A Model of an E-learning Environment for an Educational Portal

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Summary: *The present paper has the objective to provide an overview of a model of e-learning environment that is to be used on the Internet. I have endeavoured to take into consideration the latest trends in the development of this type of environment and the established standards and specifications in the field. The role of the XML standard for creating and describing the information units has been investigated. A description of the different modules being developed by the author at present is included, as well as an account of their role and interaction. The paper emphasizes the growing importance of educational portals in modern society.*

Key words: *e-learning, standards, specifications, SCORM, IEEE, XML, LCMS, ASP.NET, learning component, learning object, information object, discipline, textbook, module, section, lesson, term, repository*

INTRODUCTION

The term e-learning refers to a set of services and technologies which provide integrated high quality education available at any place and any time [2]. The methods and instruments used to carry out e-learning are called e-learning environments.

The growing need for e-learning environments (Figure 1) is determined by the problems that occur when using conventional services provided on the Internet. Generally speaking, services like e-mail, chat programs, newsgroups, etc. are not suited to support educational activities. For this reason people who do not have the opportunity to attend formal lessons at traditional educational institutions (universities, schools, colleges, courses and lessons) are compelled to waste time and effort trying to find appropriate educational resources. The Internet is a modern environment which provides almost all the necessary resources for carrying out courses, tests, examinations, etc. Nowadays it can be used to substitute for most of the traditional forms of education.

E-learning standards

The standards and specifications related to e-learning systems are technical protocols facilitating the data exchange between systems based on different technologies. Nowadays the most popular standards are:

- *SCORM (Shareable Content Object Reference Model)* – industrial standard for exchange of educational materials that is based on the adapted specifications ADL, IEEE, IMS, Dublin Core and vCard. It was created in the year 2000 with the purpose of providing reusable modules and making the contents fully independent from the programs that manage it [1].
- IMS (Instructional Management System) – created in 1997 by leading companies in the Information Technologies field. Utilizes the following standards: XML Query for obtaining metadata, Z39.50 – archive information search and SOAP for delivering messages [5].
- IEEE LTSC (Learning Technology Standards Committee) – consists of several workgroups which develop: a model for architecture of an educational system (P1484.1), a glossary of terms (P1484.3), metadata for the description of learning objects (P1484.12), semantics (P1484.14), data flows protocols (P1484.15), etc. [4]

Educational web portal

The present paper provides information on and discusses a new model of an e-learning environment for an educational portal. The model has been significantly simplified compared to the similar models developed by major companies. Its purpose is to make up for a deficiency caused by the lack of educational web portals in Bulgaria. When finished, it could be used by universities, schools and independent users. The only prerequisites for using it would be the availability of a web browser and some basic skills and experience with information structuring.

The e-learning environment described in Figure 1 represents a general model that I am trying to achieve. The Internet layer and its information flow protocols are at the bottom of the chart. Like any other educational web portal, this one utilizes HTTP for data transfer and FTP for uploading the materials (structured as HTML files) and all other information objects like photographs, graphs, etc. The Transport protocol SOAP, which is at a higher level, is to be used for making the data into packages and forwarding it to external sources. The part of the services used in the portal that are at higher levels is represented in Figure 3 and described below.

