E-learning – A Prerequisite for the Web Authoring System Realization

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Abstract: This paper includes a summary of authoring systems, which became the base of informatic modernization of the learning process in all fields. Besides conceptual determination and classification of the authoring systems, the article also discusses the technology for the realization of the WEB authoring system on the example of the Polytechnical Engineering College. Further, a review is given of leading web authoring systems, and conclusions are made about the current situation and further development trends. One of the e-learning materials for the Algorithms and Data Structures developed at the Polytechnical Engineering College is described in detail. Possibilities of the e-learning application in already existing web authoring systems are presented, its advantages and disadvantages are pointed out, and further directions of improvement and application in our conditions.

1 Introduction. Distance Learning

In the new millenium, in our environment, the realization of ideas has begun of a new learning system, so-called distance learning. A module of distance learning exceeds the borders of traditional teaching placing the entire teaching material, exercises and resources on-line. Pupils/students do not necessary have to come to school to classical lectures, instead of that they exchange ideas and information over the Internet. This model introduces and completely leans on concepts of the Internet during the whole classification period, enabling pupils/students instruction through their own dynamic and individual consultation via e-mail, electronic conferences in a local net or multi-user domain. In this model lecturers can use video transmission in real time, which becomes more and more accessible,

considering developments in technology and infrastructure. Using satellites it could be said that the slogan “learn at any place and at any time” can be taken literally. Really, by using new technologies pupils/students may participate in education from every geographical location.

1.1 Forms of Distance Learning

Programs for distance learning have arisen long before the use of WWW and the Internet. Printed materials, audio and video cassettes, TV programme diskettes and CD ROM’s have been in use. The communication between students and teachers can be realized in several ways:

- Correspondence courses – classical mail can be used for sending notes, textual material, video cassettes, CD-ROM’s as well as students’ answers. Today email is used for these types of courses.
- Courses over the radio or TV programs – pre - recorded programs are broadcast.
- Teleconference and video conference – microphones and cameras in a room make it possible for distant learners to discuss problems as if they were together in one room; desktop video conferences connect participants who work with a computer with microphone and camera.
- Computers with special programs – in the form of a computer software.
- The Internet and WWW – the Internet services (e–mail, mailing lists, chat rooms …) improve communication in distance education.

2 Definition and Classification of Authoring Systems

In the following paragraph a review of several authoring system definitions is given:

I Authoring system is a software tool, which is used for creating media objects, that is, for the defining of certain relations between media objects. Media objects include text and graphics (static objects), as well as animations, audio and video (dynamic objects) [1].

II Multimedia authoring system is defined as graphics-interactive software environment, which is used for creating interactive multimedia applications.

III Authoring system is a program, which has pre-programmed elements for developing interactive multimedia titles and contents.

There are several classifications of authoring systems. One of them is related to the concept of its usage:

Time-based authoring systems - This tool offers visual time axis on which are posted multimedia events used for controlling of the application's carrying out.

Card-based authoring systems - Application made of card system is created from one or from several groups of cards, i.e. pages, so the navigation can be performed through pages or hypertext links. Individually, they are very well connected in order to create hypertext documents.

Flowchart based authoring systems - Within this type of program icons are chosen and used for flow diagram generating, which controls the performance of application. The icons represent pictures, text, graphics (which can be added), decisions, branching, animation, sound icons etc.

Menu-based authoring systems - Within this system, the choice of software functions is performed through menus, which offer already defined actions and answer suggestions (they can be, more or less, accepted or modified by the author). The author is systematically led through the generating process of parts of a future application [1].

Another classification of authoring systems is based on the way of shaping, that is, it depends on the program languages. Those are as follows:

Systems based on program languages (C++, Borland Delphi, MS Visual Basic etc.). They are extremely fast, complex and have great possibilities with complex development (for example, for teachers).

Systems based on visual environments, which does not include much programming (Macromedia Director, Multimedia Tool book, Multimedia Fusion, etc.). With a little program code writing, it is characterized by less efficient and flexible final product, but also simpler development.

