

HPC / C++ Engineer – GPU Porting and Optimization

Application Support Team (AST) | Alice Recoque Exascale Supercomputer

CEA is recruiting an HPC engineer to join the Application Support Team (AST) for the future Alice Recoque exascale supercomputer. You will help scientific teams port, optimize, and scale their applications on next-generation CPU/GPU architectures.

Location: CEA Paris-Saclay | **Contract:** 36-month fixed-term | **Start date:** January 2027

Background

Alice Recoque will be one of Europe's first exascale-class supercomputers. Hosted at CEA's Very Large Computing Centre (TGCC), it will feature next-generation AMD processors and accelerators, as well as a CPU partition. Available to European scientific communities, it will drive progress in numerical simulation, large-scale data processing, and artificial intelligence.

In preparation for its planned opening to users in 2027, an advanced Application Support Team (AST) will provide sustained support to selected scientific projects. Its role is to address the technical challenges of exascale computing: adapting algorithms, ensuring performance portability, optimizing GPU execution, and deploying software on large-scale HPC systems. Work may begin on existing supercomputers or pre-production platforms before moving to Alice Recoque.

Responsibilities

At CEA, you will work at the interface between scientific software developers, parallel-computing specialists, and HPC infrastructure support teams. Your main responsibilities will include:

1. Scientific application support and porting

- Analyze scientific codes and user requirements (computational profiles, dependencies, software architecture, memory usage, parallelism) to define CPU/GPU porting strategies.
- Work directly with application developers to modernize computational kernels, data structures, and algorithms while ensuring numerical correctness and maintainability.
- Develop representative test cases, mini-applications, and benchmarks to measure progress and validate optimizations.

2. GPU optimization and performance portability

- Port and optimize C++ applications using Kokkos, MPI, OpenMP, and, when appropriate, AMD GPU programming tools (HIP/ROCm).
- Use profiling to identify bottlenecks in data transfers and memory access, vectorization, task granularity, MPI communication, computation/communication overlap, and multi-GPU scaling.
- Compare programming approaches and propose robust, sustainable solutions that balance performance, portability, and code readability.

3. Software environments and integration

- Prepare and test applications on available architectures ahead of Alice Recoque's commissioning, then assist with their deployment and optimization on the system.
- Help integrate software environments: compilers, numerical libraries, MPI, CMake, Spack, automated testing, job schedulers, and performance analysis tools.
- Where relevant, address C++/Python interoperability needs and integration with scientific simulation and AI environments.

4. Advanced support, knowledge sharing, and training

- Coordinate with other AST members and user communities; document technical decisions and share performance results.
- Contribute reusable tools and libraries, particularly within the Kokkos ecosystem, and foster synergies with relevant national and European initiatives.
- Take part in porting workshops, training sessions, experience-sharing activities, and technology monitoring related to exascale architectures.

Qualifications and skills

Master's degree, engineering degree (five years of higher education), or PhD in computer science, computational science, applied mathematics, or a related field. Experience in HPC application development and optimization is an advantage.

- Essential skills: solid command of modern C++; experience in parallel programming (MPI, OpenMP and/or Kokkos); understanding of HPC architectures and methods for performance measurement and optimization.
- Desirable skills: GPU programming (Kokkos, HIP/ROCm, SYCL, or OpenMP target), profiling, scientific software development, Linux environments, and collaborative tools (Git, CMake, CI/CD).
- Additional assets: large-scale distributed computing, GPU data management, Python, numerical libraries, and HPC deployment tools (Spack, Slurm, containers).
- Personal qualities: rigor, independence, scientific curiosity, user-oriented mindset, teamwork, and technical English suitable for international collaboration.

Working environment and benefits

You will help prepare a major European scientific infrastructure, working closely with demanding research projects and HPC specialists. CEA offers compensation based on experience and qualifications, opportunities for training and professional travel, as well as the employee benefits and remote-working arrangements applicable at CEA Paris-Saclay.

How to apply

Send your CV and cover letter to: remi.baron@cea.fr

Further information: [Alice Recoque – CEA](#) • [AST overview](#)