

Groundwater Modeling

BE06 will optimize groundwater modeling simulations using a Grid infrastructure. In order to realize large optimization tasks, large numbers of parallel simulation processes will be distributed over multiple resources. Based on the simulation results, relevant parameters will be adjusted until satisfying, i.e., optimal results are obtained. The results will influence decisions in the environmental sector, such as the design of groundwater drawdown or remediation systems for polluted groundwater aquifers.

Objectives

- Define and implement a large scale compute Grid for solving groundwater management and protection problems,
- Achieve cost-effective and optimized solutions.
- Provide a scalable system to adapt computational and data management capacities to user requirements
- Significantly reduce computing and response time (even making certain applications possible first time) exploiting parallelization of optimization tasks at the Grid / cluster level and at the distributed infrastructure level
- Reduce cost for end user through:
 - Reduction in total cost of software licensing
 - Minimization of administrative overhead for solving large scale problems on Grids
 - Reduction of computation time
 - Sharing of computer resources
- Provide a technology for more precise, ecological and cost-effective planning of sustainable groundwater resources management and protection
- Create new business for service providers by establishing a sustainable relationship between the end users and service providers.

Activities

The requirements of the different parties participating in the experiment will be investigated and collated. Based on these requirements, we will identify the needed services and create a detailed interface and implementation design that will close the gap between requirements and available middleware. Depending of the results of the design task, necessary wrappers around simulation and optimization software will be developed. Furthermore, user interfaces for controlling the simulation and configuring the resources and optimization will be realized. A license management component depending on business model results will be developed as well.

An existing simulation model for groundwater management and protection will be used as the basis for the test of the complete system.,



Industrial sectors

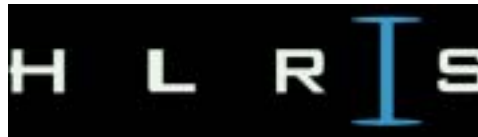
- **Environmental sciences and technology:** Simulation results are used in decisions related to groundwater management and protection, e.g., the operation of water pumps to regulate groundwater level in areas with land subsidence.

Added-value for industry

- New Grid-based services in planning and decision making
- Grid-based groundwater modelling coupled with optimization as a sales product
- Optimal use of resources
- Return of investment for application provider
- Reduction in total cost of ownership (software licences), administrative overhead and computation time
- Optimized investment and improved aquatic ecology

Partners

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Contact: Hubert Hérenger - herenger@hlrs.de