3 The Use of WWW for Distance Education

Web pages dedicated to distance education should help students and pupils to find the necessary information about the course, to learn the material and to be introduced into the subject of the course. Web pages designed in an appropriate way should promote the thinking, discussions and active participation of students in the process of distance education.

In web pages dedicated to course, the following elements should be implemented:

- Information about course and lecturer – course name, lecturer's working hours, information about printed material, course review, rules of grading.

- Communication of the group – access to the lecturer's e-mail, discussion group for student-student and pupil-pupil communication, forms for reports about problems.
- Assignments and tests – distribution of assignments and tests for on-line filling-in and submission, review of solutions, tips and tricks, frequently asked questions.
- Course material – lectures accessible in form of web pages and files for download.
- Demonstrations, animations, video, audio – material which cannot be presented in classical textual format should be include.
- Referent material – list of materials in printed or electronic form, which supplements textbooks. To avoid problems with copyrights these articles should be in public property. The instructor can also provide links to information on the WWW that would be useful to students in the class about similar topics, courses accessible over the Internet, university library and other resources that can complement the course.

The Internet, unlike „traditional" documents (which are usually linear or sequential structures), supports several ways of movement – navigation through documents. Using hypertext, the user can approach a document in the traditional – linear way of reading or using links within a document he can connect to other sites, images, audio files, etc, and then later return to the first document.

One thing that makes the moment in hypertext structure more difficult, is that despite the fact that it provides exceptional individualism in learning, it may cause user disorientation and information overload. Designers of distant learning systems, more exactly those who deal with contents, who should ideally be teachers, must keep in mind the influence of hypertext structure on the entire learning process.

While the Internet supports individual learning, researches show that, thanks to teachers, that interaction in real time increases efficiency and supplements distant courses. Students/pupils need guidance, and that is feedback information from instructor or opportunity to realize discussions with colleagues. Without interaction and connection with rest of the world, education on distance becomes an impersonal and unnatural form of learning.

New technologies and methods of teaching promote the traditional role of the teacher in the learning process, but teachers still have the responsibility to stimulate pupils interests' in connection with studying their topic and their motivation so they can completely participate in "Internet classrooms" (Updegrove 1995).

Distance learning is possible due to the Internet programs or web applications, which are executed in Internet or intranet environment. The use of WWW for

distant learning, with the application of all demands, which were elaborated in this chapter, is realized by authoring systems, which are called WEB authoring systems.

3.1 Prerequisites for Setting and Using

For using this system, any 32-bit Microsoft Windows operative system (Windows 95 or upgraded one) and installed web browser such as Microsoft Internet Explorer will be suitable. Hardware platform of a computer, which is used as a server is Pentium III on 600MHz, 512 MB RAM and hard disk of 120 GB. The server works with FreeBSD operative system, web server is the Apache.

Creating of media contents is probably the hardest and most voluminous part of author system using, even for simple one with elements of shell for DL. User, i.e. teacher or his assistant must be familiar with:

- Computer system (hardware and software)
- Graphics environment-windows operative system
- Starting of a program and working with files and folders
- Working with mouse and keyboard in windows environment

3.2 Description of E-learning Material for ASP

For the purpose of realization the post gradual thesis the realization of e-learning materials is carried out for several curricula, Algorithms and Data Structures - among other things, based on the textbook which is the result of collaboration between the University „Džemal Bijedić“ and the University Duesto (Bilbao, Spain) realized in the Project TEMPUS JEP AC-14.263/99. and collaboration with University from Lleida**.** The curriculum for Algorithms and Data Structures was written on recommendation of professors from the University Duesto. The presented e-learning material consist of complete classes and exercises from this curriculum created in a period of four years working with students at Faculty of informatical technologies from Mostar. In the first place, this tutorial is for those students who attend this faculty from a distance, as well as those ones who study this field at some other faculties.

The launching of the system is performed by starting web browser. The introduction page is shown on Fig. 1:

Figure 1
Introductional page

In the upper part of the page is the menu – hyperlinks which enable the user to choose from the following: Contents, Examples, Test, Glossary and Info. The menu is always visible and accessible at the top of the page, so it is very simple to open a new entirety at any moment. Each of these items will be described in short.

