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EnginFrame as FrameWork for Grid Enabled Web Portals on industrial and research contexts.

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EnginFrame is a Web-based innovative technology, by the Italian company Nice S.r.l., that enables access and exploitation of Grid-enabled applications and infrastructures. It allows organizations to provide application oriented computing and data services to both users (via Web browsers) and in-house or ISV applications (via SOAP/WSDL based Web services), hiding all the complexity of the underlying Grid infrastructure.

In particular, EnginFrame greatly simplifies the development of Web portals exposing computing services that can run on a broad range of different computational Grid systems (including Platform LSF, Sun Grid Engine, Altair PBS, Globus, LCG-2 and gLite grid middlewares by European project EGEE).
EnginFrame supports several open and vendor neutral standards and seamlessly integrates with JSR168 compliant enterprise portals, distributed file systems, GUI virtualization tools and different kinds of authentication systems (including Globus GSI, MyProxy and a wide range of enterprise solutions).
Because EnginFrame greatly simplifies the use of Grid-enabled applications and services, it has already been adopted by numerous important industrial companies all over the world, besides many leading research & educational institutes.

Service publishing is achieved by developing simple XML-based descriptions of the interface and business logic representing the actual services implementation.
EnginFrame receives incoming requests via standard Web protocols over HTTP, authenticates and authorizes the requests and then executes the required actions into the underlying Grid computational environment.
Then, EnginFrame gathers the results and transforms them into a suitable format before sending the response to the client. Transformation of results is performed according to the nature of the client: HTML for Web browsers and XML for Web services client applications or RSS clients.
For each submitted service, a data staging area (the “spooler”) for the service input and output files is created on the file system.

Most of the information managed by EnginFrame are described by dynamically generated XML documents.
The source of such information is typically the service execution environment: an XML abstraction layer aims to submit service actions and translate raw results coming from the computational environment into XML structures.
The XML abstraction layer is designed to decouple EnginFrame from the actual Grid working environment, hiding the specific Grid technology solution. This characteristic makes possible to easily extend EnginFrame functionalities by developing ad-hoc plugins for specific computational and data Grid middlewares.
To support the integration of data Grid middleware solutions, EnginFrame introduces the concept of Virtual Spoolers that represent distributed data areas that reside outside the EnginFrame spoolers file system, but that can be remotely accessed by EnginFrame itself through the targeted data Grid technology. The structure and the content of a Virtual Spooler is described by a dynamically generated XML document.

Thus, the access to data catalogs and storage technologies is provided in a very easy way and their contents can be inspected like a “browse a file”.

Concerning technical aspects, there are some key issues that must be addressed properly in Grid Portal development in industrial contexts:
grid security and authentication aspects are critical both at Grid middleware-level and at access-level;
the authorization system should be built into the Grid system, enabling a fine-grained access control to resources (datasets, licenses, computing resources);
the accounting system, suitable to collect the resource usage and supporting reporting and billing services, should be able to collect the records from the various Grid nodes and merge them according to the business needs;
application integration and deployment to the Grid context, as well as administration should be standardized and simplified;
the access and the exploitation of Grid enabled applications by the end users should be simplified to the level of a web browsing experience;
the users shouldn’t need to be aware of the Grid infrastructure running the application, to perform their tasks.

For the industrial/engineering companies, the long and complex process that goes from the design of an industrial product to manufacturing, involves the cooperation of dozens or hundreds of people, departments or companies, often SMEs, ranging from engineering service providers to component suppliers. This can be regarded as a “virtual organization”, made of individual members or groups of people from the various companies that share, with a well defined role and profile, the overall project goal, often composed of geographically distant members, which would benefit from increased, real-time sharing of information and IT infrastructures, while preserving the intellectual properties of each of the project members. There are a number of factors, ranging from human, to organizational, to technical and to business aspects that are only partially addressed by current GRID technologies, that pratically limit the adoption of this approach.

The Web-centric approach lets users access any service virtually from anywhere, at any time, over any network and platform, including Personal Digital Assistant and Cellular Phones, thus supporting the ubiquitous access to the Grid.
Built on the experience of Industrial and Engineering requirements, the EnginFrame system has been designed to enable addressing effectively the above mentioned values, while minimizing the efforts to build and maintain a successful Grid Portal solution.

GENIUS Portal [1], based and powered by EnginFrame, jointly developed by INFN and NICE srl within the INFNGrid Project, allows in a very easy way the integration of applications ported to be executed on LCG-2 and gLite Middlewares, and many applications have been implemented on GILDA dissemination testbed [2] from the beginning and shown within dozens of tutorials, giving to the user an easy way to run jobs on the grid and to manage own data using the virtualizations offered by exposed services at different levels, locally, remotely, on catalogs. On the other hand, using the EnginFrame Framework, GENIUS Portal has inherited all the features, deriving from years of development and experience into industrial contexts, like scalability, flexibility, easy maintenance, security, fault tolerance, connectivity, data management, authorization, usability.

Conclusions.
The adoption of this innovative technology has given industries and engineering companies very important benefits in improvements in productivity running on Grid-enabled infrastructures. GENIUS, by staying aligned with the middleware development, can be an instrument to facilitate a dialog between research and industrial contexts based on a high-level services approach. This dialog can give also a very high added-value for both worlds, to spread the use of Grid infrastructures and generate a critical mass of awareness and trust.

References.
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