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## Integrated education system

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### Abstract

In this paper we present the Lecta integrated education system. We show general assumptions of the system and we describe modules of Lecta. System programming platform, teaching aspect and exam module "Lecta-Egzaminator" are presented in detail.

### 1. Introduction

The most important thing in these days is reliable, correct and well-edited information. More and more often you can come across a piece of information without clear sense. Wider and wider effect of plagiarism and breaking the copyrights by students and also by people who should guard them are observed. To neutralize these disadvantageous occurrences in 2002 in the Department of Distributed Systems of Rzeszów University of Technology we started work on a system that makes student and worker's research and project works like: class-project, scientific articles, computer program and documentation, video materials, presentation available. We publish all this information on the web site. Thanks to general access to published presentations, system users verify and eliminate the plagiarism.

To guarantee a content-related level and uniform and connected form of works, they are verified in advance by teachers. Information collected in this way is a precious source of knowledge for students and it can show current research branches at the university making cooperation with other institutions easier..

In this paper we present conception of development, stages of entering the system, their meaning and influence on the university life and ability to popularize of knowledge.

## 2. System assumption

In this part of work issues that create the basis of the whole system conception are presented. These issues have influence on realization of individual stages of its entering.

The basic issues are:

- Commonness – dissemination access to knowledge for all interested people. All works, projects and information that are being collected in the system are published on web sites.
- Modularity – system consists of independent modules. Each module can be realized and put into practice in any time and regardless of others. Modules are being designed according to global system rules and each module has its own set of rules.
- Cohesion – all modules make one compact system. Each module has its own detail functions, and it is responsible for them. The basic rule is – do not duplicate data or functions.
- Graduation – new modules should not clash with those that have already worked. None of modules can limit system development in future and can become a „bottle-neck” of system.
- Control and verification – information collected in the system will be verified by people visiting system website in order to eliminate a plagiarism. All people who publish their work must write a statement to confirm that work is original. This kind of procedure make academy secure in the case of claim for damages from the people who recognize plagiarism-work on the system websites.

In next part of this paper we will present the functions of modules in detail. We assume a possibility of their further modification, extending their operating range at any realization stage or training.

## 3. System structure

The system consists of independent modules which create an integrated system. This kind of solution allows for system development and modification according to the user's need. None of modules can interfere with work of others because it eliminates a possibility of system hang-up or its elements and conflicts between modules which use different technologies.

Each module is independent but they can also support a work of other modules.

The general system conception is shown in Figure 1.

Below we present a few elements of the system which are realized first:

- A piece of research publication and collection system – Lecta.
- Exam system – Lecta-Egzaminator.
- Virtual laboratories system.

- University units working support system.
- Other institutions working support system.

Some of the above modules have already entered and others are being developed, built or trained.

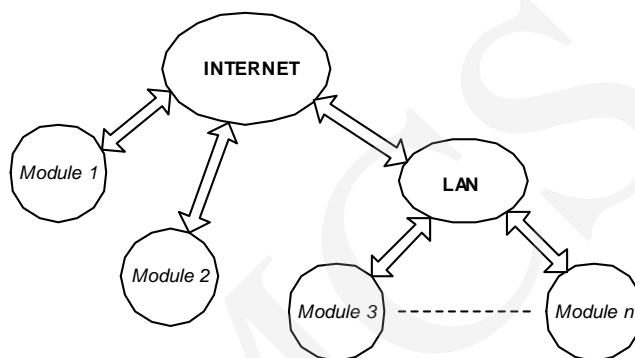


Fig. 1. System schema

#### 4. Complete modules

Two large widely used modules: a piece of research publication and collection system – “Lecta” and the exam system “Lecta-Egzaminator” have just been put into practice. These systems have been successfully tested and now are the base of system development.

