Spatial Data Infrastructures and Grid Computing: the GDI-Grid project

A. Padberg (1) and C. Kiehle (2)

(1) University of Bonn, Institute of Geography, Germany (apadberg@uni-bonn.de), (2) lat/lon GmbH, Bonn, Germany
(kiehle@lat-lon.de)

Distribution of spatial data through standards compliant spatial data infrastructures (SDI) is a fairly common practice nowadays. The Open Geospatial Consortium (OGC) offers a broad range of implementation specifications for accessing and presenting spatial data. In December 2007 the OGC published the Web Processing Service specification (WPS) for extending the capabilities of a SDI to include the processing of distributed data. By utilizing a WPS it is possible to shift the workload from the client to the server. Furthermore it is possible to create automated workflows that include data processing without the need for user interaction or manual computation of data via a desktop GIS.

When complex processes are offered or large amounts of data are processed by a WPS, the computational power of the server might not suffice. Especially when such processes are invoked by a multitude of users the server might not able to provide the wanted performance. In this case, Grid Computing is one way to provide the required computational power by accessing great quantities of worker nodes in an existing Grid infrastructure through a Grid middleware. Due to their respective origins the paradigms of SDIs and Grid infrastructures differ significantly in several important matters. For instance security is handled differently in the scope of OWS and Grid Computing. While the OGC does not yet specify a comprehensive security concept, strict security rules are a top priority in Grid Computing where providers need a certain degree of control over their resources and users want to process sensitive data on external resources. To create a SDI that is able to benefit from the computational power and the vast storage capacities of a Grid infrastructure it is necessary to overcome all the conceptual differences between OWS and Grid Computing.

GDI-Grid (english: SDI-Grid) is a project funded by the German Ministry for Science and Education. It aims at bridging the aforementioned gaps between OWS and Grid infrastructures. In this project lat/lon GmbH and the Geographic Institute of the University of Bonn created a concept for the gridification of OWS. Following these concepts prototypes of gridified WPS, WFS and WCS have been implemented. The project started in 2007 and will continue until 2010.

In this presentation, the approach for grid-enabling a SDI developed during the GDI-Grid project will be described. Using the example of a grid-enabled WPS the steps needed to utilize the computing power of the Grid from an OGC context are explained. Furthermore an outlook of the potential of other grid-enabled OGC Web Services will be given.