



Access to regional HPC resources

*International and regional projects
for computing technologies
development*

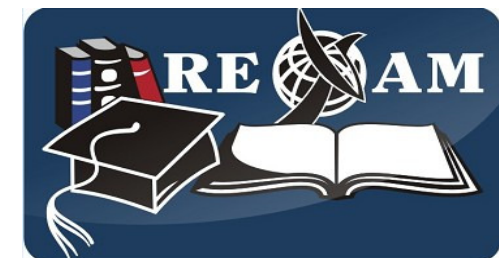
Dr. Petru Bogatencov

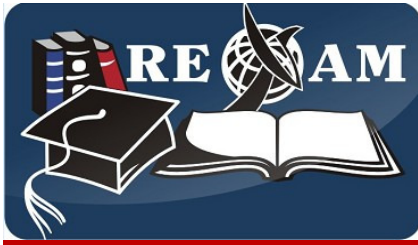


HP-SEE

High-Performance Computing Infrastructure
for South East Europe's Research Communities

www.renam.md www.math.md

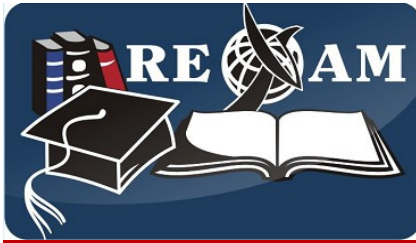




Scientific Computing - definitions



- ❑ Computing facilities based on Parallel Architectures and used for running complex applications:
 - HPC - Clusters' systems;
 - HPC - Supercomputers;
 - Distributed computing – Grids;
 - Scientific Clouds...
- ❑ Parallel Algorithms Design and Programming
- ❑ Complex Computing Applications Development
- ❑ Scientific Computing architecture is a bridge for building modern virtualized computing systems – scientific clouds



Importance of Scientific Computing

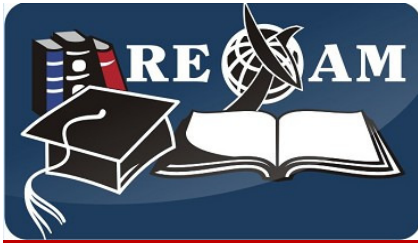


- *"Although the fastest computers can execute millions of operations in one second, they are always too slow. This may seem a paradox, but the heart of the matter is: the bigger and better computers become, the largest are the problems scientists and engineers want to solve."*

A. Jaffe, Ordering the Universe: The Role of Mathematics, SIAM Review, 1984

- *"Computing has become a third branch of research, joining the traditional practices of theorization and laboratory experimentation and verification. Due to the expense and complexity of actually performing experiments in many situations, simulation must be done first."*

C. C. Douglas, G. Haase, U. Langer, A Tutorial on Elliptic PDE Solvers and their Parallelization, SIAM, 2003



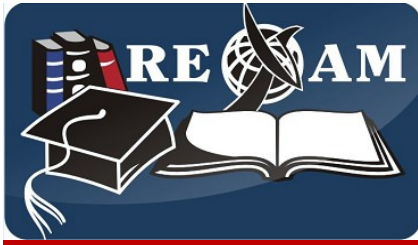
A Role of Scientific Computing



A new vision for Science:

- Collaboration between European and worldwide research teams; remote access
 - Global virtual research communities
- Data-intensive science and innovation
 - Use and manage exponentially growing sets of data
- Experimentation *in silico*, simulation
 - **Use of High-Performance Computing**

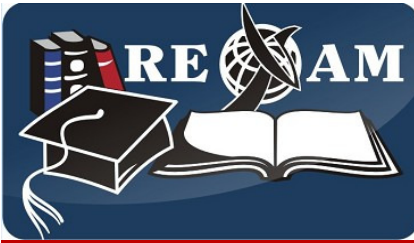
Scientific Computing is a fundamental enabler for research & innovation