Clicking on the first item of the menu, Sadržaj (Contents), in Fig. 2, a new page is opened which gives a thematic overview of what makes up the content of the subject Algorithms and Data Structures, which was made based on the textbook „Data Structures and Algorithms“, D. Radosav, N.Bijedić, Lj.Đuretanović, FIT, Univerzitetska knjiga Mostar, 2004.

Figure 2
Menu enabling the selection of chapters

Clicking on the desired chapter first page of selected chapter it appears and menu is expanded so the all subchapters could be shown. Return on the top of the page, as well as transition to previous and following chapters is possible by clicking on the navigation arrows, which are on the bottom of every page.

The next item of the menu, Primeri (Examples), gives the possibility of seeing a way of sorting data with the help of program for sorting, as shown in Fig. 3. Sorting a list of elements means sorting elements in increasing or decreasing sequence, and this is a common operation. The applet xSortlab recognizes five different ways of sorting. It has a visual sorting and it is possible to watch the process of sorting 16 columns in increasing order, as well as time sorting which enables measurements of time necessary for sorting a great amount of data. This applet (free for use for noncommercial purposes) was made by David Eck, is downloaded from official site http://www.math.hws.edu, and is one of many applets in his book The Most Complex Machine.

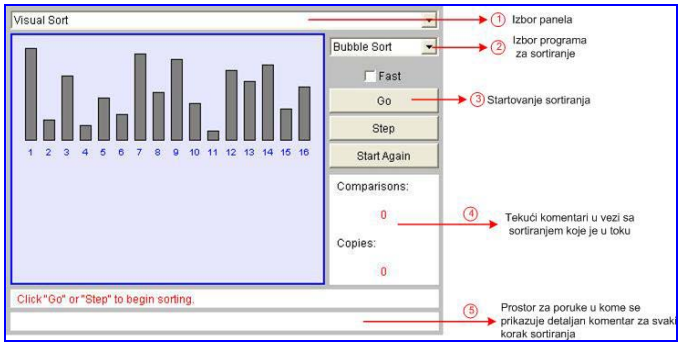

Figure 3
Sorting applet

In the section Primeri there is also one more applet that enables playing the towers of Hanoi. The applet has been downloaded from site www.mazeworks.com (it is free for use for noncommercial purposes).

The next item of menu, Test, consists of 14 test examples with 20 questions, Fig. 4. Besides every question, there is an arrow, which leads to the page (and the text) in which the answer is included. In this way students can very easily find the answers, it is also pointed out to them what is important and on what to focus their attention during the study process.

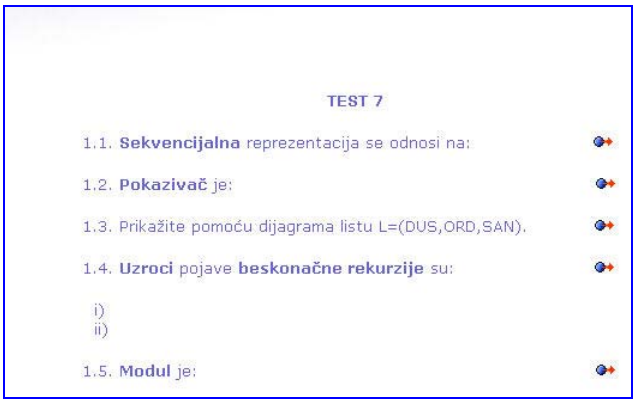

Figure 4
Example of a test

In the section Glossary there are some themes which are elaborated in text sorted in alphabetic order, as shown in Fig. 5.

