



Contribution ID: 167

Type: oral presentation

## An object-oriented approach to generating highly configurable Web interfaces for the ATLAS experiment

*Tuesday, April 14, 2015 5:45 PM (15 minutes)*

In order to manage a heterogeneous and worldwide collaboration, the ATLAS experiment developed web systems that range from supporting the process of publishing scientific papers to monitoring equipment radiation levels. These systems are vastly supported by Glance, a technology that was set forward in 2004 to create an abstraction layer on top of different databases; it automatically recognizes their modelling and generates web search interfaces. Fence (Front ENd ENgine for glaNCE) assembles classes to build applications by making extensive use of configuration files. It produces templates of the core JSON files on top of which it is possible to create Glance-compliant search interfaces. Once the database, its schemas and tables are defined using Glance, its records can be incorporated into the templates by escaping the returned values with a reference to the column identifier wrapped around double enclosing brackets.

The developer may also expand on available configuration files to create HTML forms and securely interact with the database. A token is issued within each deployed form as a random string of characters which must then be matched whenever it is posted. Additionally, once the user is authenticated through CERN's Shibboleth single sign-on, Fence assigns them roles and permissions as stored in the database. Clearance attributes can then be bound to individual inputs within their own JSON description so that whenever they are submitted, the resulting system verifies whether the user has the necessary permissions to edit them. Input validation is primarily carried out on the server side with PHP but, following progressive enhancement guidelines, verification routines may be additionally entrusted to the client side by enabling specific HTML5 data attributes which are then handed over to the jQuery validation plugin. User monitoring is accomplished by logging URL requests along with any POST data. The documentation is automatically published from the source code using the Doxygen tool and made accessible in a web interface. Fence, therefore, speeds up the implementation of Web software products while minimizing maintenance overhead and facilitating the comprehension of embedded rules and requirements.

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**Session Classification:** Track 4 Session

**Track Classification:** Track4: Middleware, software development and tools, experiment frameworks, tools for distributed computing