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INFORMATIONAL-ANALYTIC SYSTEM WITH E-LEARNING COMPONENT OF EDUCATIONAL INSTITUTE MANAGEMENT DEVELOPMENT

This paper describes architecture of the complex information system with E-learning component of Institute of computer sciences and information technologies (ICSIT), National University "Lviv Politechnika", and some approaches of the system functional improvement. Disadvantage of existing activity automation systems of other higher schools are analyzed. The structure the system components with their functionality and implementation are considered in details.

1. Introduction

Today there are not enough the developed complex program decisions of automation of registration and analysis processes in higher schools (HS) of Ukraine. The existing decisions have a fragmentary character, are closed for functional extension and do not provide extremely necessary functions of communication with society, in particular with employers, other HS and secondary education establishments.

The existing decisions are not enough using the possibilities of the global network Internet and WWW environments of system organization of the informing and collective collaboration of educational process participants. Today HS in practice do not use complex of "Web 2.0" technologies, in particular for organization of collective collaboration and co-operation with society and distant teaching organization (e-learning).

The complex information system of the institute of computer sciences and information technologies (ICSIT) must include the wide class of tasks that refer both to education process, and scientific public activity. In particular, these are registrations of entrants, students, graduate students and teachers of the Institute, registration of curricula and methodical providing, students progress registration and analysis, concomitant documents forming, net centric technologies and methods implementation for personal control of distant teaching, Institute management with computer documents circulation, Institute activity presentation in Internet.

Using modern telecommunication tools (E-mail, Web communities, audio/ videoconferences) and distributed network-centric architecture in distance learning (on-line learning, e-learning) organizing gives opportunities to implement new pedagogical educational methods and forms (e.g. learner-oriented approach, cooperative learning and others). It is important to use open e-learning standards - SCORM (Sharable Content Object Reference Model) and IMC.

The complex information system except the rise of HS functioning efficiency must be an instrument of education openness and publicity in Ukraine, European integration according to Bologna Convention.

In obedience to the Bologna process the education development in Ukraine supposes the use of the newest pedagogical technologies, information providing systems based on TV communications networks with access to Internet in the education process. This purpose is pursued by any HS for its integration into the distant education national system and the European and World Community in whole.

Existing systems of activity automation have some disadvantages that are substantial for such institutes as ICSIT.

Closed character and inflexibility – Institute ICNI is a type institute on information technologies, and consequently owns specialists that are able to extend functional possibilities of the system with their selves, to build arbitrary database queries and to analyze data with non-standard approaches. Also they are able to do scientific activity in such systems building area.

Groupware elements absence – The system must foresee adjusting of effective document circulation and communication between employees both at the level of dean's office, and at the level of all institute.

Absence of news Web-services and on-line communication realization with Web-2.0 technology tools for organization of collective collaboration and co-operation with society.

Improper security level – The Web-technologies usage at databases interfaces construction and direct integration of the Internet presentation system with the registration systems may cause serious problems in the security system.

Unoptimum choice of program tools for the system realization – Institute ICSIT co-operates with Microsoft according to MSDN program, and therefore it is able in to actively use the proper software products from Microsoft for scientific researches related to modern information technologies introduction into the Institute's activity.

Authors, having analyzed the existing systems of higher school automation [4, 6], consider that the Institute complex information system must consist of the following modules:

– OLTP- and OLAP-modules of the system for students progress registration;
– The system of university entrants registration;
– The program complex of methodical and scientific work support of the institute;
– The system of computer documents circulation and groupware both at dean's office and whole institute;
– The system of network-centric distance learning (e-learning);
– The system of efficient ICSIT presentation in Internet with Web 2.0 technologies.

The system must be realized according to the semantic open systems requirements [1, 5]. Registration components and computer documents circulation must be built in the client/server architecture and with requirements of the system user rights and authorities distributing.

2. Main part

The system of students progress registration

The system of students progress registration consists of server and client components.

Server is based on DBMS MS SQLServer. It is built according to the generalized temporal relational data model [3]. De bene esse it can be divided into a referntial and documentary parts. The students card index lies in a basis of the referntial part and it is represented on fig.1.

Referential information about a student is devided in two tables: Q_OB_STUDENT stores main information about a student, which is necessary in an educational process; Q_OD_STUDENT stores additional information about a student, got at the stage of its entry in an university.
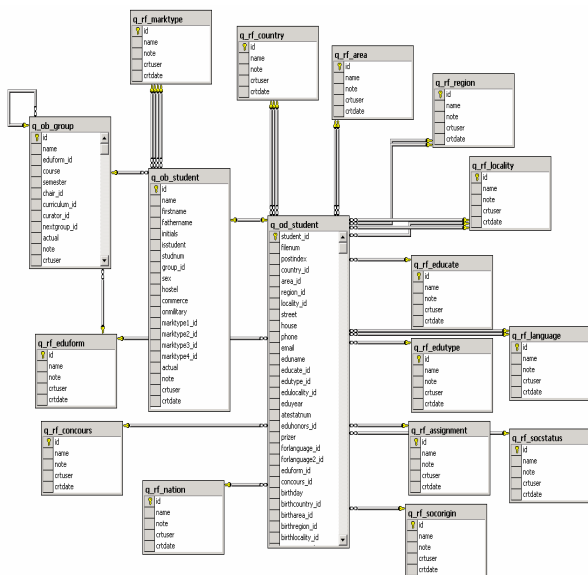

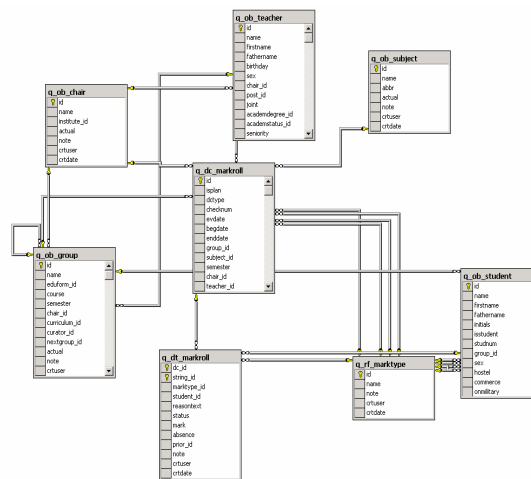*Fig. 1* Students card index data scheme.   *Fig. 2*. Data scheme of mark roll registration.

