



## Linking Scientific Computing in Europe and the Eastern Mediterranean – Phase 2

**Summary:** The LinkSCEEM-2 project aims at the establishment of a high performance computing (HPC) eco-system in the Eastern Mediterranean region by interlinking and coordinating regional compute, storage and visualization resources to form an integrated e-infrastructure. The main project objective is to enable scientific research in the region by engaging and supporting research communities with an initial emphasis in the fields of climate research, digital cultural heritage and synchrotron applications. To achieve its mission, the project will link e-resources, provide user support and training, carry out targeted networking activities, and, develop and implement a well-structured HPC resource allocation mechanism.

**Objectives:** The FP7 Support Action LinkSCEEM has initiated the development of a network of users in various fields who will benefit from the development and integration of HPC facilities. LinkSCEEM-2 is the follow-up and implementation phase of LinkSCEEM; it will adopt a three-fold approach structured as follows:

1. Optimally integrate computational resources contributed by HPC centers in the Eastern Mediterranean region, while in parallel establishing links with established lead HPC centers, and thus developing and sharing best practices for managing these resources
2. Create user support and training programs, in parallel to an active networking process, that will engage and integrate research communities and enable scientists in the region to utilize HPC for addressing complex scientific and engineering problems, thus diminishing the digital divide.
3. Develop a subset of the HPC relevant research topics identified by the HPC in Europe Task Force (HET), namely climate science, cultural heritage and synchrotron applications, that are of particular relevance to region, and provide the links to leading groups in these fields enabling research of the highest standing. Thanks to the participation of world lead HPC Centers and research teams, core expertise of the highest level will be brought to the region both in terms of the service provided and the spectrum of research that will be enabled.

**Action plan:** Several lines of activities will be developed in parallel and in a coordinated fashion in order to achieve the objectives described above. Networking activities will be organized to facilitate the engagement of user communities in computational science and monitor their needs, so that training and user support programs are developed and adapted accordingly.

A resource allocation mechanism based on a well-established peer review process will be implemented in order to grant access to integrated computational resources contributed by the regional HPC centers at CaSToRC, NARSS and BA. To facilitate collaborative activities in the region, and in particular the analysis of synchrotron radiation data produced at SESAME, the project will also undertake activities for upgrading network connectivity between the academic and research networks of Cyprus and Jordan.

LinkSCEEM-2 will instigate cooperation between the HPC centers at CaSToRC, NARSS and BA and expert groups in Western Europe and the US to implement a large-scale computational platform integrating compute, data and visualization resources. The integration of resources will be founded on the implementation of a data management infrastructure environment at CaSToRC, NARSS and BA, and on the development of software tools linking distributed software applications and hardware resources.

**Project acronym:**  
LinkSCEEM-2

**Contract n°:** RI-261600

**Project type:** CP-CSA

**Start date:** 01/09/2010

**Duration:** 48 months

**Total budget:**  
4 121 340 €

**Funding from the EC:**  
2 450 000 €

**Total funded effort in person-month:**  
271

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**Project participants:**

CyI-CaSToRC	CY
NARSS	EG
BA	EG
FZJ-JSC	DE
NCSA-UIUC	USA
SESAME	JO
ESRF	FR/EU
MPI	DE
CYNET	CY
JUNET	JO
IUCC	IL

**Keywords:**  
HPC, Eastern Mediterranean, e-infrastructure, computational science, user support, network connectivity, climate change, cultural heritage, synchrotron

**Collaboration with other EC funded projects:**  
PRACE-IIP  
EUMEDCONNECT2  
DARECLIMED

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Cross-disciplinary research will be pursued in collaboration with partners such as JSC and NCSA to develop and adapt software for the support of the optimization of parallel applications, data management and visualization technologies. Cross-disciplinary research will contribute to advanced user support initiatives aimed at enabling the user communities in the region to effectively use HPC in their thematic research objectives. Joint thematic research activities will be undertaken in climate change, digital cultural heritage and synchrotron applications that will leverage the expertise of groups at partners such as MPI, NCSA and ESRF.

