HPC Business Innovation for SMEs

Collaboration between Romanian NCC and Netherlands NCC

EUROCC2

1. General information

Project/Call full name: HPC Business Innovation for SMEs
Publication date: 22.06.2023
Deadline: on going open call
Expected duration of participation: maximum 12 months
Contact: eurocc@ici.ro

1. HPC Overview. What is HPC?

High-Performance Computing most generally refers to the practice of aggregating computing power in a way that delivers much higher performance than conventional computing systems in order to solve large problems in science, engineering, or business.

HPC, or supercomputing, enables the user to solve complex problems in different application domains. When a solution requires intensive computing tasks, it cannot be managed by conventional computers, for example, laptops or desktops. The architecture of HPC systems includes a hierarchy of processing units, also called cores. The HPC software allows application programs to run in parallel, using a large number of computing units at the same time.

Most supercomputer systems in operation today are classified as petascale systems, which means that a supercomputer system can process more than one petaflop - 10^{15} operations per second). In computing, floating point operations (flops) is a measure of computer performance. In recent years, the R&D world has strived to move supercomputing to the next level, Exascale - 10^{18} operations per second. HPC is used for simulations and visualizations, e.g. virtual testing of safety-relevant car driving systems, design of airplanes, analysis of seismic data, prediction of air quality, simulations for drug compounds in medicine, and much more. Using HPC for product optimization brings significant benefits, as prototyping the products is often an expensive and time-consuming process.

HPC is becoming more accessible than ever before – scientists, researchers, and engineers can run HPC workloads on on-premise infrastructure or can use resources from public cloud service providers.

2. Background

The **National Institute for Research and Development in Informatics - ICI Bucharest** and **SURF**, through the European program EuroHPC JU, are involved in the European Union project "National Competence Centers in the Framework of EuroHPC - Phase II" (eurohpc-ju.europa.eu), with the aim to continue the establishment of the National Competence Centers in HPC and to support them in order to develop HPC expertise and to encourage the European collaboration and exchange of best practices in the HPC domain.

Within the European project, the competence centers will operate as an interface to facilitate access to resources and superior computing capabilities in this field at the national and European levels. Thus, the centers will provide valuable resources for users and potential users, especially in the private sector.

The National Institute for Research & Development in Informatics - ICI Bucharest is the most important institute in the field of research, development, and innovation in information and communication technology (ICT) from Romania. The main activity of ICI Bucharest is the implementation of research-development projects in the field of ICT, thus supporting the development of the information society. Moreover, ICI Bucharest supports collaboration and cooperation in order to develop and innovate ideas and projects in emerging domains.

SURF is the ICT cooperative association that supports Dutch educational and research institutions, which are the group of members that make SURF possible. The main commitment of SURF is to develop and/or acquire the best possible digital services for Dutch institutions and encourage knowledge sharing through continuous innovation. In particular, SURF hosts the national supercomputing and storage facilities of the Netherlands (including HPC, cloud and data management tools) and keeps a large support team for them, which includes the core team of the Dutch National Competence Center.

3. Scope of the call

Through the present call, RO NCC and NL NCC offer the opportunity to the entities in the private sector to use high-level infrastructure in order to develop or test their applications or products. We offer access to the **Snellius supercomputer** (https://www.surf.nl/en/dutch-national-supercomputer-snellius), by providing computing hours based on the needs of each winning project. In addition, technical assistance will be provided in order to operate the Snellius infrastructure via requested meetings or regular service desk consultation (https://servicedesk.surf.nl). Moreover, in case the proposed project does not require supercomputer infrastructure, we can suggest an alternative platform or solution.

This call for proposals focuses on experiments carried out by SMEs or start-ups that present their ideas and work plans built around the use of HPC infrastructure for innovation in their chosen area of activity, for example, aeronautics, agriculture, medicine, manufacturing, energy, transport, maritime, engineering, data analytics, weather. The projects should be designed to enable progress and innovation in the respective domain.

Proposals to address business challenges from SMEs in a variety of application areas will be accepted. All proposals will go through a selection process carried out by RO NCC and NL NCC.

3. Expectations on proposed experiments

The expectations for the proposed experiments are

- Identify all necessary actors for the effective and efficient execution of the experiment and the demonstration of the impact on SME business challenges through the use of HPC systems or advanced HPC services. Appropriate technical management is a required component.
- Define the HPC computing resources necessary, possibly using computing resources provided directly by NL NCC. The HPC National Competence Centre may be able to provide assistance with the selection of appropriate resources and the application process directly or through other NCCs with expertise in the chosen domain.
- Declare any data protection issues that might impact its proposed work plan, define data/information protection mechanisms addressing these in the framework of Romanian and Netherlands law, and ensure that the operation of the experiment adheres to these.
- Generate publishable success stories – preferably in multi-media form – based on solutions for the SME's real-world problems that clearly identify the resulting business benefits.
- Align, where appropriate, with regional priorities, such as industrial specialization areas.

4. Submission Information

Electronic submission

The applicants will send to eurocc@ici.ro, one PDF document compliant with the instructions on the proposal structure given below.

Proposal structure

Proposals will be submitted in English. Each proposal must comprise 2 parts: Part 1 (containing administrative information) and Part 2 (containing the description of the proposal):

- Part 1 contains a cover page and a set of tables to provide administrative data
- Part 2, the main section of the proposal must not exceed 7 pages in length. The descriptive text should be no smaller than 11 point Times New Roman font.

The structure of the proposal Part 2 (and indicative length per section) should be as follows:

I. Summary (1/2 page)
II. Description of the domain and main activities (1 pages)
III. Relevance of the chosen use case, innovation aspects, potential impact, benefits, and exploitation plans (1 pages)
IV. Motivation for the need to use HPC infrastructure (1/2 page)
V. Main objectives and results (2 page)
VI. The impact of results on society (1 page)
VII. Intermediate Deliverables – progress reports, success stories, use cases, etc.

The winning proposal/proposals will be supported by RO NCC and NL NCC in order to achieve their goals and successfully implement their chosen use case. After the successful implementation of the chosen scenario, the results will be published as a success story on RO NCC and NL NCC portals and also will be disseminated on EUROCC network channels.

5. Evaluation process

The results of the evaluation will be published on the RO NCC website (https://roncc.ro/).
The evaluation process will consider the following aspects:
- the impact of the use case on the development of the society
- the complexity of the use case
- the future development perspective after the usage of HPC infrastructure
- the consistency of the results