

On-line system for Testing and Certification

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Abstract – The on-line system is designed to close the cycle of e-learning, providing the opportunity to test out individually and remotely. Teachers in different disciplines create test questions on an issue, then activate them on an individual student, as determined during the activity (time in which to be completed).

The certificate includes information about the test - title and total number of questions for the student data - name and number of faculty, evidence of completion - time and time initial evaluation and assessment in points, rates and assessment words and numerals in the six-grade system assessment.

The system is programmed using ASP.NET, SQL Sever 2005 and C#.

Keywords –on-line test, e-learning, certificate, test questions, validation, database.

I. INTRODUCTION

One of the main objectives of the global network is easier for consumers to search information. As present the Internet very quickly goes out of its original close-oriented application. It is very important to use Internet for studying, to access information on mobility, especially if e-learning offers. E-learning provides many benefits: student mobility, the opportunity for individual pace of preparation, training at convenient times for student work-based learning; significantly cheaper cost, continuing education, complied with the requirements of students with disabilities. Specially created data base allows 24-hour access to learning materials, resources, documentation and Internet resources and selected bibliography.

This on-line system is designed to close the cycle of e-learning, enabling the test to be conducted individually and remotely. Teachers in various disciplines create test questions on an issue, then activate them individually for each student, as determined during the activity (time in which to be completed) [2]. After activating the test, students completed them and immediately after their skills are assessed by the system. At the request of teachers, the time of each test may be limited. After assessing the test, students and teachers can download a certificate for passing the test in PDF format. The certificate includes test data - title and total number of questions for student data - name and number of faculty, completing data - initial time and during the assessment and evaluation in points, rates and assessment in words and

figures on the six-grade system assessment. This system stores all data for students' tests. Each student can see the results of all their tests and to download certificates at any time. Teachers also have access to the students' results.

II. SYSTEM DESIGN

A. Main functions of on-line system

There are three important functions: user management, login and access management and create, activate and complete the tests.

The first includes registration of the user (requires the introduction of basic user data: user name, password, name, number, and faculty e-mail address) and adjust your own profile. To this module of the system includes functionality to recover a forgotten password. Also included here is the complete management of users by system administrators (adding, activation / deactivation, profile correction, and change the access level of the user).

The second function traits the three levels of access - a system administrator (users with rights to administer the data in all modules of the system), a group administrator (user with rights groups to administer the training and testing - in particular teachers); ordinary users (users' rights to use the materials in groups for training and testing to make - in particular students). The login is done by entering a user name and password. Enhanced security password is encrypted. The menu is loaded dynamically from a table in the database, which describes the access rights of different types of users to different pages.

System administrators group and administrators should be able to create tests for on-line testing and activate them for ordinary users. Viewers must complete tests and receive results immediately after completion. The results should be displayed on the screen with the option to download the certificate examinations, including the assessment thereof, in the form of a PDF document.

B. Database Design

To store and to data manage, Microsoft SQL Server 2005 is used. Microsoft SQL Server 2005 is a platform for management and data analysis, which offers enhanced security, opportunity for expansion and accessibility of data and applications for analysis of the right place at the desired time [3]. In addition, SQL Server 2005 makes it easy creation, deployment and management of applications. The name of the base and the location and name of the server are not relevant, since the details of the connection to the server are exported to the application configuration file called web.config in

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connection string. The base consists of 13 tables [1]. Links between tables are constructed based on relationships using foreign keys and relations of type m:n related tables are used.

The contact between ASP.NET application and the database uses the library DBEngine classes for Microsoft. NET Framework 2.0 [4]. The library includes methods, extraction line (DataRow), rows of a table (DataTable), rows of multiple tables (DataSet). The methods to perform queries returning result of scalar type are also included. A class BaseAdapter is an object of class BaseDataProvider DBEngine library and it is inherited by classes which are formally called adapters (Adapters). These classes are divided by topic and contain methods, calling methods from the library and DBEngine responsible for specific topics [Fig. 1.]

