

# SEE-HP Project – Providing Access to the Regional High Performance Computing Infrastructure

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**Abstract:** HP-SEE - High-Performance Computing Infrastructure for South East Europe's Research Communities will link existing and upcoming HPC facilities in South East Europe in a common infrastructure, and it will provide access to HPC resources to wide range of researchers. With HP-SEE regional research community will get access to computing resources of leadership-class capability and will remain competitive at the European and international level, thus overcoming fragmentation in European regions development.

**Keywords:** High-Performance Computing, Balanced Regional Development, Multi-Disciplinary User Communities.

## 1 Introduction

The project brings together 14 countries from the SEE region. Projects has begun with only few HPC installations available, not open to cross-border research, while less-resourced countries like Moldova have no mechanism established for interfacing to pan-European HPC initiatives. South-East European HPC initiative is aimed for equal participation of all countries of the region in European eInfrastructure development trends [1].

## 2 HP-SEE project strategy

HP-SEE focuses on a number of strategic actions:

First, it will link existing and upcoming HPC facilities in the region in a common infrastructure, and provide operational solutions for it.

Second, it will open this HPC infrastructure to a wide range of new user communities, including those of less-resourced countries, fostering collaboration and providing advanced capabilities to researchers, with an emphasis on strategic groups in computational physics, chemistry and life sciences.

Finally, it will ensure establishment of national HPC initiatives. HP-SEE will aim to attract local political & financial support for long-term sustainable eInfrastructure.

Development of regional scientific computing infrastructure was initialized by a series of regional projects (Figure 1). The SEEREN initiative established a regional network, while BSI project has established GÉANT link to Caucasus. The SEE-LIGHT project is working towards establishing a dark fiber backbone that will interconnect National Research and Education Networks of the SEE region.

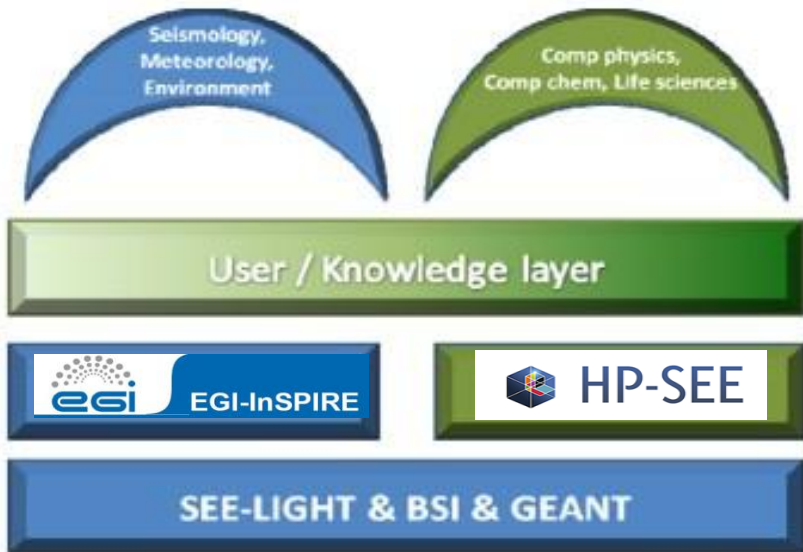


Figure 1. Supporting initiatives of regional computing infrastructure

Regional scientific computing infrastructure development is coordinating with pan-European initiatives like EGI-InSPIRE project that is focused on supporting transition process from a project-based system (the EGEE series) to a sustainable pan-European e-Infrastructure. EGI-InSPIRE activities are covering grids of high-performance computing (HPC) and high-throughput computing (HTC) resources. The project integrates new Distributed Computing Infrastructures (DCIs) such as clouds, supercomputing networks and desktop grids, to benefit the user communities within the whole European Research Area.

EGI-InSPIRE collect user requirements and provide support for the current and potential new user communities. Resources of Pan-European computing infrastructure are also available for SEE regional research community.

### **3 HP-SEE project resources**

Computational resources for the regional HPC infrastructure are provided by 6 organizations: Greek Research & Technology Network (Greece); Institute for Parallel Processing, Bulgarian Academy of Sciences (Bulgaria); "Horia Hulubei" National Institute of Research and Development for Physics and Nuclear Engineering (Romania); National Information Infrastructure Development Office (Hungary); Institute of Physics Belgrade (Serbia); SS. Cyril & Methodius University of Skopje (FYROM - Macedonia).

The structure of the regional HPC infrastructure is heterogeneous, comprising supercomputers, Intel/AMD CPU and GPU clusters. HPC resources available for user' community include Blue Gene/P supercomputer deployed at Executive Agency "Electronic Communications Networks and Information Systems" in the Bulgarian Supercomputing Centre (BGSC), consisting of two racks, 2048 PowerPC 450 based compute nodes, 8192 processor cores and a total of 4 TB random access memory. Supported parallel programming paradigms are MPI and OpenMP. There is also possibility to run jobs in HTC mode (High Throughput Computing). Another resource is the HPCG cluster located at IICT of Bulgarian Academy of Sciences. It has 576 computing cores organized in a blade system. The storage and management nodes have 128 cores. There is an agreement with the partner institution West University of Timisoara (Romania), concerning access of Moldavian researchers to Blue Gene/P supercomputer which deployment finishes in the nearest future.

It is planned to adapt on this resources 26 applications, among them application from Institute of Mathematics and Computer Science [2] - [http://hpseewiki.ipb.ac.rs/index.php/HP-SEE\\_Wiki](http://hpseewiki.ipb.ac.rs/index.php/HP-SEE_Wiki).

From Moldova in Project involved RENAM Association (National Research and Educational Network of Moldova) and Institute of Mathematics and Computer Science of the Academy of Sciences of

Moldova (IMI ASM). RENAM efforts are emphasized on the involvement of national communities to the use of the regional infrastructure for high performance computing, training activities and applications operational support. IMI ASM main task is the development of HPC applications and deploying them in regional HPC-infrastructure.

RENAM and IMI ASM should be jointly engaged in promoting the project ideas, in organization and participation in training events at the national and regional levels.

## 4 Conclusion

HP-SEE aspires to contribute to stabilization and development of research and Hi-Tech activities in South-East Europe by overcoming fragmentation in Europe and stimulating eInfrastructure development and adoption by new virtual research communities, thus enabling collaborative high-quality research across a spectrum of scientific fields.

HP-SEE will support and strengthen a number of strategic Virtual Research Communities, which will bring together users across the SEE region within a common cooperative research space, enabling them to share HPC facilities, software, tools, data and results of their work.

**Acknowledgments.** This work is supported by EC FP7 HP- SEE (grant 211338) and EGI-InSPIRE (grant 261323) projects.

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