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The Grid as an Extended Application Service Provider in an Synchrotron Radiation Facility

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The Synchrotron Radiation Facilities (SRF), as large research establishments, have a very important role in Science and a great impact in the community. Due to the data-parallelism of the computational problems in the general field of physical sciences and the very high data volumes in terms of storage, the Grid Computing has been a successful paradigm. But other than their Computational requirements there are additional Grid characteristics and features that can be highly useful. We discuss the Grid utilisation in the SRF ELETTRA.

Detailed analysis

The first section of this paper presents the use of suitable Grid technologies for beamlines and labs of the Synchrotron Radiation Facility ELETTRA. The second part is focused on novel technologies (Instrument Element) and Grid characteristics (on-line), other than that of HTC, that can be very useful especially for SRFs. The general modus operandi of these facilities is that they host laboratories/beamlines that have resident scientific personnel that assists visiting scientists to perform experiments. The visiting scientists often have to use software that is preconfigured for the tasks of the beamline. We demonstrate how the Grid can be used as an Application Service Provider to serve the ELETTRA in-house and visiting users with an extended Software as a Service model that includes the Computation and secure user Authentication. The beamlines that will be discussed are in the field of Computed Tomography, Medical Physics, Small Angle X-ray Scattering, and X-ray Diffraction. The Grid infrastructure that is utilised is based on gLite and the user front-end to the Grid is through an advanced web portal with Virtual Collaboration features.

Conclusions and Future Work

The future plans aim to the improvement and the extension of the above-mentioned Grid technologies. Particularly there are on-going efforts for the advancement of the remote instrumentation control technologies. Additional beamlines and labs in ELETTRA will adopt these technologies. The web portal for Grid access (VCR v.3) is in active development. We expect additional results in user management especially for the case of visiting users.

Impact

By deploying a suitable and customised set of Grid technologies for Synchrotron Radiation Facilities there may be a direct positive impact to the hosted scientist. In the described deployment in ELETTRA, the interaction with the computational resources has been greatly improved. The user can use a specialised form of Grid Certificate, belonging to the beamline, thus additional authorisation overheads are minimised. The Grid as Application Service Provider offers to the user the required scientific application in addition to computational and storage resources. The advances of the middleware in the form of an Instrument Control technology can greatly improve the on-line elaboration of the scientific data. Finally the VCR, a web portal for secure and user-friendly access to Grid resources, can offer a better user experience. Such a set of technologies can enable more users to access the services of an SRF.

Keywords

Synchrotron, Remote Instrumentation, On-line processing, e-Infrastructure, Scientific Applications, Grid

URL for further information

<http://www.dorii.eu/> <http://www.elettra.trieste.it/>

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