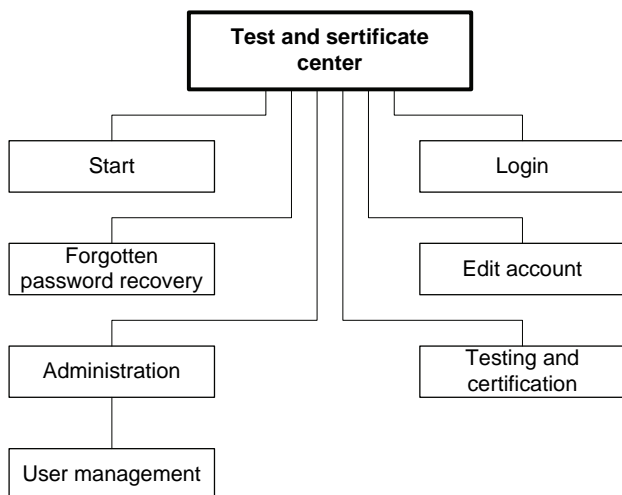


Fig. 1. Main functions of system

C. Interface Design

The login requires user name and password. For greater certainty in the database (DB) the password is stored in encrypted form and compared. It is encrypted using one-way hash function (Secure Hash Algorithm).

The recovery of password requires a entering of the correct username and the e-mail address to generate a new random password of 10 characters. It sent an e-mail address of the consumer and he can use it to login. Each user can edit his profile, which includes change data and change the password. The username is unique and not subject to change. To change the password, it is requiring the introduction of the old password and the introduction of the new password twice.

System administrators can register users, and the users themselves can fill the registration form. The difference is that an individual registered user receives the lowest level of access (regular user) and accounts are activated, while system administrators can change the access level to enable or disable accounts.

In the section testing and certification, the system administrators create and group tests. They enter the total information of the test (title, subtitle, total number of questions of questions per page and maximum time for its completion). Then they fill information about the issues one by one. Each issue is filled with text, answers their texts and

points (ten responses). Tests can be edited completely while not yet filled out by students. Once they were completed, tests are also subject to revision, but rather limitations: can not change the number of questions and the number of points and their answers

Once you create a test, it can be enabled for normal users (students). System administrator can activate the test for students, regardless of which groups are connected, while the group administrator can activate your test for students connected to their groups. The test can be activated for a specified number of hours (1, 2, 3, 6, 12, 24 or 48 hours). The test can also be disabled for a user.

On the evaluation page the user is able to download a certificate of test solutions in the form of a PDF document. It contains the same information that is contained on the page. To create a PDF document it uses the library for Microsoft.NET - iTextSharp, which is distributed free for non-commercial purposes. It contains methods for creating the document and adding elements to it (text, paragraph and image). It also uses the library PDFCreator, which is in direct interaction with iTextSharp and contains methods to build the document, interpret the HTML stream (HTML Parser).

In the section testing and certification ordinary users (students) may consult the results of all tests made by them and to download the certificate of each test was evaluated. System and group administrators can also see the results of students grouped by tests, and to download certificates.

III. CREATING, CHANGE, ASSESMENT AND CERTIFICATION OF ON-LINE TESTS

The management of the tests carried out by several forms, from the menu access page Testing.aspx (test). Fig. 2. shows the structure of the forms involved in this section.

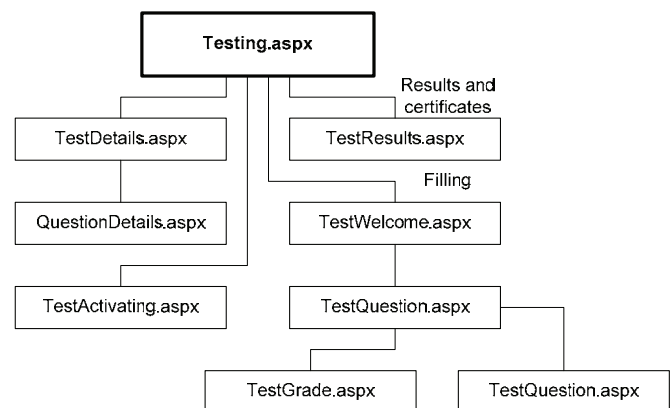


Fig. 2. Structure of system's forms

The tests can be created and edited by users who have a type system administrator or group administrator. Page Testing.aspx is pagination GridView control, where are the tests. This control has a different functionality for different types of users, system and group administrators can manage (create, edit, activate and deactivate) test and examine the results.

