Geophysical Research Abstracts
Vol. 18, EGU2016-17434, 2016
EGU General Assembly 2016

The SmartGeo Portal: A retrospective

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The SmartGeo portal was created in a follow-up project that evolved from the geophysical data imaging services of a Grid computing portal for Geoscience, called GRIDA3. The scope of the project was to support commercial geotechnical service providers as well as academic researchers working in near-surface geoscience. Starting from the existing services, the SmartGeo portal was set up on new hardware, using the latest version of the grid portal environment EnginFrame. After a first working version was established, the services were reviewed, updated and accompanied by new services according to the feedback we received from our partners. One partner for instance experienced large difficulties in a project that aimed at delineating the aquifer for finding water pollutant substances in an industrial area of Basel. The seismic imaging service inherited from the previous portal was employing a data-driven algorithm optimized to provide, directly during data acquisition, nearly in real-time a first image of the subsurface structure. Different to this, our user needed for his data from a geologically very complex and noisy urban environment the maximum lateral resolution and noise reduction possible. For this purpose we added two cutting edge data imaging algorithms able to deliver such high precision results by simultaneously optimizing, for every single image point, all parameters of the mathematical model—a procedure which increased the computational effort by one or two magnitudes, respectively. Thus, parallel computing on grid infrastructure served for maximizing the image resolution instead for generating real-time results. This proved also very useful for the data of an academic partner, recorded for imaging the structure of a shallow sedimentary basin, where we could obtain strongly improved seismic velocity information using these new algorithms. A general user request was to implement interactive data visualization tools. To fulfill this demand we took advantage of the capability of the cloud computing framework to integrate a VNC server that exports the display of any chosen application to the user screen. Since in some cases incomplete data headers created problems for processing and visualization, we used GUI virtualization via VNC to include a powerful freeware application capable to review and set the data header in a graphical, user friendly way. Due to the limited size of the project and the short time frame of two years, some issues could only be identified but not completely resolved. Just to mention one of them: inherent to all shared infrastructure approaches is the fear of users to upload their data to external hardware and to work on a system that does not provide the same level of privacy as their office workstation. We believe that optional encryption of user data and work spaces with a key known only to the user itself could help to dispel these doubts. In this way, a gradual system of data transparency could be created, including public, shared, protected and encrypted data.