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## MEDIGRID: Mediterranean Grid of Multi-risk data and Models

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We present an IST project of the 6th Framework Programme, aimed to create a distributed framework for multi-risk assessment of natural disasters that will integrate various models for simulation of forest fire behavior and effects, flood modeling and forecasting, landslides and soil erosion simulations. Also, a distributed repository with earth observation data, combined with field measurements is being created, which provides data to all models using data format conversions when necessary. The entire system of models and data will be shaped further as a multi-risk assessment and decision support information platform.

There are 6 partners in the project from Greece, Portugal, France, Spain, United Kingdom and Slovakia.

The system targets both Linux and Windows based simulation models. The Linux based models are meteorological, hydrological and hydraulics models of the flood forecasting application, with meteorology and hydraulics being a parallel MPI tasks. Other applications - forest fire behaviour and effects, landslides and soil erosion - are sequential Windows jobs. These simulations are being merged into one system that uses common distributed data warehouse containing data for pilot areas in France, Portugal and Spain. User should be able to transparently run these simulations from the application portal, reuse data between models and store the results annotated with metadata back to the data warehouse.

In order to create a virtual organization (VO) for multi-risk assessment of natural disasters a grid middleware had to be chosen to be used on computing resources. Because each of the partners provides some of the services on his own resources that run both Linux and Windows, we could not use available middleware toolkits like LCG or Globus as they are focused on Unix/Linux platform. For example, they build their data services on the GridFTP standard for data transfer. However, there are stable implementations of GridFTP just for Unix based systems, ignoring the world of Windows. Therefore, we have decided to implement our own data transfer and job submission services. In order to keep some compatibility with the established grid infrastructures, we have chosen the Java implementation of the WSRF specification by the Globus alliance as a base for our services. It is an implementation of core web (grid) services with security, notifications and other features and it is capable of running on both Windows and Linux. Each of the system components - simulation models, data providers, information services or other supporting services - is exposed as a web service. We use WSRF as a standard basic technology that both serves as an implementation framework for individual services and also enables to glue the individual components together.

The whole system will be accessible via a web portal. We have chosen GridSphere portal framework for its support of portlet specification. Application specific portlets will allow users to invoke all the simulation services plugged into the system in application specific manner; for example using maps for selection of a target area or an ignition points for forest fire simulations. There will be

portlets for browsing results, metadata describing those results, testbed monitoring and others.

So far, two services have been implemented on top of the WSRF: Data Transfer service and Job Submission service.

Data Transfer service serves as a replacement for widely used GridFTP tools. The main disadvantage of GridFTP is that implementations are available just for the UNIX platforms. In Medigrid, Windows is a platform of several models and porting them to UNIX world was not an option for developers.

Data Transfer service provides data access policies definition and enforcement in terms of access control lists (ACLs) defined for each data resource - a named directory serving as a root directory for given directory tree accessible via the service. It has been integrated with central catalog services we have deployed: Replica Location Service - a service from Globus toolkit for which we had to implement WSRF wrapper - and Metadata Catalog Service - a service from Gryphyn project that is just a plain web service.

Job Submission service provides the ability to run the executable associated to it with parameters provided with job submission request. Currently, jobs are started locally using the "fork" mechanism on both Linux and Windows. Requests are queued by the service and run in the "first come first served" manner in order not to overload the computer. In near future we plan to add job submission forwarding from the service to a Linux cluster and later on to a classical grid. A base of the project's portal has been set up based on the Gridsphere portal framework. Thus far portlets have been developed for browsing the contents of the metadata catalog service and a portlet for generic job submission.

As it can be seen in this project, the world of simulations is not limited to the Unix platform and support for Windows applications is desired but missing. Therefore we think it may be important for the EGEE project to try to support Windows users in order to widen its reach and appeal.

## Summary

We present an IST project of the 6th Framework Programme, aimed to create a distributed framework for multi-risk assessment of natural disasters that will integrate various models for simulation of forest fire behavior and effects, flood modeling and forecasting, landslides and soil erosion simulations. Also, a distributed repository with earth observation data, combined with field measurements is being created, which provides data to all models using data format conversions when necessary. The entire system of models and data will be shaped further as a multi-risk assessment and decision support information platform.

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