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Earth Science and Astrophysics Applications in Armenia: Present and Perspectives

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The Institute for Informatics and Automation Problems of the National Academy of Sciences of the Republic of Armenia operates, supports and manages the national Grid Infrastructure and Academic Scientific Network of Armenia, which provides all core services to the users and consists of 7 Grid sites located in Yerevan and Ashtarak cities (424 cores). Armenia actively engaged in different international Grid (EU FP7 SEE GRID SCI, ISTC A-1606, ISTC A-1451) and connectivity (EU FP7 BSI) Projects, which make possible to deploy infrastructures and environments in the earth science and astrophysics.

Keywords

ArmGrid, ArmNGI, gLite, WRF, Seismology

URL for further information

http://www.grid.am

Detailed analysis

The following applications from the earth science and astrophysics domains are already running on the national Grid infrastructure:
⬚ The seismology platform consists of the seismic data (received from 30 seismic stations), seismic data server, programming tools and interfaces, and applications (ELF, SRA, etc.) developed within the SEE GRID SCI Project.
⬚ The core of the numerical weather prediction system is the Weather Research and Forecasting model implemented and operationally used for the territory of Armenia by Armenian State Hydrometeorological and Monitoring Service. Initial condition data is taken from Meteo (downloaded from National Center for Environmental Prediction) database and the results of calculations are stored in the forecast database. The model serves as a basis for solving different problems (environmental, hydrological, etc).
⬚ The Digitized First Byurakan Survey (digitized version of the Markarian Survey) has been ported on the National Grid infrastructure by using the standards of International Virtual Observatory Alliance. Each plate contains low-dispersion spectra of some 15,000-20,000 objects, and there are some 20,000,000 objects in the whole survey.

Conclusions and Future Work

The implementation and usage of the suggested platforms are crucial for the local community in the earth science and astrophysics domains. The implementation of the mentioned infrastructure allows to integrate with the international and regional correspondent infrastructures, such as ORFEUS, NERIES, EnviroGrid, EGI SAFE, etc.. The work has been started to port the Community Multiscale Air Quality modeling system in

order to improve the environmental management community's ability to evaluate the impact of air quality management practices for multiple pollutants at multiple scales.

Impact

To study and analyze very large scale and complex problems in the earth science and astrophysics domains require to have data sets from different regional areas, experimental results from different research laboratories, some good data processing, analyzing software and above all high performance computational resources. The main impacts are:

⊠ Facilitate access to the vast archives of continuous seismic waveforms collected in the Armenian regional datacenters and promote better standards in quality control of the data archives and procedures for data availability and exchange.

⊠ The outputs of global numerical weather prediction models with coarse resolutions, which represent only broad features and patterns and are able to reproduce processes in the large scale. Weather forecasting would significantly benefit from information on the processes at spatial resolution much finer than the coarse resolution of global models (nested domain covers the South Caucasus region - spatial resolution 5km).

⊠ Link astronomical archives and databases of the Armenian virtual observatory (VO) to the other national and international VOs, together with analysis tools and computational services.

Author: Dr ASTSATRYAN, Hrachya (IIAP NAS RA)

Co-authors: Mr KEROPYAN, Hovsep (Junior Researcher); Dr GYURJYAN, Mikayel (Senior Researcher); Mr KHOTSANYAN, Tigran (Junior Researcher); Dr SAHAKYAN, Vladimir (Director); Prof. SHOUKOURIAN, Yuri (Scintific Adviser)

Presenter: Dr ASTSATRYAN, Hrachya (IIAP NAS RA)

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