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Bridging the gap between applications geospatial data and the Grid

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CROSS-Fire is a Portuguese NGI funded project aiming to develop a grid-based risk management decision support system for the Civil Protection (CP), using forest fires as the main case study and FireStation (FS) as an application that simulates the fire spread over complex topography.

CROSS-Fire uses EGEE to provide raw technological capability provision, including data management and storage, access to meta-data data bases and HPC and a Geospatial Information Infrastructure based on OCG-SWE Web Services to provide the access and management of remote geospatial data and meteorological data.

Detailed analysis

The CROSS-Fire overall software approach take advantage of the adoption of OGC-WS standards proposal and INSPIRE directives on the development of : i) a standard-based Spatial Data Infrastructure layer, based on Geoserver to exploit and enable geospatial services for data access and processing ii) a 52N's implementation of a OGC-SWE compatible layer, to address sensors CP data sources, such as meteorological stations data and satellite images and iii) a graphical user interface to access the platform facilities.

The core of the CROSS-Fire is a WPS 52North OGC standard layer divided into three interoperable components: the Application Business Logic, the Grid Services and Geospatial Services.

The WPS hides from the user the complexity of the access to a wide range of distributed computing resources, by providing: i) the mechanism to access the grid facilities for processing and data management, ii) all the algorithms, calculations, and execution models that operate on spatially referenced data, iii) an interface to the SOS server that provides dynamic meteorological data and iv) the services requested from the portal and other GUI clients.

Conclusions and Future Work

Current work is centred on the design and implementation of a web portal where many players can connect, to request services through the WPS core layer.

The portal will allow to update the input data required to estimate the risk of the natural hazard, or to access the past simulations to validate the predictions with actual field data.

To provide FS with the dynamic data, we are using the 52º North implementation of the OGC-SWE layer.The dynamic data includes information coming from sensors in weather stations (such as DAVIS Vantage Pro2) and sensors MODIS from satellites such as Terra/Aqua.

Impact

Cross-Fire provides a general approach for the development of a Civil Protection application that requires not only the availability of high-performance computing resources and data management at remote Grid sites, but also the ability to access, to integrate, to analyze and present geospatial, available data repositories and sensor networks data across a distributed computing environment.

The approach allows different components to interact with each other in a standardised mode, acting each one as clients of the OGC WPS web services layer.

The use of WPS offering a modular addition of new facilities, algorithms and services to clients and users of an application as long as the requests conforms to OCG-SWE and EU/INSPIRE standards.

The platform may also be used to support new brands of CP applications, such as Flash floods, implemented as a new Application Business Logic component that responds to the specificities of the new application domain.

Keywords

civil protection, geospatial services, interoperability, forest fires, OCG

URL for further information

http://pop.cp.di.uminho.pt/crossfire/

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