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Experience feedback on some scientific gateway components for medical imaging applications

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This presentation summarizes experience acquired at Creatis with some Scientific Gateway components to deploy medical imaging applications on the EGEE grid during the last years. We will detail feedback about various tools that we tested, including pilot-job systems, workflow managers, user front-ends, monitoring components and data management systems. Based on application use-cases ported at the lab, we will discuss advantages and drawbacks of these gateway components and highlight remaining challenges. Finally, an integration of some components in a coherent grid environment will be shown.

Conclusions and Future Work

This presentation summarizes user feedback regarding medical image simulation obtained at Creatis on several scientific gateway components during EGEE-III. The resulting system covers the complete application-middleware stack and provides useful application monitoring tools for production control. However, effort is still needed on certain aspects like MPI and data management issues. We are confident that this work contributes to the improvement of gridified applications performance as well as to the interoperability and re-usability of existing tools in the context of the EGEE-EGI transition.

Detailed analysis

The discussion will be based mainly on three use-cases with different characteristics: the GATE Monte-Carlo simulation code, the Simri MPI image simulator and the FIELD-II Matlab ultrasonic simulator. We will show how workflow systems (in particular Taverna and MOTEUR) can facilitate the porting of those applications on infrastructures operated by gLite and ARC. Some remaining interoperability issues (in particular regarding service developments) will be highlighted as well as performance road blocks. Besides, we will illustrate to what extent pilot-job systems (in particular the DIANE tool) improve performance and reliability in some cases. Missing features regarding, e.g., MPI codes, control of pilot submission or the handling of GLUE requirements will be summarized. Various user front-ends (application-specific portals, generic workflow interface) will be shown and their features will be discussed as well as their current limitations regarding for instance the handling of grid certificates. Finally, data management issues related to SE(s) selection and secure handling of medical data will be summarized and potential solutions will be reviewed.

Impact

We integrated RESPECT tools in a complete middleware stack offering a powerful and easy to use system for executing applications on the grid. Pilot jobs improve QoS in terms of latency reduction and fault-tolerance. They allow to easily reach 100% success, while the gLite-only approach success rate is often between 70% and 80%. The workflow implementation provides a generic framework for the integration of new applications with different computing models and their execution on other systems. Results show that this generic workflow approach is not penalizing in terms of performance. The user-friendly frond-ends are essential for opening the access to the grid to larger research communities. The monitoring allows on the one hand for production

control and on the other hand for gathering logs that feed grid research models. Last but not least, we hope that our work and feedback could contribute to identify some common bricks among existing scientific gateway components and to facilitate their interoperability.

Keywords

Medical imaging, pilot jobs, workflows, front-ends, data management

URL for further information

http://www.creatis.insa-lyon.fr

Authors: Mr BENOIT-CATTIN, Hugues (University of Lyon - CREATIS); Mrs CAMARASU-POP, Sorina (CNRS - CREATIS); Mr GLATARD, Tristan (CNRS - CREATIS)

Presenter: Mr GLATARD, Tristan (CNRS - CREATIS)

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