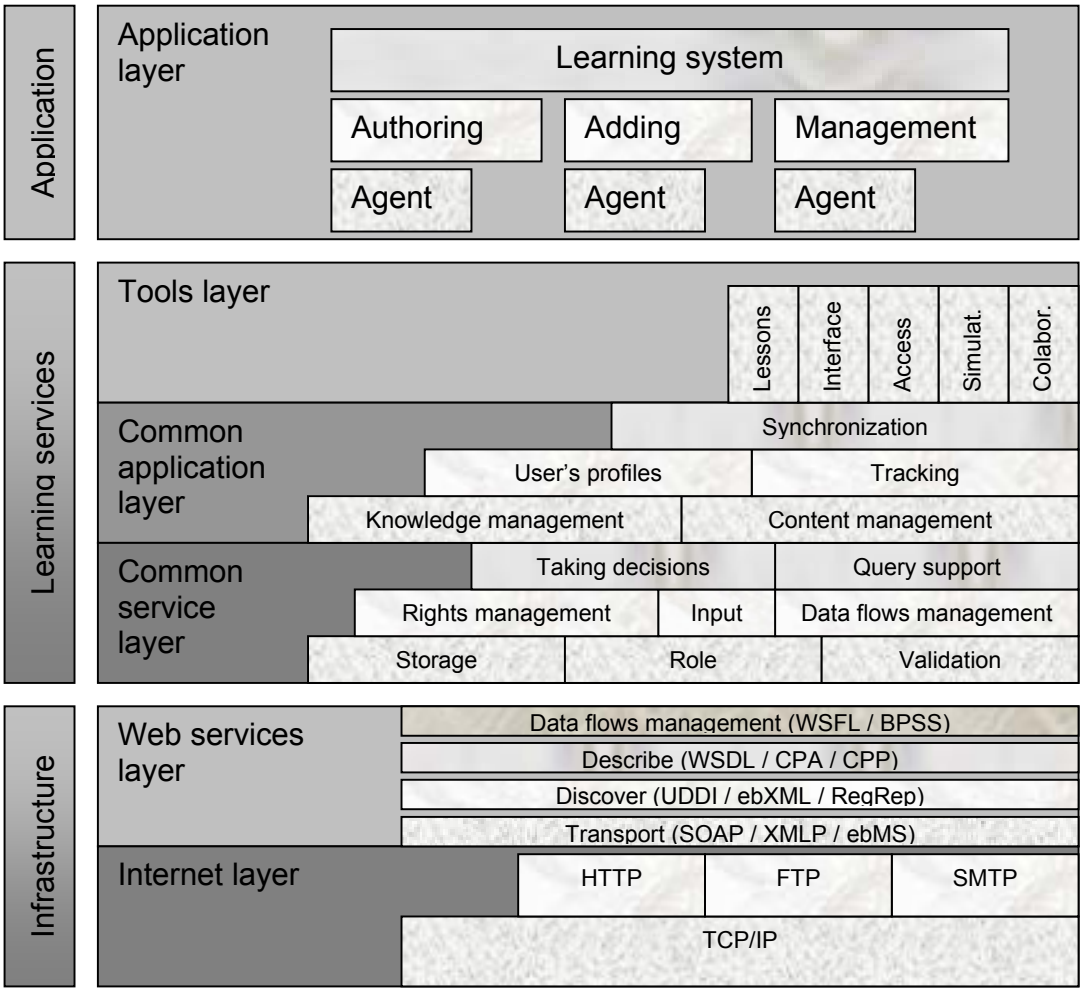

Fig.1 The architecture of a common e-learning environment

Figure 2 represents the data flows from the user to the LCMS and vice versa. The portal utilizes ASP.NET Microsoft server. The programming language used for developing the

environment is C#. It is a powerful and convenient tool for creating Internet applications. When a user chooses the web address of the portal, the queries of the browser he/she uses are received and processed by the server. It forwards them to the LCMS, which determines what is to be done after that.

