

Re-usability problems in large-scale content management of database driven Web based environments

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Abstract: The use of databases involves assigning resources to users with changing access rights. How will the information be presented to the right users? How can resources be reused for different audiences and how should access rights be provided. Who has the right to change, who can read it and who is owner of the objects in a resource base?

Introduction

The faculty of Educational Science and Technology started a faculty wide implementation of Telelearning with the TeleTop project in 1997. The aim of the project was to support teachers and students with a web based database driven environment. Two years later the entire university, including ten faculties, is ready to implement the TeleTop system. How reuse of material should be provided is a point of research because content management can make the use of objects more efficient.

The problem of assigning resources to people

Scaling up a course management system means that more information will be stored. Reusing includes retrieving stored information. Finding relevant material and assigning this material to the right users is a problem because of the large amount of objects and the large scale of users. A second point of attention is the use of access rights. Access rights are used to give users rights to read or change objects. Using databases includes controlled access to different objects for different users.

Objects:

Every object has users that can read or use the object, users who are able to change or create the object and users that can actually delete an object. These rights are set in the access control list and every database uses some sort of access control list to control access objects in a database. These objects can consist of (elements of) learning material, course descriptions, assignments, multimedia fragments, HTML pages or any other type of digital content. Controlling access to information is needed so that copyrights or confidential material can be stored in a protected environment; i.e. an environment that is not accessible for unauthorized users.

Users:

Users are mostly unaware of these access control lists, because software developers make these environments as easy as possible by not showing objects that users are not authorized to see. The problem in most cases is that objects may be accessible for one user, but not for another. Resources available for teachers may not be accessible for students. Assigning students to these resources may result in irrelevant links for the students. This makes reuse for different users and audiences a difficult issue. This problem has not earlier been identified because most web-based environments are still pilots or prototypes. A faculty wide implementation includes a large number of users who can create objects and even more users that should be able to use these objects. Dealing with a large scale of objects and really reusing these in database driven courses is a new development.

Solution for large numbers of objects

Maintaining access control for every single object in a very large resource base is not manageable. Managing many (more than 10.000) users over many (more than 10.000) objects is a realistic example in our situation at the University of Twente. Combining a number of related objects in a course is a solution to make control access rights manageable. In this way it is possible to assign a set of objects to several predefined user groups comprised of teachers or students. One group can be assigned the role of author and other groups as readers. Copying objects to new courses can involve reuse of objects. This method has been sufficient until now, because in most cases instructors wanted to reuse only the material created by themselves. Reuse as described gives the possibility to make changes to objects for the new audience.

Making objects more flexible

Considering the results of reuse we recently developed a new model for access rights. This model is based on roles that are assigned to user groups. A user group is a list of people who can access the same functionality in a database. So the access control of every object in a course depends on the role a user has. Three roles were identified: Teacher, student and administrator. Using roles makes reuse possible by employing an abstract access level that can be used over courses and provides a consistent control of rights. Objects can be used in every course without changing access control lists of involved courses. The development of a resource browser is in progress. In the first place reuse of objects within a course is being researched, in the second place exchange of objects between courses will be researched.

Challenge, future plans

In the next years reuse of objects at the university level should be supported. Objects should be reused within courses, between courses and faculties. Even different universities should be able to reuse objects in courses. Therefore, interfaces should be developed that support users selecting the right resources. Also, access right models have to be developed. Another objective of our research should be directed at the ownership of objects; i.e. copyrights. Ownership can be seen as part of the access rights involved with objects. Is a user who creates an object the owner and is this user the only one who may reuse or add or edit this object? Who owns such copyrights? All these points need further research. In this respect it is important to note that a number of organizations involving standards for learning technology and related issues are aware of these problems and are trying to find solutions, but until now there is not a standard way to handle large scale resource bases. Examples of these organizations are the Instructional Management Systems project (IMS)¹, the Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE)², the IEEE 1484P Learning Technology Systems Architecture (LTSA)³, Advanced Distributed Learning (ADL)⁴ and the Aviation Industry CBT Committee (AICC)⁵.

¹ IMS: <http://www.imsproject.org>

² ARIADNE: <http://ariadne.unil.ch>

³ LTSA: <http://www.manta.ieee.org/p1484>

⁴ ADL: <http://www.adlnet.org>

⁵ AICC: <http://www.aicc.org>