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A Grid-Based Architecture for Coupling Hydro-Meteorological Models

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Computational hydro-meteorological research (HMR) requires the execution of various meteorological, hydrological, hydraulic, and impact models, either standalone or as well-orchestrated chains (workflows). While the former approach is straightforward, the latter one is not because consecutive models may depend on different execution environments, on organizational constraints, and on separate data formats and semantics to be bridged. Consequently, in order to gain the most benefit from HMR model chains, it is of paramount interest a) to seamlessly couple heterogeneous models; b) to access models and data in various administrative domains; c) to execute models on the most appropriate resources available in right time.

In this contribution we present our experience in using a Grid-based computing infrastructure for HMR. In particular we will first explore various coupling mechanisms. We then specify an enabling Grid infrastructure to support dynamic model chains. Using the DRIHM project as an example we report on implementation details, especially in the context of the European Grid Infrastructure (EGI). Finally, we apply the architecture for hydro-meteorological disaster management and elaborate on the opportunities the Grid infrastructure approach offers in a worldwide context.