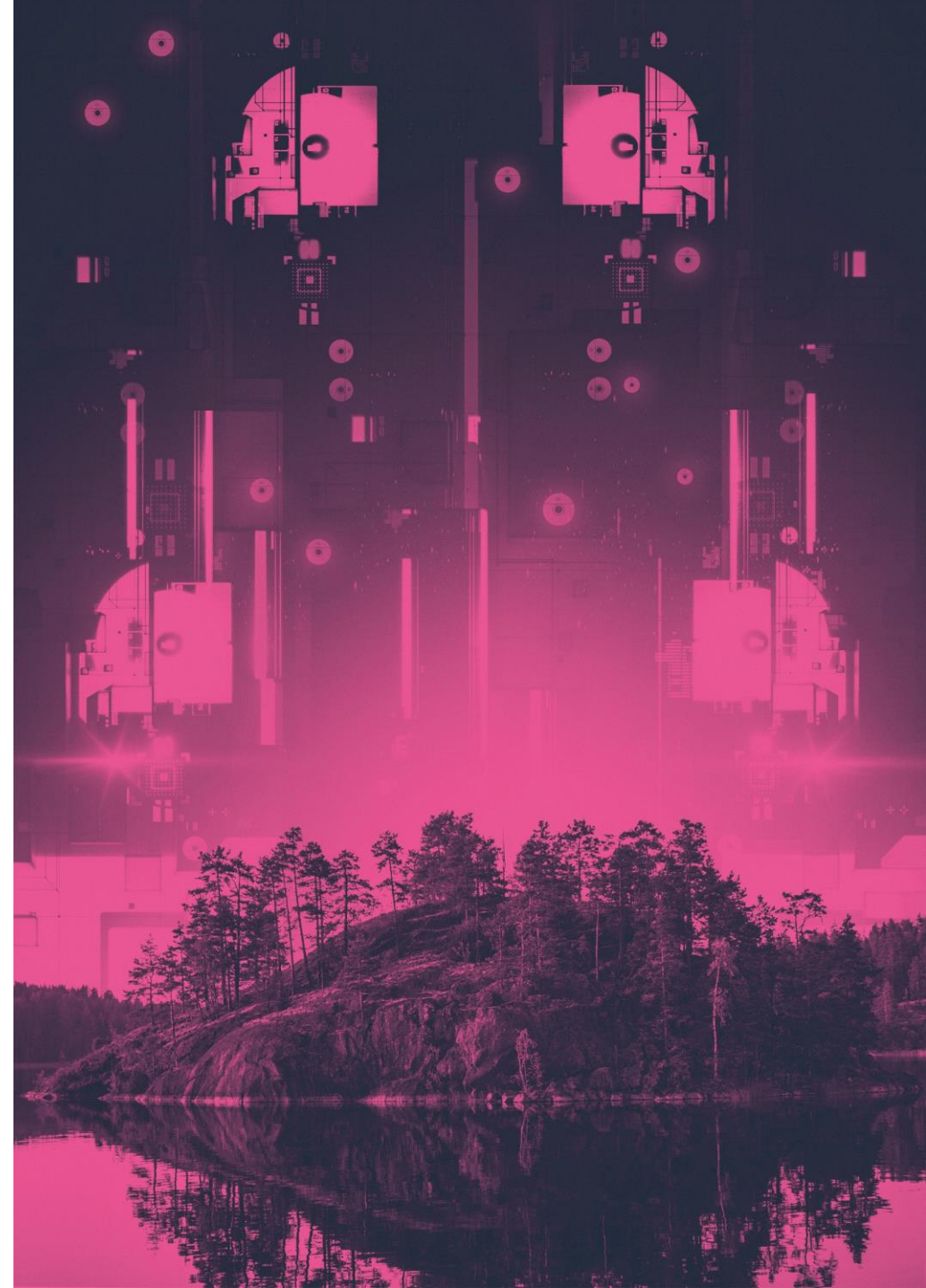
## Application migration



- **New hardware, OS, module stack**
  - Prepare to recompile your own software
  - Check if/how your GPU code can run on the GH200 nodes (ARM)
  - Containerized Python environments (Tykky) and other Apptainer containers might work as is (except on GPU nodes)
- New Slurm partitions – **old batch scripts should not be expected to work**
  - CSC will develop documentation and provide templates and support for setting up new scripts and workflows

# Changes to Allas and cloud services

- **New hardware for Allas and Pouta** will also be installed as part of DL2026 program
- New version of Allas with **more storage capacity** coming in 2026
  - **"Allas 2" will only support S3 interface** – swift not supported
  - **Data will not be automatically migrated** – CSC will develop tools and documentation to help with migration in 2026
- **Pouta**
  - **More GPUs**, possibility to make available in **Rahti**
  - Also storage and CPU resource
  - ePouta updated end of 2025, cPouta later in 2026





# DL2026 outreach project

- Project's aim is to inform about the DL2026 infrastructure renewal and help users to migrate to and use the new systems
- **How?**
  - Presentation, documentation, self-learning materials, blog posts, ...
  - [docs.csc.fi/roihu](https://docs.csc.fi/roihu)
- **Invite us to tell you more!**
  - We are happy to give a tailored presentation for your lab, department or university about DL2026, Roihu, or CSC services in general

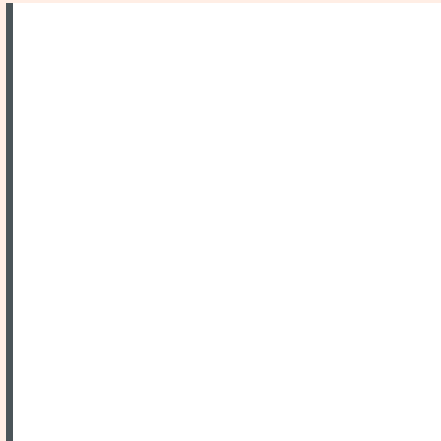


Contact us via:  
[servicedesk@csc.fi](mailto:servicedesk@csc.fi)





# Share your needs and give us feedback!



Follow us

[LinkedIn](#)

[Instagram](#)

[Facebook](#)

[YouTube](#)

[csc.fi](#)