

Lightweight construction of rich scientific applications

Tuesday, 10 November 2015 12:10 (15 minutes)

This paper presents an approach to rapid and lightweight development of scientific applications running on high performance computing resources, which resulted in a platform facilitating access to grid resources and handling the entire web application deployment pipeline. Usage of available web frameworks enables purely browser-side programming and frees application developers from any server-side dependencies. The platform provides testing and production environments to cover application development cycle including seamless source code synchronization.

Recently, scientific gateway delivery has shifted towards web platforms. Complete software packages built on top of grid resources offered installable binaries such as desktop rich clients [1] and gave way to advanced and easily managed web solutions [2]. The grid integration layer has been completely hidden from end users by providing domain-specific graphical user interfaces through just one omnipresent application: the web browser, so grid-ready web toolkits [3] emerged as tools to build gateways tailored for individual scientific communities.

The development process can be further improved with the platform by disposing of the server side completely from developer's concerns and exploiting grid based functionality exposed through REST interfaces. Enabling usage of browser-side web frameworks over grid resources to compose rich scientific gateways is the main goal of the platform. The objective is to completely detach application developers from the underlying tools and to provide the required functionality through a set of JavaScript libraries with a complete application deployment pipeline in place. This allows to minimize boilerplate work as it is no longer necessary to setup production and test environments (as they are provided by the platform) and to fully exploit browser debugging capabilities. Creating a new web application comes to filling in a web form which includes application URL schema setup. Authentication and authorization is handled by the platform and the server-side processing has to be exposed as REST services. The platform comes with all the basic services in place and already wrapped with JavaScript libraries (e.g. job management, file transfers and metadata management).

An example of such a service exposing its functionality through a REST interface is DataNet [4]. Building a JavaScript API on top of this service and exposing it to developers is straightforward and may be done by other service providers to expand the API set of the proposed platform.

The platform is already available as a part of the PLGrid infrastructure. It is integrated with the security mechanism and REST services present in the infrastructure which was done only once for all scientific applications implemented with the platform; this considerably facilitates the audit process of each new application.

Summing up, the elaborated platform improves creation of modern science gateways by making the process platform-independent, taking care of the deployment pipeline, and ensuring source code synchronization with popular engines such as Dropbox.

Links, references, publications, etc.

[1] B. Demuth, B. Schuller, S. Holl, J. Daivandy, A. Giesler, V. Huber, S. Sild: The UNICORE Rich Client: Facilitating the Automated Execution of Scientific Workflows, e-Science (e-Science), 2010 IEEE Sixth International Conference, pp.238,245, 7-10 Dec. 2010

[2] K. Benedyczak, P. Bala, M. Borcz, V. Huber, R. Kluszczynski, M. Petrova, P. Piernik and B. Schuler: Fostering the Adoption of UNICORE Portal, UNICORE Summit 2014, Publisher: FZV, Editors: V. Huber, R. Muller-Pfefferkorn, M. Romberg, pp.15-22, 2014

[3] P. Kacsuk, Z. Farkas, M. Kozlovsky, G. Hermann, A. Balasko, K. Karoczkai, I. Marton: WS-PGRADE/gUSE Generic DCI Gateway Framework for a Large Variety of User Communities, Journal of Grid Computing, vol. 10, no. 4, pp. 601 - 630, 2012

[4] D. Hareźlak, M. Kasztelnik, M. Pawlik, B. Wilk, and M. Bubak: A Lightweight Method of Metadata and Data Management with DataNet. In: M. Bubak, J. Kitowski, K. Wiatr (Eds.): eScience on Distributed Computing Infrastructure, LNCS, Vol. 8500. Springer, pp. 164-177 (2014)

Additional information

Acknowledgements. This research has been partially supported by the European Union within the European Regional Development Fund program no. POIG.02.03.00-12-137/13 as the PLGrid Core project.

Primary authors: Mr WILK, Bartosz (ACC CYFRONET AGH); HAREZLAK, Daniel (CYFRONET); Mr PAWLIK, Maciej (ACC CYFRONET AGH); Mr KASZTELNIAK, Marek (ACC CYFRONET AGH); Prof. BUBAK, Marian (ACC CYFRONET AGH)

Presenter: HAREZLAK, Daniel (CYFRONET)

Session Classification: The EGI Federated Cloud - The word to the users: showcasing the fedcloud use cases