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Spatial Data Exploring by Satellite Image Distributed Processing

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Our society needs and environmental predictions encourage the applications development, oriented on supervising and analyzing different Earth Science related phenomena. Satellite images could be explored for discovering information concerning land cover, hydrology, air quality, and water and soil pollution. Spatial and environment related data could be acquired by imagery classification consisting of data mining throughout the multispectral bands. The process takes in account a large set of variables such as satellite image types (e.g. MODIS, Landsat), particular geographic area, soil composition, vegetation cover, and generally the context (e.g. clouds, snow, and season). All these specific and variable conditions require flexible tools and applications to support an optimal search for the appropriate solutions, and high power computation resources.
The research concerns with experiments on solutions of using the flexible and visual descriptions of the satellite image processing over distributed infrastructures (e.g. Grid, Cloud, and GPU clusters). This presentation highlights the Grid based implementation of the GreenLand application. The GreenLand application development is based on simple, but powerful, notions of mathematical operators and workflows that are used in distributed and parallel executions over the Grid infrastructure. Currently it is used in three major case studies concerning with Istanbul geographical area, Rioni River in Georgia, and Black Sea catchment region.
The GreenLand application offers a friendly user interface for viewing and editing workflows and operators. The description involves the basic operators provided by GRASS [1] library as well as many other image related operators supported by the ESIP platform [2]. The processing workflows are represented as directed graphs giving the user a fast and easy way to describe complex parallel algorithms, without having any prior knowledge of any programming language or application commands. Also this Web application does not require any kind of install for what the house-hold user is concerned. It is a remote application which may be accessed over the Internet.
Currently the GreenLand application is available through the BSC-OS Portal provided by the enviroGRIDS FP7 project [3].
This presentation aims to highlight the challenges and issues of flexible description of the Grid based processing of satellite images, interoperability with other software platforms available in the portal, as well as the particular requirements of the Black Sea related use cases.

References:
[1] GRASS - Geographic Resources Analysis Support System project (2011), http://grass.osgeo.org/
[2] Gorgan D., Bacu V., Rodila D., Pop F., Petcu D., Experiments on ESIP - environment oriented satellite data processing platform, in Earth Science Informatics Journal, Springer, Vol.3/4, 2010, pp. 297-308.
[3] EnviroGRIDS FP7 Project - Black Sea Catchment Observation and Assessment System supporting Sustainable Development, http://www.envirogrids.net/