**Networking activities** LinkSCEEM-2 will pursue a variety of networking activities including the organization of user meetings and workshops at regional institutions, the development of online tools for the enrichment and support of user communities, and the establishment of a resource allocation mechanism to coordinate access to the integrated simulation platform. The project will also undertake work for the development of a tiered HPC training program adapted to the changing user needs, compiling basic and advanced course material, and making it available via workshops and online tutorials. A dissemination and outreach program will be implemented to publicize the project to the HPC and computational science communities in Europe and the Eastern Mediterranean, which will include an international conference in computational science, as well as programs targeting young talent in the region.

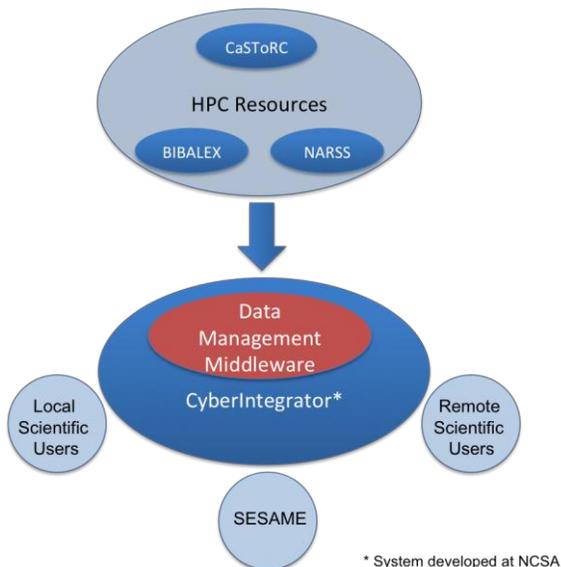
**Service activities** Service activities will engage in the creation of an integrated simulation platform through the linking and coordination of compute, data and visualization resources available at CaSToRC, NARSS and BA. LinkSCEEM-2 will implement an interactive scientific process management environment based on the Cyberintegrator application developed at NCSA. Software tools linking distributed software and hardware will be developed and remote access to the integrated resources will be given to scientific users. To provide adequate user support related to effectively using the Teraflop scale machines and the scientific workflow software application exposing the regional data repositories, a user support program will be developed. User support activities will also focus on providing assistance for the visualization of results and the generation of visual simulations for climate and cultural heritage data, and the support of SESAME activities in synchrotron radiation, via an upgrade of network connectivity between Cyprus and Jordan.

**Joint Research activities**

LinkSCEEM-2 will engage in two categories of research activities: cross-disciplinary and thematic. The general goal of cross-disciplinary research is the development of software to support the optimization of parallel applications on large-scale systems. Cross-disciplinary research activities will focus on:

1. Performance analysis and best implementation
2. Mathematical analysis and algorithms
3. Data management and scientific workflow software optimization
4. Visualization research in the deployment of visualization software for enabling collaborative virtual spaces

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Thematic research activities include:

1. Research in climate modeling with an emphasis on scientific code porting and optimization for regional HPC infrastructure led by MPI with the participation of CaSToRC.
2. The use of scientific computing and visualization as a research framework in Cultural Heritage, with the participation of groups from CaSToRC, NCSA and BA.
3. Synchrotron data analysis and modeling aimed a porting existing and new algorithms to Graphical Processing Units (GPU). Research will mainly focus on the methodology and tools for analysis of measurements from SESAME and will leverage the high-level expertise of ESRF.

**User communities:** One of the primary goals of the project is to promote the creation of virtual research communities in the Eastern Mediterranean and their integration with the HPC resources offered within the scope of the project. The first phase project LinkSCEEM has paved the way for this, and LinkSCEEM-2 will build on its initial accomplishments through networking and service activities targeted at the emerging user communities in the region.

**International aspects:** LinkSCEEM-2 will not only provide an integrated HPC infrastructure in the region, but also strengthen the expertise and support the integration of scientific communities in the Eastern Mediterranean. In agreement with the rationale and objectives of the European Neighborhood Policy, LinkSCEEM-2 activities will enable scientists in the European Research Area’s periphery to produce new knowledge and contribute to the world research output in fields that can greatly benefit from advances in large-scale computation.

