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OGC and Grid Interoperability in enviroGRIDS Project

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EnviroGRIDS (Black Sea Catchment Observation and Assessment System supporting Sustainable Development) [1] is a 4-years FP7 Project aiming to address the subjects of ecologically unsustainable development and inadequate resource management. The project develops a Spatial Data Infrastructure of the Black Sea Catchment region. The geospatial technologies offer very specialized functionality for Earth Science oriented applications as well as the Grid oriented technology that is able to support distributed and parallel processing. One challenge of the enviroGRIDS project is the interoperability between geospatial and Grid infrastructures by providing the basic and the extended features of the both technologies.

The geospatial interoperability technology has been promoted as a way of dealing with large volumes of geospatial data in distributed environments through the development of interoperable Web service specifications proposed by the Open Geospatial Consortium (OGC), with applications spread across multiple fields but especially in Earth observation research. Due to the huge volumes of data available in the geospatial domain and the additional introduced issues (data management, secure data transfer, data distribution and data computation), the need for an infrastructure capable to manage all those problems becomes an important aspect. The Grid promotes and facilitates the secure interoperations of geospatial heterogeneous distributed data within a distributed environment, the creation and management of large distributed computational jobs and assures a security level for communication and transfer of messages based on certificates.

This presentation analysis and discusses the most significant use cases for enabling the OGC Web services interoperability with the Grid environment and focuses on the description and implementation of the most promising one. In these use cases we give a special attention to issues such as: the relations between computational grid and the OGC Web service protocols, the advantages offered by the Grid technology – such as providing a secure interoperability between the distributed geospatial resource –and the issues introduced by the integration of distributed geospatial data in a secure environment: data and service discovery, management, access and computation.

enviroGRIDS project proposes a new architecture which allows a flexible and scalable approach for integrating the geospatial domain represented by the OGC Web services with the Grid domain represented by the gLite middleware. The parallelism offered by the Grid technology is discussed and explored at the data level, management level and computation level. The analysis is carried out for OGC Web service interoperability in general but specific details are emphasized for Web Map Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS), Web Processing Service (WPS) and Catalog Service for Web (CSW). Issues regarding the mapping and the interoperability between the OGC and the Grid standards and protocols are analyzed as they are the base in solving the communication problems between the two environments: grid and geospatial.

The presetation mainly highlights how the Grid environment and Grid applications capabilities can be extended and utilized in geospatial interoperability. Interoperability between geospatial and Grid infrastructures provides features such as the specific geospatial complex functionality and the high power computation and security of the Grid, high spatial model resolution and geographical area covering, flexible combination and interoperability of the geographical models. According with the Service Oriented Architecture concepts and requirements of interoperability between geospatial and Grid infrastructures each of the main functionality is visible from enviroGRIDS Portal and consequently, by the end user applications such as Decision Maker/Citizen

oriented Applications. The enviroGRIDS portal is the single way of the user to get into the system and the portal faces a unique style of the graphical user interface.

Main reference for further information:
[1] enviroGRIDS Project, http://www.envirogrids.net/