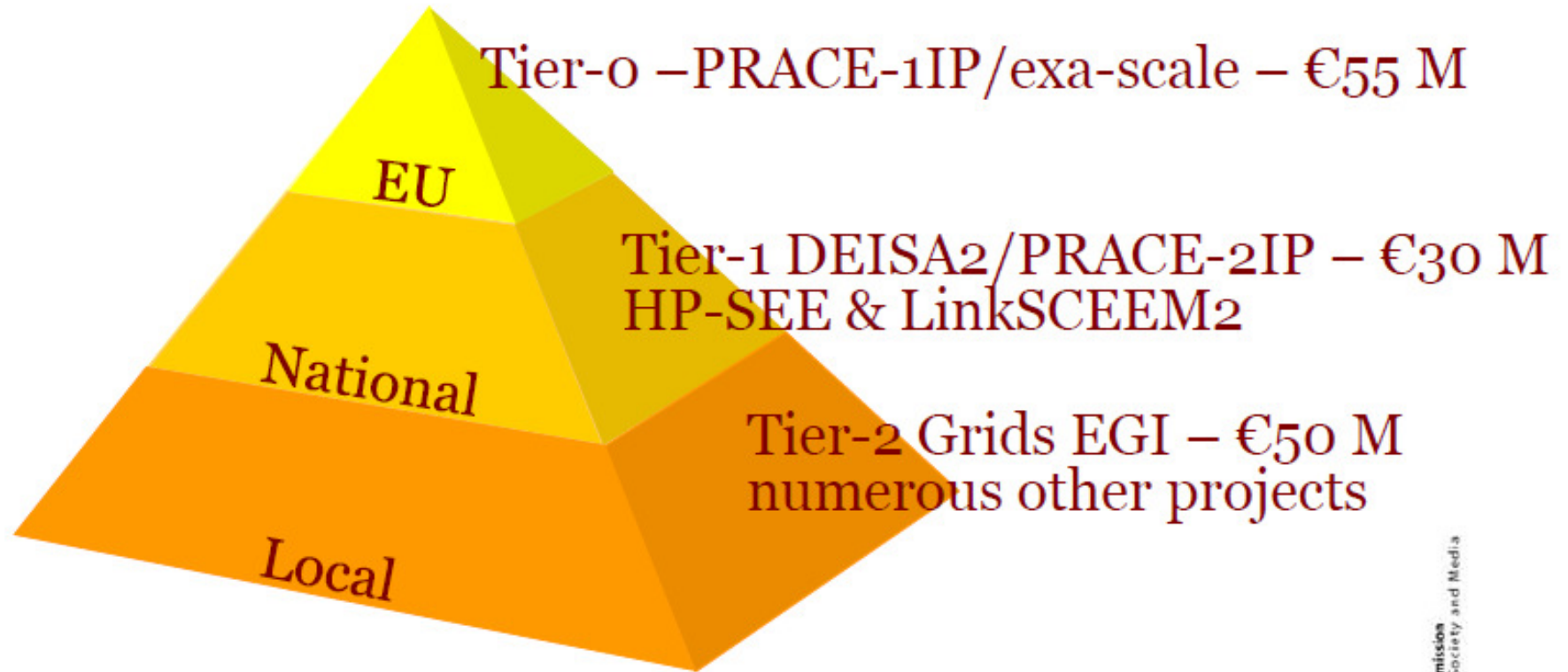
European Projects for Scientific Computing development support

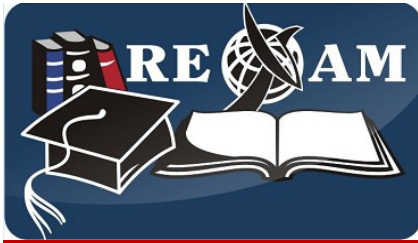


- ❑ PRACE (Partnership for Advance Computing in Europe – www.prace-project.eu)
- ❑ DEISA (Distributed European Infrastructure for Supercomputing Applications - www.deisa.eu)
- ❑ EGEE I-III projects (Enabling Grids for eScience)
- ❑ EGI-InSPIRE (European Grid Initiative: Integrated Sustainable Pan-European Infrastructure for Researchers in Europe – www.egi.eu)
- ❑ Enabling Clouds for e-Science



