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WRF4G: The Weather Research Forecasting model workflow for the GRID

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Several application areas as high energy physics or bio-applications have benefited for years from GRID technologies. Applications from the Earth Science community are starting to take advantage of this technology (see e.g. www.eu-degree.eu) . Earth science applications and, in particular, a climate and meteorological models poses a great challenge to the GRID in terms of the computing and storage requirements. These models are resolved by numerical equations that are CPU intensive applications which usually require long walltimes and produce large amounts of data.

WRF for GRID (WRF4G) is a port of the WRF Modeling System to GRID environments. Small modifications to the source code of the model allow the monitoring and output data management in a flexible way. In addition to the model, the WRF Grid Enabling Layer (WRFGEL) is an interface between the model and the GRID, allowing the model to inform about its status, get the required input data and save the output data to a Storage Element (SE) in the GRID. Finally, a set of user scripts permits a flexible design of experiments consisting of realizations which can span different physics/parameters and/or a sequence of independent hindcasts.

Currently, the heterogenous GRID infrastructure is subject to common failures and intermittent availability of resources the numerical weather models are not prepared for. For those reasons, in this contribution we present a new execution framework providing a software wrapper for a numerical prediction model. Since multi-site parallelism cannot be used due to latency, the GRID is best suited for large amounts of independent and relatively short simulations (ensembles). WRF4G is able to benefit from intrasite parallelism where available, though.

The WRF4G framework has been adapted for the gLite middleware developed in the EGEE project (http://eu-egee.org), and used in EELA2 project .