

MULTILEVEL AUTHENTICATION ON THE WEB WITH CUSTOMIZABLE FEEDBACK

By Sergey ZHDANOV¹, Alexey KOSTIN¹ and Dmitriy BORODIN²

¹ Moscow State Pedagogical University, Moscow, Russia

² University College of Ghent, Belgium

This paper describes the principle of multilevel authentication aiming on assigning different rights to the users of a web system. The customizable feedback feature enables users from different groups to perform efficient intercommunication by email bypassing respective online pages of the web system. These statements are illustrated with an example of a website for organizing distant competitions and trainings in elementary mathematics.

Introduction: Authentication and Authorization on the Web

Authentication is a way to be ensured that users identify themselves as whom they say they are. Usually, authentication is performed by challenging the user to prove his/her identity – the most common way on the web is to request a username and password. If the user successfully meets the challenge – that is provides a valid username/password combination, the application authenticates them. If the user does not, the entry on the system is refused.

Authorization can only happen after a user has met the authentication challenge. Authorization is determining the user's privileges within the application. In a typical forum application for instance, a Guest would only be allowed to read posts, while a Member can respond to posts and create new threads, and Administrators may be able to remove or edit posts as well as ban Members who violate forum policies.

What is Multilevel Authentication?

Multilevel Authentication enables you to assign different authentication levels to the applications that it protects. It is possible then to map these authentication levels to specific authentication plug-ins. For example, you may configure a highly sensitive application to require a user certificate and a less sensitive application to require a user name and password.

The model of multilevel authentication with customizable feedback

We describe the model on the real-life example, developed by Alexey Kostin – the website <http://kiloherz.ru> under the supervision of Professor Sergey Zhdanov. This website provides free service for secondary and high school students who want to develop their knowledge of elementary mathematics and participate in competition in mathematics.

The website contains the materials and methodology of interuniversity competition in mathematics. The site also contains the service which provides the feature of the distant competition in mathematics for everyone. This competition is

considered as an online training activity as well as preliminary stage for the face-to-face competition.

The content of the website is maintained by the teachers and professors of the Faculty of Mathematics (<http://www.mpgu.edu/abitur/math2.htm>) of Moscow State Pedagogical University (<http://mpgu.edu>).

The multilevel authentication with customizable feedback can be described as follows:

1. There are three levels of authentication: *participant*, *tutor* and *administrator*.
2. The *participant* can register on the website by him/herself and be enrolled in a distant competition stage with the feature of sending/uploading the solutions of the problems online as well as to train on example solutions and also submit them online.
3. The *tutor* can upload problems, start distant competition stage and check the solutions sent by *participants*.
4. The *administrator* is able to perform all the actions that *participants* and *tutors* can do, but only he/she can register/remove *tutors* on the system, remove *participants*, moderate the uploaded content of the website, assign authentication levels.
5. It is possible to change the permissions of each level.
6. Each action, performed by any user on the system, can give its feedback (by email). Actions requiring a feedback can be configured on the user's profile.
7. It is also possible to use dynamic links for events in emails sent automatically when an action is performed.

Below we have a small example to show how multilevel authentication with customizable feedback.

A participant is enrolled to the training competition. He solved the problems and uploaded the solutions online under his username/password (it is possible to do either on the textarea compatible with the LaTeX/MathML standard and simply uploading a file of a recognisable format). A tutor who started this training competition, received a feedback on his email that there were a file with solutions uploaded. The email message the tutor received contained the direct link to the solutions, ie all the tutor is need to do is to click this link and he is automatically logged on (authorized) and is able to read and check the solutions. Once the checking is completed, he submits the corrected solution with the commentaries on the server. The participant, in his turn, receives a feedback containing the information that the solutions he uploaded were checked and the link to see the content.

Another simple example of a feedback is when administrator receives notification messages about new users that have been registered.

In all described cases the feedback on the respective actions was enabled.

This website was developed on the technical basis of the open-source content-management platform Drupal 6.x. (<http://drupal.org/>).

Below we give an example of how to create authentication levels and manage user permissions in Drupal:

1) Add new user roles (**Add role**) for administrators under **administer >> access control >> roles** area.

2) **Administer >> access control >> permissions** area and check the boxes for the modules and settings you want to grant access to for these new roles created in step 1.

3) **Users** area under **administer >> users**, the **edit** link for the user(s) to change / set the roles for the user(s).

Conclusion: Social Networking

The feedback features of the multilevel authentication module together with the feature of creating content by a number of professional users may lead to a professional community and professional social networking, which is very important within the education globalization process and knowledge exchange.

This paper was composed following the speech of a Ph.D. student Alexey Kostin with the same subject, made on the official working meeting of the international TEMPUS SEXTANT Project in Moscow State Pedagogical University, February 22nd, 2010.