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Implementing the Weather Research & Forecasting Model on the German Grid

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In our research project WISENT (http://wisent.d-grid.de) funded by the German Federal Ministry of Education and Research (BMBF), computer scientists and meteorologists work together to provide easy access to distributed computing resources of the German Grid (http://www.d-grid.de) for running Numerical Weather Prediction models, in particular the mesoscale Weather Research and Forecasting model.

WRF software is normally installed on a single machine or on a single computing cluster for a limited group of users. Its configuration and installation requires substantial effort and technical knowledge. The software can be configured and compiled in a great number of variants with tradeoffs in runtime performance. Our experiments and performance benchmarks are of interest to researchers who intend to deploy WRF.

We also report on the use of WRF combined with Grid technologies. A computing Grid integrates multiple high-performance computing clusters to create a virtual powerful supercomputer. To realise this vision for executing Numerical Weather Prediction models, several issues need to be addressed:

Usability. Several software packages are currently under development which aim at improving WRF's usability (e.g., WRF Domain Wizard and WRF Portal). However, they do not integrate well with resource managers of computing clusters with mixed workloads - which are typical on the Grid.

Multi-user operation and access. Standard Grid middleware provides ways for submitting computational jobs to clusters, but it is unaware of the needs of specific applica-

tions, such as WRF. Thus, some configuration steps directly available for users with interactive (shell) access are difficult to perform. Our work explores alternative ways of accessing and configuring models.

Remote software and data deployment. Installing, configuring and testing WRF poses significant challenges to Grid administrators who lack knowledge of meteorology. To succeed, the WRF implementation on the Grid must be manageable by the community of meteorology researchers. Virtualization technology shows some promise for fulfilling this goal.