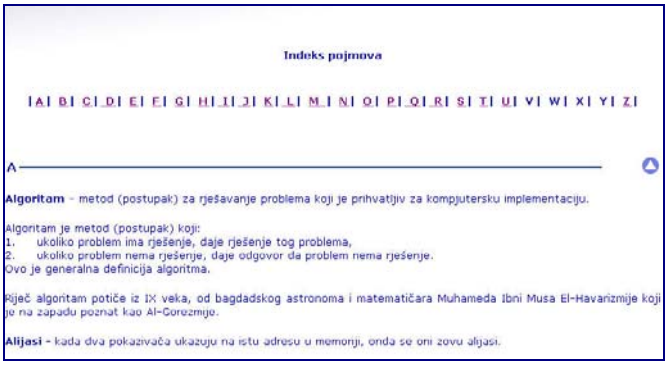

Figure 5
Section Glossary of e-learning system

4 Internet Relay Chat (IRC)

Distance learning requires one to have the tendency towards individual learning, self-discipline, taking responsibility in their own learning progress, and a great amount of persistence, too. It is very important to get feedback information from students about their satisfaction with the course-contents, as well as problems that have appeared during learning. Chat discussions specifically enable such feedback, which is missing from classical teaching, so that's why the students

enrolled in the course of Algorithms and data structures are able to communicate by chatting.

Internet relay chat (IRC) is communication based on textual messages on Internet or intranet in real time. The advantage of IRC lies in linking the students with approximately equal level of knowledge, such as in abblity of compensating missed contents.

IRC is system based on client-server architecture. Its starting purpose was to substitute a similar program, named talk, but over the years it overgrew its basic purpose and developed into one of the standard services on Internet with a huge number of users.

Once connected to IRC network, the user can join one or more channels and talk to other present users. Conversation can be public (everyone can see the content of the message) or private (message is exchanged between two or more subjects, who can be but not have to be on the same channel).

The network can sometimes be net split, disconnecting people engaged in talking before. It can last very shortly, but sometimes much longer, depending on the reasons of net split appearance.

A frequent problem is also the so called lag phenomenon when the time needed by conversating person to see the message becomes too long, which could lead to enormous conflicts between users.

Basic components of IRC protocols are the server and client, as shown in Fig 6. The server represents the backbone of IRC, and is the only protocol component that could integrate all other components together. It provides the point where communicating clients could be connected and as well as the point for networking the other servers. The server also provides basic services that are defined by IRC protocol.

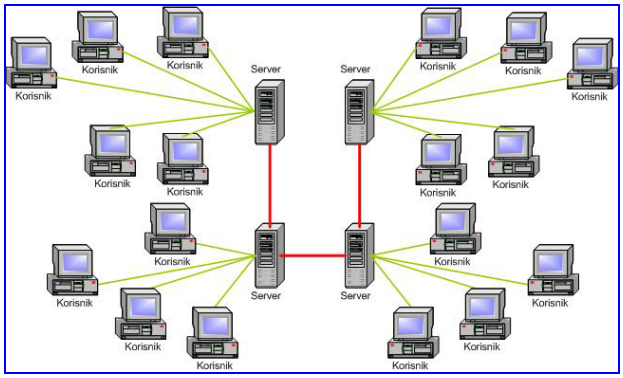

Figure 6
Illustration of the typical IRC network

The client represents everything connected to the network, different from the other server. For every client all servers have to serve the following information: an identificator unique in the network (the format of which depends on client-species) and server to which the client is connected. There are two types of clients: user clients and service clients [7].

5 Bahamut IRCd

Bahamut is an Internet Relay Chat Daemon (IRCd) designed for DALnet, one of the major IRC networks in the world. Bahamut is designed to run on the following OS' without any issues: FreeBSD and Linux. Bahamut is known to run on the following OS' but may need some tweaking: Solaris, Tru64, AIX and OSX.

Bahamut will not run on Windows. There are various unofficial patches and distributions of Bahamut on the Internet that allow it to run on Windows. These patches/distributions are completely unoffical and are not supported by the Bahamut team.

Installation of Bahamut assumes several things: first that you have a shell, then that you have access to FTP on your PC, and that you know what IP you are allowed to bind to, and what ports you are eligible to use.

The IRCd should not be installed as root; this is not needed as most irc servers use port numbers above 1024. Note: From version 1.5 Bahamut will not allow you to run the IRCd as root and will quit out on run. Installation is very simply and it is done following instructions downloaded from the official site [8].

