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Software for automation of conduct of module and semester information on a base Microsoft SharePoint 2010

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Предметом дослідження є система автоматизації обліку та контролю навчального процесу. Мета роботи – побудувати електронну систему ведення заліково-екзаменаційних відомостей, яка б виконувала наступне: збір поточних балів, які отримали студенти за різні види занять; облік та аналіз успішності студентів на основі зібраних даних; можливість автоматизованої побудови відомості у кінці визначеного навчального періоду; виконання вимог болонської угоди; забезпечити мобільність студентів та викладачів.

Предметом исследования является система автоматизации учета и контроля учебного процесса .Цель работы - построить электронную систему ведения зачетно-экзаменационных ведомостей, которая бы выполняла следующее: сбор текущих баллов, которые получили студенты за различные виды занятий; учет и анализ успеваемости студентов на основе собранных данных; возможность автоматизированной построения сведения в конце определенного учебного периода; выполнение требований Болонского соглашения; обеспечить мобильность студентов и преподавателей.

The subject of study is a system of automation of controlling and reporting of the educational process. The main goal of the qualification work was to build E-Marksheet Management System that would perform the following tasks: collection of marks that the students have had for different subjects; accounting and analysis of student's progress based on the collected data; automated construction of the marksheet at the end of the specified academic period; accomplishment of Bologna Accords requirements; ensure the mobility of students and teachers.

Keywords: навчальний процес, електронна система документообігу, заліково-екзаменаційна відомість, educational process, electronic system of circulation of documents, test-examination list, SharePoint

Introduction

During the entire period of the development of education system in our country, along with the problems of qualitative knowledge in different universities and institutions there has always been the problem of effective accounting and control of the educational process. Today, modern computer technology enables us to build systems that can assist in solving this problem by partially or fully automate the controlling and reporting of the educational process. However, none of them are yet used for this purpose in full.

E-Marksheet Management System that would perform the following tasks:

- collection of marks that the students have had for different subjects;
- accounting and analysis of student's progress based on the collected data;
- automated construction of the marksheet at the end of the specified academic period;
- accomplishment of Bologna Accords requirements;
- ensure the mobility of students and teachers.

Problem statement

To achieve this goal there were used Microsoft SharePoint technologies and products, because at the faculty there exists an educational portal implemented on the SharePoint platform.

Prior to the introduction of E-Marksheet Management System, a separate Excel sheets for every discipline were created each year. Teachers manually calculated current and module marks that raised the risk of errors and inaccuracies occurrence.

Therefore, the heads of the department has decided to automate this process. System requirements were formed. The main ones were:

Web access. As desktop applications are attached to a specific computer, one of the main requirements was to create a web-based application, access to which does not require a teacher of any additional resources, except the Internet and his/her login and password to login to the system. Thus, the mobility of the application was reached.

Integration with SharePoint 2010. There exists a SharePoint department portal that has been operating for several years. Portal provides a rapid exchange of information between teachers and students. One of the requirements set to the system was to integrate it with the existing SharePoint portal in order to avoid creation of additional application. The main idea was to gather all necessary information in one place, i.e. on the portal. It provided the flexibility and ease of setting up all the necessary workflows by SharePoint 2010 standard tools.

Affordable price. In the current economic situation, the funding of the department was insufficient to purchase ready-made solutions, or modules, because such systems cost is unreasonably high, and additional expenses for configuration and support of these systems are required.

Easy to use and understand. The developed system should be simple in using and understanding, so that to save time and effort for training teachers.

As a result, there was designed and implemented the following:

Teacher's working journal, which is filled in with marks during the academic semester and at the end the marksheet for the specified subject can be build and print from teacher's journal.

Program for the creation and management of working schedule curriculum of each department.

Database of all students and teachers, which is managed via SharePoint lists.

E-Marksheet Management System allows for:

Dean's office staff:

reduce the time spent for the management of the faculty workflows;

get quick access to information that accompanies the educational process to make effective management decisions;

increase the efficiency of educational process.

Employees (teachers):

get quick access to documents regulating the educational process;

get quick access to information about students, their academic progress and attendance;

organize the automated capturing of students' statistical data.

Software Design

The objective of the software is to automate the process of curriculum and education program creation and the process of creation and filling the marksheets within the Faculty of Computer Science at the National Aviation University.

System consists of three applications: Program manager, Plan manager and Marksheet web-part.

Deployment diagram (Fig.1) is primarily used to represent physical view.

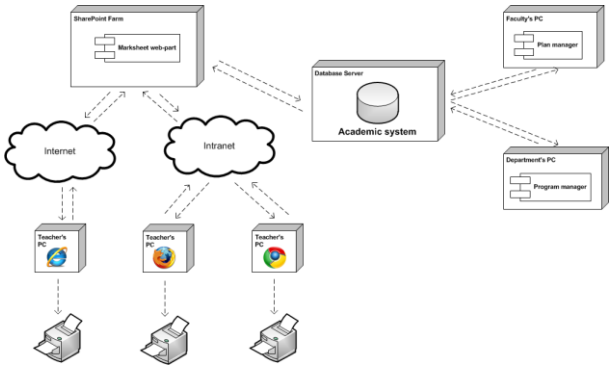

Fig.1. Deployment diagram

Implementation

Different applications of the system are implemented using different technologies. Plan Manager and Program Manager applications are installed on each computer on the faculty or departments, i.e. are desktop applications implemented on Microsoft .NET Framework 3.5 SP1 and works under Windows (7, XP, Vista) operating systems.