European Scientific Computing Eco-System

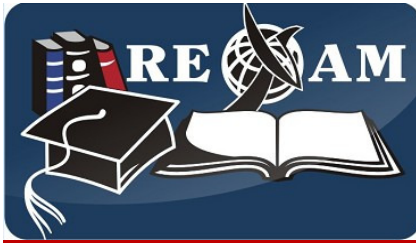




Regional Projects for Scientific Computing development in South-East Europe



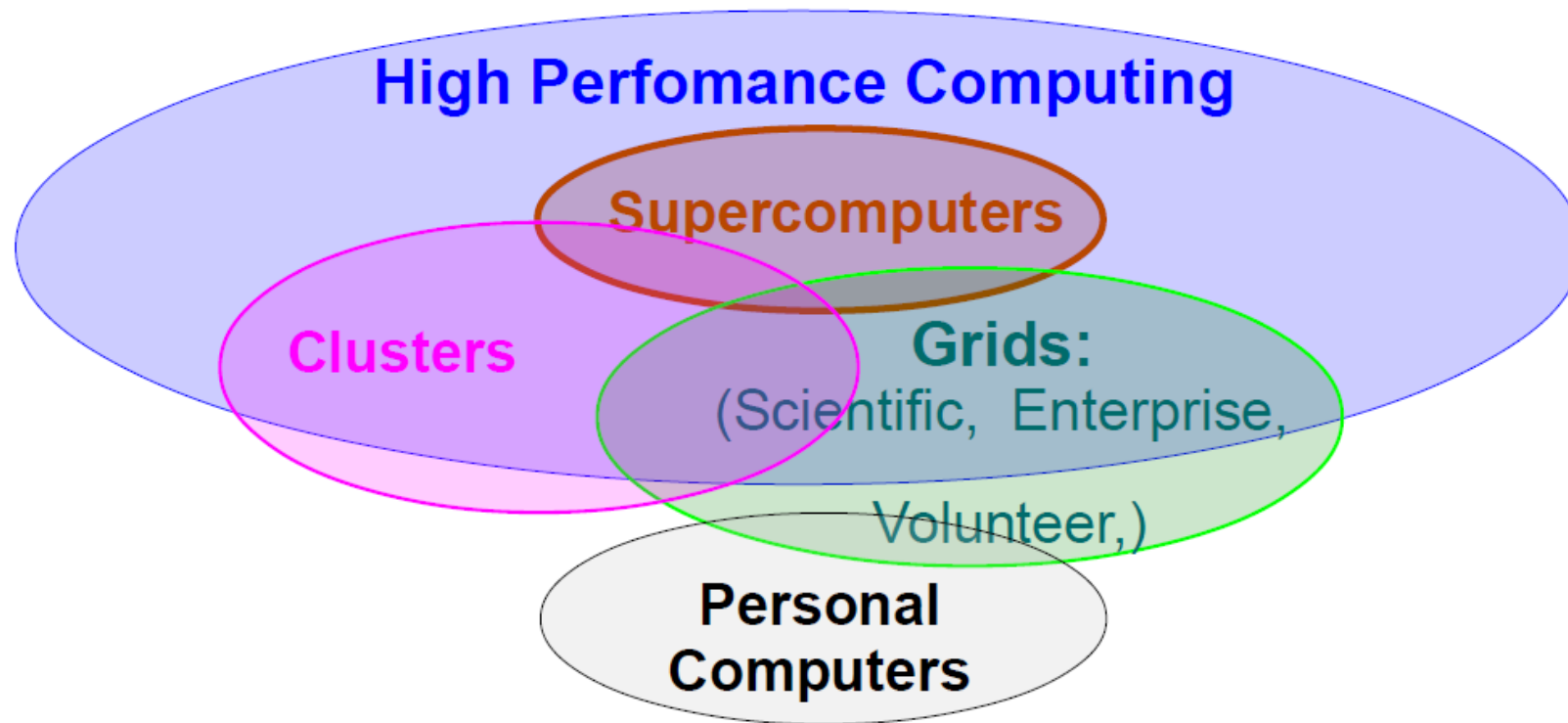
- ❑ SEE-GRID-1 project (May 2004 - May 2006)
- ❑ SEE-GRID-2 project (May 2006 - May 2008)
- ❑ SEE-GRID-SCI project (May 2008 - May 2010)
- ❑ HP-SEE project (High-Performance Computing Infrastructure for South East Europe's Research Communities – www.hp-see.eu)

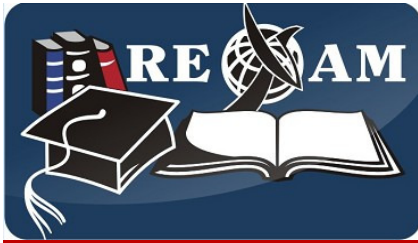


SEE-HP project – providing access to the Regional High Performance computing infrastructure



High-performance computing is a branch of applied computer science that is dealing with the finding of solutions to problems that require a large amount of computing resources.