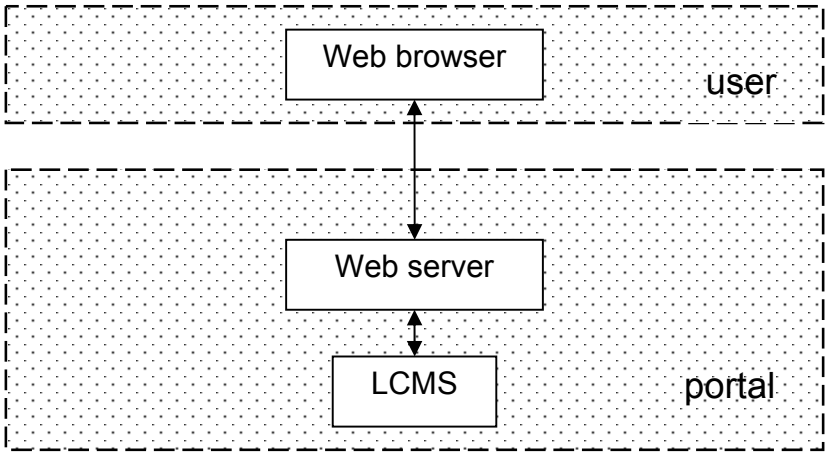

Fig. 2 Dataflow diagram

The Learning Content Management System (LCMS) is an environment that has two main goals:

- Regarding the learning/educational process – to consolidate its planning, building and evaluation;
- Regarding the content – to cover the tools for creating, arranging and consolidating its parts [3].

The structure of the environment that is being developed is not particularly complex. It consists of separate modules interacting with each other. The structural units have been given the name modules because the environment does not claim to be capable of performing all the functions that can be assigned to a completely finished e-learning system. In a completely finished e-learning system, the same structural units perform significantly more complex functions and are called agents. They can not only interact with people (authors, learners, etc.) when creating and using the objects but they also automatically obtain information from different Internet sources [6].