Marksheet web-part is installed on the collection of SharePoint web-sites at the faculty portal, which is running on Microsoft Windows Server 2008. The Marksheet web-part is correctly running under IE (version 7 and higher), Mozilla Firefox (version 3.5 and higher), Google Chrome, and Safari web-browsers.

All main functionality of the application is realized using C# programming language, UI parts of Marksheet web-part are written in XAML and desktop applications are implemented using Windows Forms technologies in the Visual Studio 2010 programming environment.

All the data is stored in SQL database. For single interface of interchange between system

components was used LINQ to SQL Microsoft technology, of the basis of which was created single database model that is used in all components for common data interchange with database.

Resulting marksheets are represented as digital images of PNG format because of need of common security level for inability to change resulting report manually and for common possibility of opening this document in any operating system on any platform.

It consists of three components:

- Marksheet web part is a teacher journal is represented as a thin web client component, a web part that deploys on SharePoint 2010 site collection and gives possibility to perform teacher work of student's results management and marksheets generation regardless of its computer operating system and location (internet connection, of intranet).
- Plan Manager is represented as a Windows Forms application and installs on PC in the dean's office and works under Windows (7, XP, Vista) operating systems. This application gives possibility to manage structure of study plans on the basis of which a whole process of students results and marksheets generation runs.
- Program Manager is represented as a Windows Forms application and installs on PC in each department office of the faculty and works under Windows (7, XP, Vista) operating systems. This application gives possibility to manage structure of each study program that teaches of particular department and assign teachers for groups that studying subjects of this department.
- All the data that is produced during work of E-Marksheet Management subsystem is stored in centralized faculty database for further availability for other document management subsystems that have been developing in faculty.

Main tasks of teacher journal

1. The teacher should be able to put a mark into teacher journal on a specific discipline.
2. The teacher may close the examination marksheet (module, exam, credit, and additional credit-examination marksheet), but only over a period of closure.
3. The teacher cannot close the additional additional credit-examination marksheet if credit-examination marksheet of the module isn't closed.
4. The teacher cannot close examination marksheet or credit marksheet if any module marksheet (one or more) and/or additional credit marksheet (if it exists) are not closed.
5. The instructor can view the closed examination and/or credit marksheet.
6. The teacher can print the closed examination and/or credit markshee sheet.
7. The system should calculate statistics for each group.
8. The system should show statistics only for closed examination and/or credit markshee sheet.

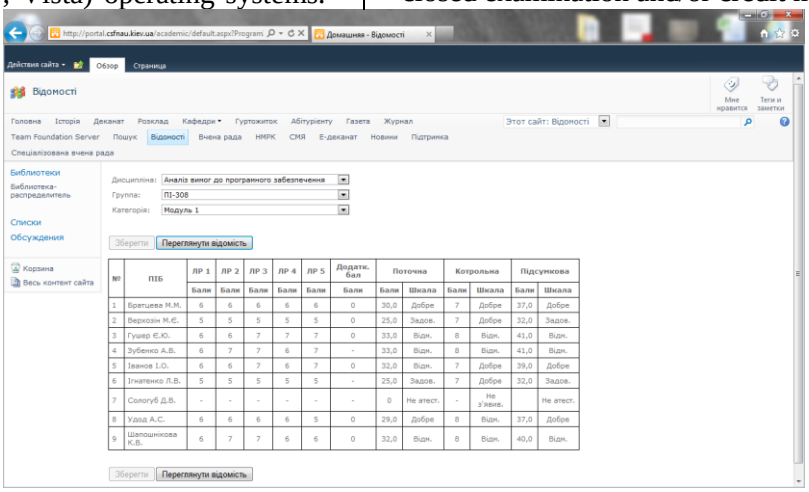

Fig. 2. Teachers work journal

Main tasks of plan manager

1. The system should create curricula.
2. The system should create semesters within a certain curriculum.
3. The education system must create educational programs related to specific semester curriculum.
4. Faculty members should be able to determine the final type of control for each curriculum.
5. The system should create a differentiated examination or test as a kind of final assessment for each study program based on the type of control.
6. The staff of the faculty may determine whether a study program will have individual student works.