6 Realization, Application in Praxis

Chatting, like in praxis, is tested by a program named Xchat 2.0.9, which is free client for UNIX operation systems and is downloaded from the official site [9]. It works under the following operation systems: Linux, FreeBSD, NetBSD, OpenBSD, Solaris, AIX, IRIX, DEC/Compaq, Tru64 UNIX, HP-UX 10.20 and 11, MacOS X, Windows 9x/NT.

Xchat is graphical IRC client and its installing is very simple. After starting the installation, the program itself recognizes regional settings on the computer and without any intervention by user "jumps on" appropriate language (on Serbian, in this case), which means great relief to users whose knowledge of English is not adequate.

After choosing the network to access, a new window appears, who after accessing the network by the join command, gives a list of channels to which the user could be attached, the name of the operator, if a nickname is used by the user is registrated and so on.

The ability of communication between each other and formulating questions about the contents of the course, made excellent acceptation by the students who participated in researching process. Problems, which occurred analyzing tasks given in virtual lessons, students intended to solve by chatting between each other or by asking for help from experienced colleagues. Students were able to exchange comments and information in a few minutes, independently from space and distance. In a very short time, students had chosen channel moderator, that controlled and supervised the channel and conducted discussion.

Conclusions

The educational software presented in this work, its full contribution to the teaching process only comprises a part of a complex system for learning at distance. Such a system would make it possible to document all required parameters for tracking the teaching process. The system tracks all listeners within the predicted time, enables communication according to a system: one to one, one to all, gives inspection into data of previous teaching and experiences of listeners from other groups. Based on those parameters it would be possible at any given every moment to track the progress of each individual or group, and at the end of the teaching process to measure reliability and analyze efficiency.

Furthermore, it would be desirable to extend the module with the application of multimedial contents: images, sound (voice), and animation. The module for learning should be extended with the use of an interactive feedback which leads student toward their goal with the system simulating a real situation. Students' mistakes are immediately signaled and are used as means of direct learning. Students can reach their goal only if they do all steps correctly. The student accesses each module student as many times as it is necessary for him until the final result is satisfactory.

It is necessary to provide the possibility of input testing of students in the aim to get inspection into the prior knowledge of an individual and based on that, to direct him to the appropriate level of course material, and in addition, output testing for comparing input and output knowledge.

No matter whether we use ready-made Web authoring system, which we have purchased, or those which are free, or whether we develop a shell alone, there is no quality distance learning if teachers do not create quality e-learning materials which include all teaching units, lessons and exercises, and which have a final output in practical knowledge which is applicable in practice. The Web authoring system also have mechanisms for testing included, as well as forums,

consultations and notices, that will be the further elements of development of the given e-learning material.

References

[1] Nadrljanski, Đ: Obrazovni softver – Hipermedijalni sistemi, Univerzitet u Novom Sadu - Tehnički fakultet "Mihajlo Pupin", Zrenjanin, 2000

[2] Radosav, D., Bijedić, N., Đuretanović Lj.: Strukture podataka i algoritmi, Univerzitetska knjiga Mostar, Biblioteka Priručnici, knjiga broj 2, ISBDN/BH-ID 9958-603-10-X, Mostar, 2004

[3] Radosav, D.: Obrazovni računarski softver i autorski sistemi, ISBN: 86-7672-032-0, UDK: 004.4 (075.8), 37.018.43:004 (075.8), COBISS.SR-ID: 200750343, Zrenjanin, 2005

[4] Radosav, D: Učenje na daljinu i WEB autorski sistemi, Međunarodni naučno-stručni Simpozijum INFOTEH – Jahorina 2005.godine, BiH, CD INFOTEH-Jahorina, Vol. 4, Ref. E-I-11, p. 244-248, ISBDN-99938-624-2-8

[5] Radosav, D., Kazi Z., Kazi Lj.: WEB autorski sistemi, III Međunarodni simpozijum Tehnologija i informatika u obrazovanju – izazov 21.veka, Beograd, 2004

[6] Urošević, D.: Algoritmi u programskom jeziku C, Mikroknjiga, Beograd, 1996

[7] www.irchelp.org

[8] www.bahamut.dalnet.net

[9] www.xchat.org

[10] http://www.elearningeuropa.info