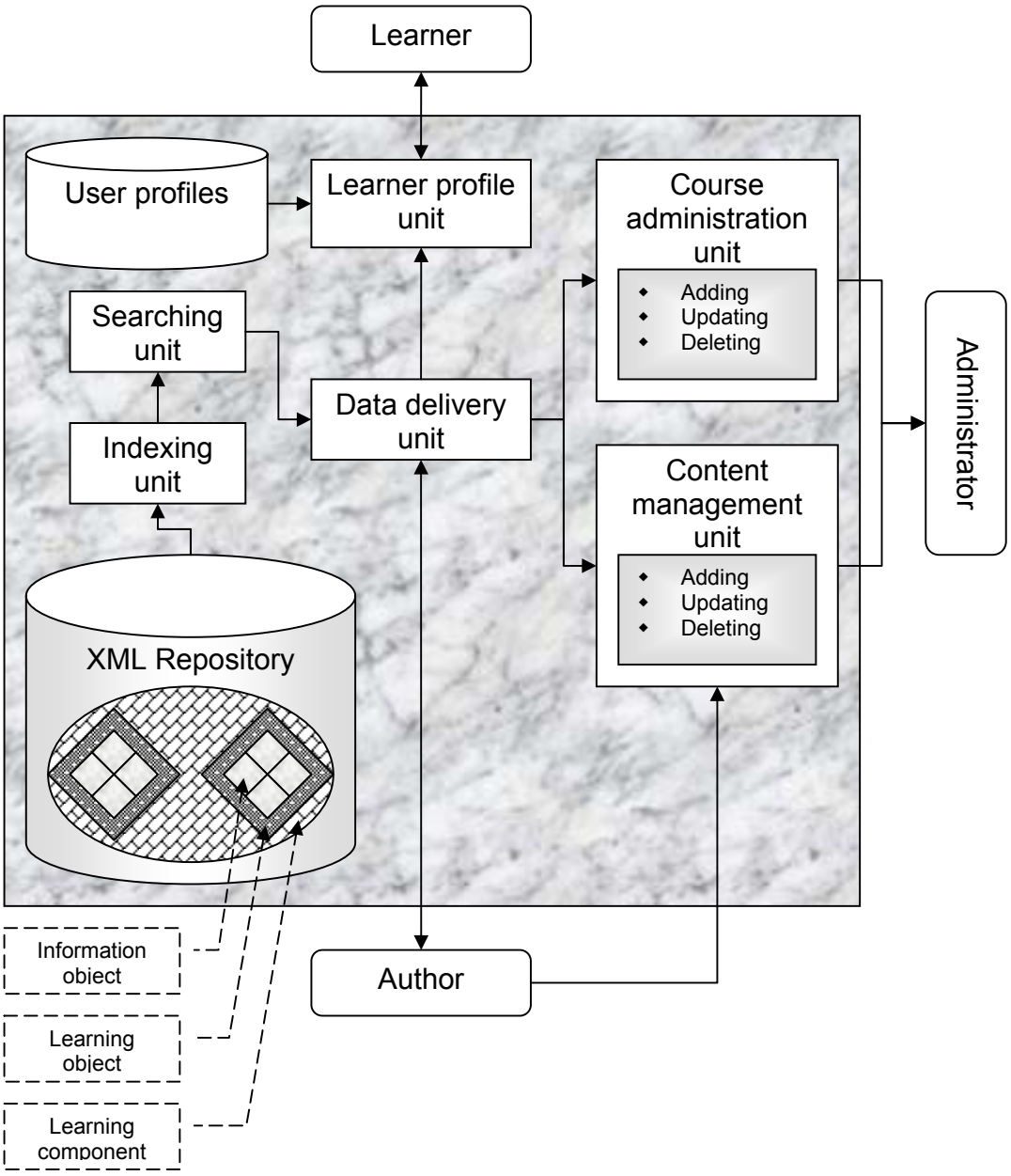

Fig. 3 Structure of the developed LCMS

Structure of the environment

The *Learner profile* module is responsible for creating and storing the profiles of the learners. Initially, it will be the learner who determines his/her own level by choosing one of a number of alternatives (Table 1). At a later stage the environment will determine the level by means of tests carefully selected by the course leader. Later on, the module will forward the user details to the repository called User profiles. It will be also used to store the users' identification (autobiographic) details: objectives, interests, level, design preferences, user name, password, etc.

The *Data delivery* module is of central importance to the system and serves as a mediator between the different modules when there is an information search query. The

queries are processed by the *Searching* module. The module uses XML Query for data search because the data in the repository is in XML format. However, it does not have direct access to the repository and uses a system for indexing - *Indexing* unit, for the resources stored there. The indexing system is responsible for setting a unique number for each resource and thus facilitates their aggregation in the repository.

The two modules *Course administration* and *Content management* support three standard operations related to the manipulation of data: adding, deleting and updating. The first module is responsible for the support of the structure of the subjects in the repository and the second one – for their content.

