

# Efficient Gridification of Environmental Modeling Applications

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The environmental modeling was identified as a domain of high interest for Europe, addressing practical problems related to security and quality of life. The building blocks of these applications are large-scale models like CMAQ (Community Multi-scale Air Quality model), MM5 (the 5th generation PSU/NCAR Meso-Meteorological Model), SMOKE (Sparse Matrix Operator Kernel Emissions Modelling System). A number of interfaces (Linux scripts and Fortran codes) are used as to link those models with different types input information in a system capable to perform long term calculations. Running these applications on the Computational Grid faces a lot of challenge, for example: these applications are usually resource intensive, in terms of both CPU utilization and data transfers and storage; the use of applications for operational purposes poses requirements for availability of resources, which are difficult to be met on a dynamically changing Grid environment; the validation of applications is resource intensive and time consuming. This leads to a certain level of conservatism and requires the execution environment to be predictable and controlled by the developers of the applications.

In this work we describe efficient grid implementation scheme which incorporates several grid services specifically developed by us for this type of applications. We present also a new version of the Job Track service (JTS) offering applications specific functionality, geared towards the specific needs of the Environmental Modelling and Protection applications. We used the modular design of the JTS in order to enable smoother interaction of the users with the Grid environment. Our experience shows improved response times and decreased failure rate from the executions of the application. In this work we present such observations from the use of the South East European Grid infrastructure. The new version of the JTS enables more collaborative and efficient use of the Grid resources and answers to the application requirements.