##### 4.1. “Lecta” system

Before starting work with the Lecta system, we had distributed some questionnaires among students of a few universities in Rzeszów. Based on this we have defined needs of new system users. At the same time we collected opinions and clues about the pilot system “Biblioteka” that we had trained previously. On the basis of the collected information we have defined basic assumptions of the system to publish and collect pieces of research – Lecta. The basic functions are as follows:

- collecting information written in any format,
- standardizing a form of the work collected in the system (research work, scientific work, development work and others),
- hierarchical system management,
- verifying received works,
- communication between the system users.
- system modularity which allows for its further development and integration with other systems.

The system task is to enable an access to knowledge for the largest group of user. Now a collected knowledge range is limited to computer science and

related problems. This appears from organization abilities, and from labour consumption of train in particular. It is assumed that system development will not be limited.

The Lecta system construction and development is a complex process and must be divided into many tasks linked with each other and constructed at the same moment. Every subtask included into Lecta is being realized by a different group of programmers. In the first period of work it was necessary to elaborate mechanisms which allow effective planning and partitioning of programmer task.

Detailed information about the Lecta system are presented in [1]. The system is available also on web site: <http://www.lecta.prz.rzeszow.pl>.

#### 4.2. "LECTA-Egzaminator" system

Clear and commonly known rules of estimating students are the base of reliable verification of their knowledge and acquired skills. For this reason we have started to build the next module of "*Lecta-Egzaminator*" integrated system. This module is responsible for making tests in any knowledge branch and checking them according to precisely defined rules.

#### 4.3. System assumptions

The "Egzaminator" system come into being as a result of demand for a such type of application from the university workers web site. A traditional way of examining and checking knowledge (written and oral forms) seems to be not efficient. Therefore, completion is proposed and in the further prospect also complete entering an electronic system of student's knowledge verification.

The proposed system satisfies the following assumptions:

- it is designed for efficient verification of knowledge and obtained skills in any domain. It guarantees the same conditions and difficulty degree for all students subjected to opinion. A selection of questions is made within the confines of the chosen difficulty criteria and knowledge areas which are selected by a teacher in the fair and adapted way for the student's level,
- it ensures the security of stored data.

Protection of any data stored in the system is one of the most important aspects of its running. The system is widely accessible so it is open to interference the of unauthorized people. Its protection takes place on the several levels:

- protection of data stored in database,
- user's hierarchy with the assigned relevant rights,
- protection by passwords,
- server protection,

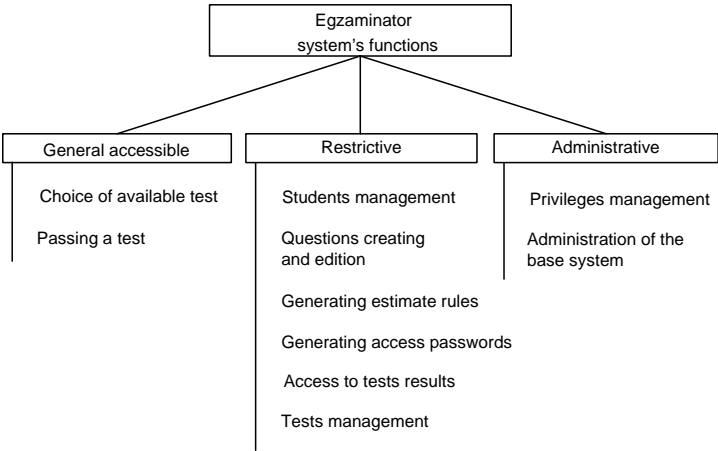
- it is the scalable platform possible to enter in any university unit or another institution. Modularity and flexibility allow for further system development and its individual elements. The system can be an individual application or a part of larger project. Like in the “Lecta” system the cyclic evolution conception is used [1].

The particular functions executed in the “Egzaminator” system are shown below. They can be divided into three groups: generally accessible, restrictive and administrative. Generally accessible functions are those which are accessible for all the people subjected to verification and opinion. In this level in order to get an access the identifier and password are necessary which is generated in independent ways. Information concerning an identifier and passwords is passed to the student by the teacher during the exam.