Scientific Computing – organizational structure for access to computing resources



❑ **Virtual research communities (VRCs):**

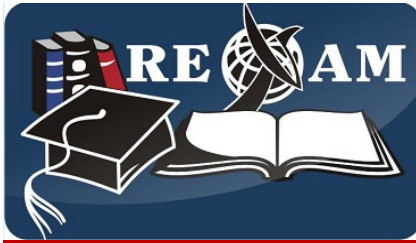
VRCs are groups of like-minded individuals organised by discipline or computational model. VRCs typically have an established presence in their field and represent a well-defined scientific or research community.

VRCs are self-organised research communities which give individuals within their community a clear mandate to represent the interests of their research field within the computing ecosystems. They can include one or more virtual organisations and act as the main communication channel between the researchers they represent computing resources providers (EGI, PRICE, etc.).

❑ **Virtual organisations (VOs)**

Virtual organisations (VOs) are groups of researchers with similar scientific interests and requirements, who are able to work collaboratively with other members and/or share resources (e.g. data, software, expertise, CPU, storage space), regardless of geographical location.

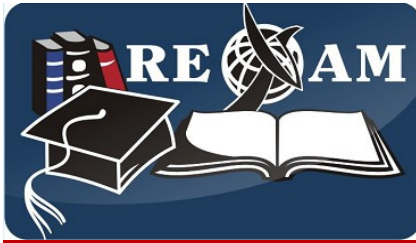
Researchers must join a VO in order to use European grid computing resources. Each virtual organisation manages its own membership list, according to the VO's requirements and goals.



Grid and HPC Initiatives. MD-Grid NGI Aims and Tasks



- ❑ **MD-Grid NGI** participates in strategic European Programs for the development of transnational grids and in initiatives for the completion of SEE eInfrastructures. The operation of the MD-Grid NGI implements the general EU policy on the development of national initiatives for the coordination of actions related to eInfrastructures and Grids.
- ❑ **The integration** of Grid actions (infrastructures, middleware and applications) with the broadband research and technology network into a standard e-Infrastructures system. Optimization of exploitation of advanced network resources and services, which can serve the new e-Science generation and will attract the greater users community of the Information Society to the mass adoption of advanced services provided by Grid architectures.
- ❑ **Permanent development** and administration of Grid infrastructure in Moldova
- ❑ **Organization access** for national R&E community to the regional and European computational resources (HPC, Grid, scientific clouds, etc.)
- ❑ **Preparing** (educational, training events organization) and **support** of national users' communities



Memorandum of Understanding for High-Performance Computing resource sharing in the region of South Eastern Europe



This Memorandum of Understanding (MoU) is made on February 23rd 2012 hereinafter referred to as the "effective date"

BETWEEN Resource Coordinators and Beneficiaries:

For Moldova: RESEARCH AND EDUCATIONAL NETWORKING
ASSOCIATION OF MOLDOVA

The following principles will be followed within this resource sharing model:

- A. Partners should allocate as a minimum 5% of the total core hours of their HPC systems offered for resource sharing, per year for regional use.*
- B. Cycles are allocated to users via the peer review system.*
- C. Calls for access can be either continuous or are announced periodically (yearly or twice a year), based on the demand and the capacity of the peer review system.*

This MoU is intended to remain into effect for at least 3 years from the effective date.

The duration of the MoU is automatically extended for one year after the end of the initial 3 years period or after the end of each yearly extension.

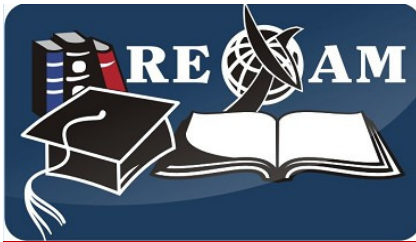


Enabling Clouds for e-Science Initiative



Open collaboration spot for cloud projects in Europe

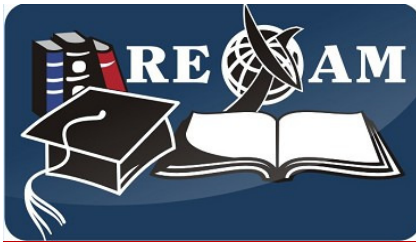
- VENUS-C (Italy, Germany, UK, Spain, Sweden, Greece, Israel)
 - VENUS-C is co-funded by European Commission, as one of six European Distributed Computing Infrastructures (DCIs). VENUS-C is combining experiences in Grid infrastructures and Cloud computing to capitalise on EU investments. VENUS-C brings together 14 European partners.
 - Supporting basic research disciplines:
 - Biomedicine: Integrating widely used tools for Bioinformatics, System Biology and Drug Discovery into the VENUS-C infrastructure
 - Data for Science: Integrating computing through VENUS-C on data repositories. In particular focus will be on Marine Biodiversity through Aquamaps.
 - ...