7. The system should be able to create course work, calculation-graphical work or individual work to the curriculum based on the types and volumes of selected works.
8. The system should be able to edit existing curricula.
9. The system should be able to edit the semester curriculum.
10. The system should be able to edit existing study programs related to specific academic semester.
11. Faculty members can edit existing closure period for each record-exam information.
12. The system should be able to remove the existing curriculum. If the curriculum is deleted, all the terms educational and study programs associated with it will be deleted too.
13. The system should be able to remove the existing academic semesters. If the term is deleted, all the study programs associated with it will be deleted too.
14. The system should be able to remove the existing curriculum. If the study program is deleted, all modules work (laboratory work, practical work, module tests, and calculation-graphical), the scale of assessment and closure period associated with it will be deleted too.
15. The system should save all the data in the database.

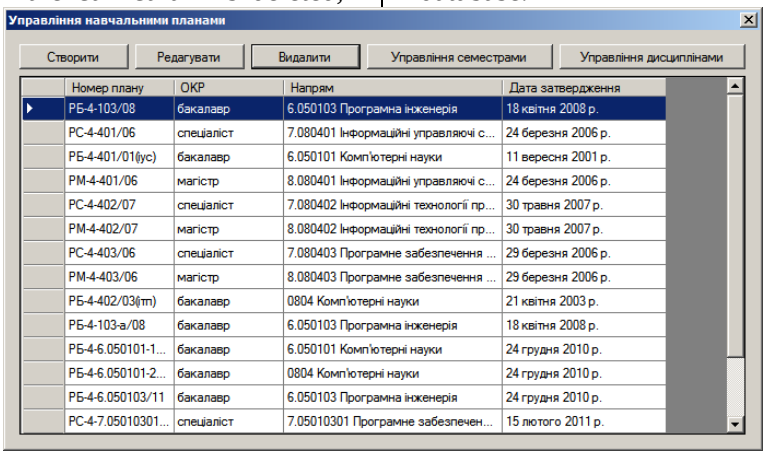

Fig. 3. Plan manager

Main tasks of program manager

1. The system should create modules within a curriculum.
2. The system should make laboratory work (if they exist), practical work (if they exist), calculation graphical works (if any), within a particular module of a study program.
3. The system should create a framework for evaluation of all work and module created within a certain discipline.
4. The system must monitor the total number of points for each curriculum.
5. Employees of the department should be able to determine the period for closure of modules and coursework in the curriculum.
6. Employees of the department should be able to edit existing curricula.
7. Employees of the department should be able to appoint a teacher study program (lecturer and assistant) study for groups of students.
8. The system should save all the data in the database.

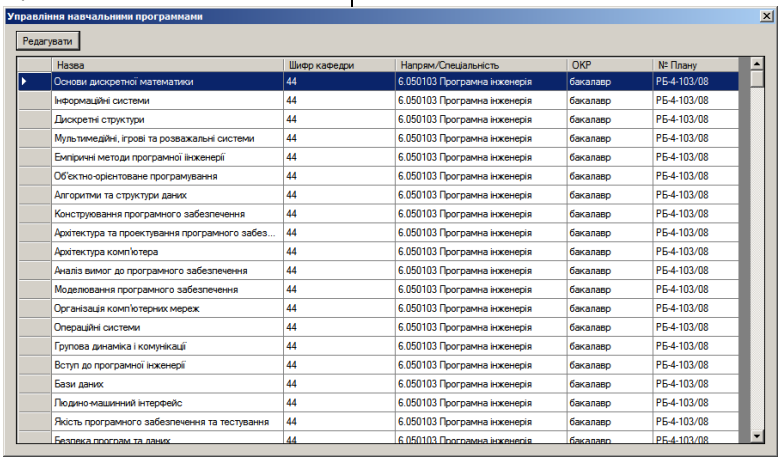

Fig. 4.

System deployment

The deployment stage of E-Marksheet Management subsystem started from generation of faculty database on SQL server and creating database users for further connection to database from system applications and web-part.

After the database deployment Plans Manager application was installed on faculty dean's office computer. Using this application dean's office employees started entering of study plans and information about groups and teachers into system.

The next stage of deployment was installation of Programs Manager application on each department's office computer. Using this application office employees of each department on the faculty started entering information about study programs of subjects that are tough by its teachers.

Conclusions

In Ukraine, as in other developed countries, higher education is considered to be one of the main human values. Ukraine has inherited from the past a well-developed and multifunctional system of higher education. The establishment of the national higher education system is based on the new legislative and methodological grounds.

One of the basic principles that influence the development of Ukrainian higher education in modern terms is to create innovative area based on educational and scientific support. It is an innovative way of society development that can be achieved by forming a generation of people who think and act in new way.

Nowadays there exist a great number of products that automate different management processes in universities. But all of them have disadvantages that stop the heads of our faculty to purchase them.

After the architecture design a stage of implementation started in a tight cooperation with stakeholders from deans office and various departments.

As a result of implementation stage, E-Marksheet Management subsystem was developed as a software that has distributed architecture.

E-Marksheet Management System successfully passes user acceptance testing on the basis of the Computer Science Department of National Aviation University during 2010-2012 academic years. As a result of deployment 64 teachers from three departments at the period of two semesters successfully where using system for marksheets management and generation for their tough subjects.

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