There is a random matching questions up with each student taking the exam with the same rules for all students eliminating a possibility of cheating during the test.

Restrictive functions are available for teachers in order to create and manage tests by means of accessible instruments. There is a possibility to create questions, group into thematic categories, choose an applied score, answer, assign students to a given test, generate results and create statistics. Additionally, teachers have possibility of continual monitoring a started test and also of making decision about ending a test for the individual students or the whole group.

The last group of functions belongs to the system administrator which has the right of granting user’s privileges.



Fi. 2. Classification of Egzaminator system functions

#### **4.4. System programming platform**

In order to chore the most effective programming platform two independent design groups are brought into being and their aim is to create two systems identically functioning and performing the same functions and assumptions but different from the technology used. This approach requires a lot of work but allows to denote usefulness of a specific technology to the system construction.

To define a programming architecture on whose base the Lecta will be built we used some basic assumptions to make comparative tests:

- system has to make it possible to use general access technology (Postgres database, MySQL, Java, PHP, CGI, JSP),
- there must exist possibility of adaptation Lecta to any widely used commercial platform,
- as follows the investigations the operations performed in base most often are Select and Insert operation – therefore from the point of view of these operations the capacity tests were made,
- frequent appeals to database with the single question line predominate in the system,
- during choosing a technology it was important to analyse its usefulness for the method of running programming jobs.

The tests point out that with such questions which Lecta-Egzaminator generates you can use two platforms equivalently: JAVA or PHP. As follows the practice PHP is the language that can be used more easily in the proposed programming operations method. Lecta system modularity does not preclude the usage of JAVA technology in modules with the different questions nature.

#### **5. Teaching aspect**

As the collected experiments show it is not possible to automate completely the teaching process. The following phenomena have the effects:

- the lack of contact with a teacher impoverishes the knowledge range and student's existence culture,
- the usage of advanced word processors causes making a lot of spelling mistakes by students,
- there exists an education domain in which test knowledge check is not sufficient or is just impossible (for example foreign language teaching),
- a student is not always capable of controlling his progress and it can lead to serious backlogs.

Despite disadvantages the use of the Internet and computers in the teaching process is justified. The system supporting research works and teaching whose exam module is presented in this paper makes up the resultant between traditional teaching methods and completely automated teaching (for example "distance teaching").

The system task supports the knowledge verification process and points to possible defects. The system practically completely eliminates a possibility of “cribbing”, because the solution that is being solved at present is drawn and it is unlikely, on the assumption of the right questions pool that students sitting side by side will solve the same task.

After finishing test, the system automatically generates lists of students along with the number of scores they got. It makes easier to correct tests and eliminates a possibility of mistakes. Unfortunately, the test form of examination eliminates a possibility of checking a capability for independent solving compound tasks by students, therefore it is possible to insert a written answer to descriptive questions by student in the *Lecta-Egzaminator* which are estimated by the teacher.

## 6. Further works

In the stage of entering systems the two big module mentioned above were made, namely *Lecta* and *Lecta-Egzaminator*. At presents some works are done on the next two systems, such as *System supporting work of university units* and *Virtual Laboratory*.

The *Virtual Laboratory* will include several subjects conducted in the Department of Distributed Systems. For the sake of its complexity the first accessible laboratory will be computer networks laboratory which enables to acquaint with operation of selected network devices, their configuration and thematic help accessibility in the form of multimedial solutions concerning operation and technologies which are the subject of individual laboratories.

Other modules will be realized and entered successively if possible and the requested needs.

## References

- [1] Hajder M., Paszkiewicz A., Bolanowski M., *Ogólodostępny system wspierania procesu Edukacji i prac naukowo-badawczych „LECTA”*, Zeszyty Naukowe Politechniki Rzeszowskiej „Informatyka”, Rzeszów, 2 (2003), in Polish.