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Environmental Protection and Modeling Applications in Bulgaria - Deployment and Results

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Overview

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).
Running these applications on the Computational Grid faces a lot of challenge: they 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.

Impact

Our results show 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 use of Grid resources allowed rapid achievement of interesting scientific results.

Description of the work

We describe the efficient grid implementation of 3 applications from the domains of Environmental Modelling and Environmental Protection: Multi-scale atmospheric composition modeling, Modelling System for Emergency Response to the Release of Harmful Substances in the Atmosphere, Climate Change Impact on Air Quality.
One of the ingredients is the new version of the Job Track service (JTS), where we used the modular design of the JTS in order to enable smoother interaction of the users with the Grid environment.

Conclusions

The applications that we describe proved to be well suited for Grid implementation due to their high data requirements and high amount of required CPU time. The obtained results gathered attention also from national policymaking bodies.

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