Information about students progress and corresponding orders lies in a basis of the documentary part. For example, on fig. 2 the data scheme of mark roll registration is represented.

Information about students progress is stored in tables Q_DC_MARKROLL and Q_DT_MARKROLL. Rolls can be opened and closed. It is determined by a value of the field ISPLAN in the table Q_DC_MARKROLL (-1 – is opened, 0 – is closed). If a roll is opened, a user has a right to do corrections in the roll, in other case there is no right.

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The client component is developed with MS Access/Excel for interfaces and ODBC-protocol for access to the database server. Although in practice in Institute ICSIT client component accesses to MS SQLServer, it fully independent from database server.

The client component allows to perform the following basic functions:

- An institute structure and employees registration.
- Students card index registration.
- Students progress registration with mark rolls and their closing. The both module and semester control is allowed.
- Students debts determination and second rolls forming.
- Current and semester progress control analysis.
- Current and average students rating determination, scholarship calculation.
- Registration of orders about students progress.
- Necessary documents printing for progress registration organization.

The system of university entrants registration

The system of university entrants registration is intended for collection of primary information about future students (fig. 3).
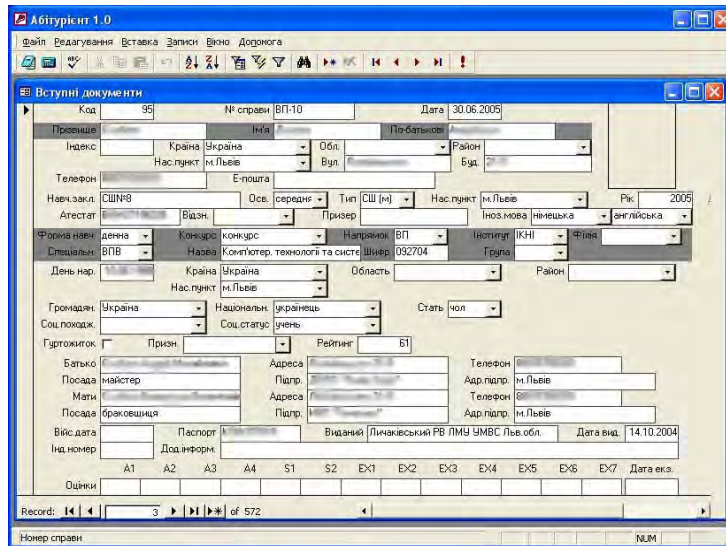

Fig. 3 The entrants registration user form.

After preliminary examinations every university entrant receives the status of entered/failed. Information about university entrants with status of student is transferred into the card index of first course students of the progress registration system.

The complex of methodical and scientific work support of the institute

The complex of methodical and scientific work support of the institute is intended for curricula registration, discipline methodical support monitoring etc.

MS Access and MS SQLServer were used for building of entrants registration, students progress and scientific-methodical work systems.

The system of computer documents circulation and groupware

MS Outlook and MS Exchange were used for building of the computer documents circulation system.

The system of network-centric distance learning (e-learning)

The network-centric distance learning (e-learning) system can be divided into three basic subsystems:

- Teaching methodical support.
- Interactive co-operation and feed-back
- Knowledge control.

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Obviously, that the knowledge level control system can take different forms, but must have test principle of building and function in the distributed net centric Web-oriented educational environment.

The network-centric distance learning (e-learning) system is based on system principles of the distributed intellectual information systems building and can function in local and net centric (Internet) environments.

The network-centric distance learning (e-learning) system does the following functions:
– Educational materials (content) management.
– Distant learners management.
– Adaptive teaching organization;
– Testing and knowledge level control.
– Statistical data analysis.

The system allows more detailed determining of teaching maintenance and structure, providing of personality and activity approach realization in teaching; efficiency promotion of teaching control with the detailed knowledge diagnostic; new types of educational diagnostics development.

The System of ICSIT presentation in Internet

The proposed complex system can include realization of the following Web-services integrated into registration subsystems:
– News Web-service.
– On-line-communication.
– The service of direct co-operation of higher school with Ukrainian society (in particular with employers, university entrants, other higher school and so on).

3. Conclusion

Everybody has no doubt that modern information and technological decisions usage for the middle and higher educational establishments sphere is very important. Universities, institutes, schools are interested in their information educational environment extension due to new perspective teaching forms introduction based on net centric technologies (E-learning) and conservative organizational methodical activity automation that is present in teaching process (students progress and university entrants registration, scheduling and curricula forming, library organization etc).

The developed complex system of Institute ICSIT can be effectively complemented by new modules and functions. The structure of the system and chosen software tools allow scaling on the arbitrary quantity of users. In addition, it can be circulated on other institutes of university. Base building principles of the system are based on the modern generally accepted ideas of semantic open information systems and networks design.

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