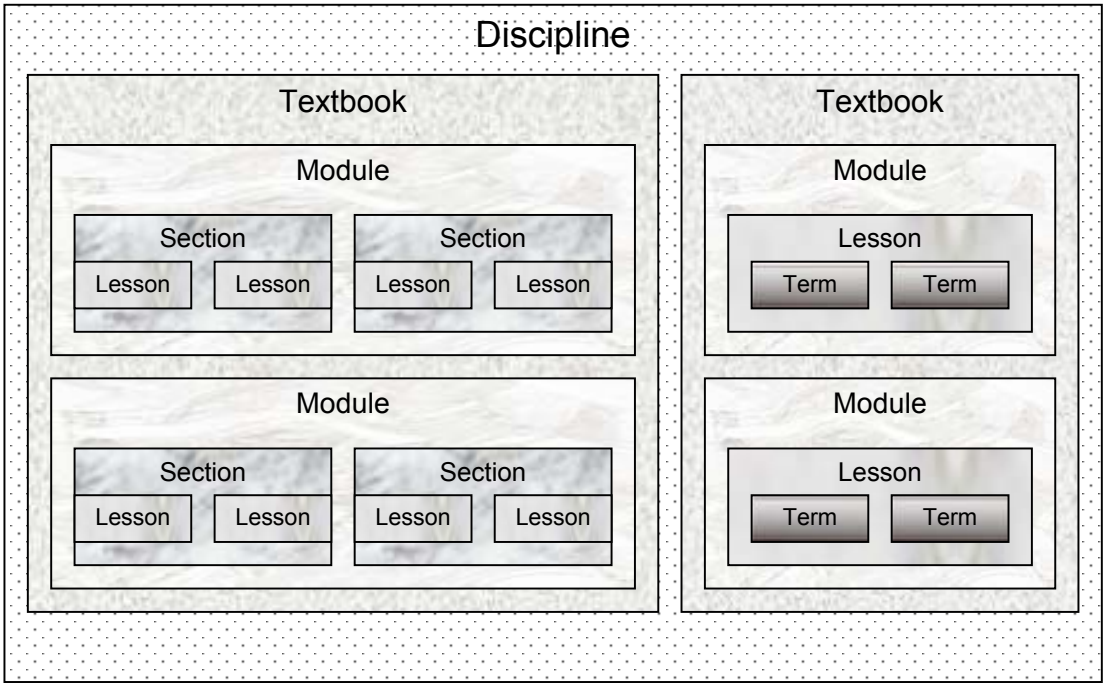

Fig.4 Structure of the data repository

The structure of the materials in the repository is hierarchically organized: discipline, textbook (learning components), module, section, lesson (learning objects) and term (information objects) [7]. It must be stated that the absolute adherence to this structure is not compulsory (Figure 4) because it is not always possible to perform such a detailed division of the material. Apart from structural division, there will be other methods for dividing the content. All the methods are represented in Table 1:

Table 1 Objects in the repository

Objects structure	Objects range	Users knowledge	More characteristics
Discipline	Area	Expert	Author
Textbook	Direction	Advanced	Date
Module	Theme	Upper-Intermediate	Name (bul.)
Section		Intermediate	Name (eng.)
Lesson		Pre-Intermediate	Definition
Term		Beginner	Key words

The range division is hierarchical, too. The area includes directions, and the directions

include themes. The structure of the objects and the objects themselves will be stored in separate XML files, in order to accelerate the processing, to achieve a greater independence and security of the data. The last column contains the set of different properties of the objects. They are described in the XML files as sub-sets or attributes for the corresponding object. When certain properties are unique and of great importance to the corresponding object, they are saved as attributes (for example the object's identification number in the repository). Some of the properties refer to the components, others to components and objects, and others to terms only (definition, for example).

It is necessary to specify that the content of each lesson will be represented by means of a standard HTML page. This could be text, a photograph, a graph, audio or video material (information objects). In order to ensure the easy and secure work with the objects it is necessary to build a good taxonomy. The concepts that the system is going to operate with should be described according to the guidelines for compiling thesauri.

CONCLUSION

The new e-learning environments are a real challenge from administrative, organizational and pedagogical point of view. In recent years this type of environment has become increasingly popular and widely used in the educational systems of the economically developed countries. One of the most important conditions necessary for putting into practice the idea "education at any place and any time" is adopting and recognizing universally accepted standards, which is actually the policy of most major developers. The policy of the corresponding public institutions in the countries mentioned above is to create and develop information systems facilitating and promoting education and the information and resources exchange [2].

REFERENCES

[1] Academic Advanced Distributed Learning (ADL) Co-Laboratory, Wisconsin, http://www.academiccolab.org/initiatives/scorm.html

[2] Eduspecs, Canada http://www.eduspecs.ca/index.htm, 2004

[3] EdutoolsWiki, http://www.edtechpost.ca/pmwiki/pmwiki.php/Main/GlossaryAnalysis, 2004

[4] IEEE Learning Technology Standards Committee (LTSC), http://ltsc.ieee.org/meeting/200203/doc/, 2002

[5] IMS Global Learning Consortium, http://www.imsglobal.org/accessibility/index.html

[6] Florida Community College, http://faculty.valencia.cc.fl.us/jdelisle/lis2004/glossary.htm, 2002

[7] Reusable Learning, http://www.reusablelearning.org/index.asp?id=28, 2004

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