Enabling Clouds for e-Science Initiative



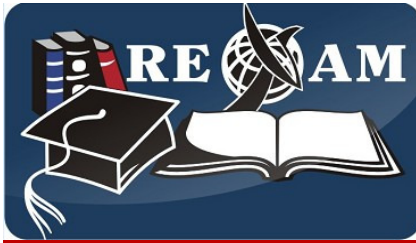
- StratusLab (France, Greece, Switzerland, Spain, Ireland), FP7 funded project
 - ❑ Enhancing Grid Infrastructure with Virtualization and Cloud Technologies;
 - ❑ Developing a complete, open-source cloud distribution that allows grid and non-grid resource centers to offer and to exploit an “Infrastructure as a Service” cloud.
- NGS (United Kingdom)
 - ❑ Cloud@NGS – The NGS Cloud Prototype is expected to be available until September 2011
- GRNET cloud (Greece)
 - ❑ Offering Cloud Services to Greek Research Community
- SARA cloud (The Netherlands)
 - ❑ HPC cloud computing
 - ❑ With the newly developed High Performance Computing Cloud environment researchers get access to their own Virtual Private HPC Cluster.



Enabling Clouds for e-Science Initiative



- UCM (Spain –as part of the OpenNebula Project)
 - ❑ OpenNebula.org is an open-source project aimed at building the **industry standard open source cloud computing tool** to manage the complexity and heterogeneity of distributed data center infrastructures.
- SEECI (Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Montenegro, Kosova, FYRo Macedonia, Albania, Romania, Bulgaria)
- CESGA Spain –as part of the Open Cirrus project
 - ❑ Open Cirrus is an open cloud-computing research testbed designed to support research into the design, provisioning, and management of services at a global, multi-datacenter scale
- NEON (Sweden, Norway, Denmark, Finland, Iceland)
 - ❑ Northern Europe Cloud Computing
 - ❑ The aim with the NEON project is to review the promises and summarize the overall offering cloud computing could give to the Nordic eScience community
- BalticCloud (Estonia, Latvia, Lithuania, Belarus, Poland)
 - ❑ BalticCloud is a subproject of the [BalticGrid](#) project aimed at developing cloud infrastructure in Baltic states and Belarus



Concurs pilot comun de proiecte regionale
SEERA-EI. Cercetarea și crearea capacităților
în Cloud Computing științific



2012-05-23 Academia de Științe a Moldovei anunță **concursul pilot comun al proiectelor regionale SEERA-EI în domeniul cercetării și creării capacităților în Cloud Computing științific. Țările eligibile:** Bulgaria, Grecia, Moldova, România, Serbia și Turcia

Organizații eligibile din Republica Moldova: organizațiile din sfera științei și inovării acreditate

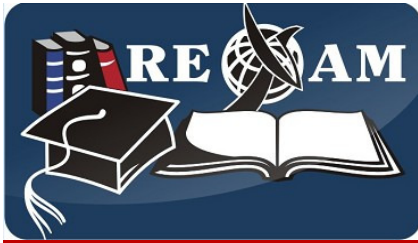
Număr minim de parteneri în proiect: cel puțin 3 organizații din cel puțin 3 țări

Durata unui proiect: 12 sau 24 luni

Bugetul unui proiect: maxim 150 mii Euro

Bugetul unei organizații-partener din Republica Moldova: maxim 150 mii lei

Data limita de depunere a propunerilor de proiecte: 5 septembrie 2012 Propunerile de proiect se elaborează în limba engleză și se depun de către coordonator online prin intermediul unui sistem elaborat pentru apelul dat. Detalii privind concursul, documentele necesare și depunerea online pot fi accesate la <http://www.seera-ei-pjc.asm.md/>.



Thank you!



Questions?

www.math.md

www.renam.md
www.grid.md