For editing the test it clicks the icon for editing. The next page `QuestionDetails.aspx`, introduces or edit data themselves questions. Index edited or added to the current issue is kept in ViewState container. On this page, add or edit the questions one by one. Once completed with the introduction of issues, all data is sent to the database in a transaction, taking an object of type `TestsDataSet`, which are stored and transported so far. Data are validated by the matters necessarily have at least 2 possible answers and all answers have completed points that will bring answers to fill.

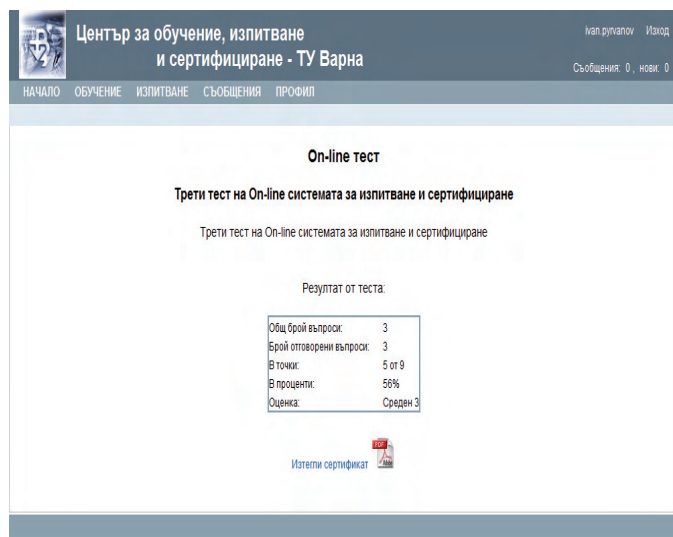


Fig 3. Test evaluation page

The test activation for a user(s) from a group starts on page `TestActivating.aspx`. Students can see the results and download certificates at any time [Fig. 3.]. The information remains available in the database and is not intended to be deleted. For the preparation of the certificates in PDF format is used the `iTextSharp` library NET Framework. This library is free to use for non-commercial purposes. It is added to another library that interprets the HTML stream and methods used `iTextSharp` to create PDF document. An HTML stream is made in which is based a certificate template. A class is created with only static `PDFReports` method `TestCertificatePDF`. This method derives from the database necessary data using the completion test identifier (`TestTokenID`). It creates a PDF document from HTML stream and return it as a result of object type `MemoryStream` [Fig. 4.].

All input data in the system are validated. It is used the built-in ASP.NET controls validating - `RequiredFieldValidator` (request an introduction of value in a given field); `RegularExpressionValidator` (validate value using regular expression); `CompareValidator` (compare with another value and check its type); `CustomValidator` (used in validated more complex logic).

The main part of the business logic of the system is given in stored procedures in the database. The idea is to perform all special features there and to filter the rows derived from the application. Thus, the traffic between the database and the application is minimized. It also adds to increase the system performance. All data operations, performed in Microsoft

SQL Server environment, are running significantly faster than in the NET environment.

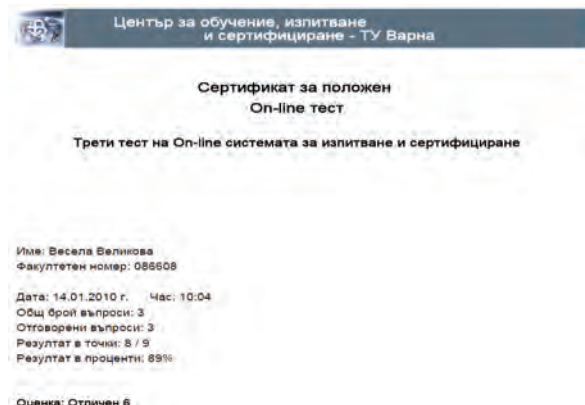


Fig. 4. Sample of certificate

IV. CONCLUSION

E-learning is a modern and interesting form, the result of developments in information technology and communications. Verification of knowledge during training and after its completion is a crucial stage of the training itself.

This system closes cycle of e-learning, provides an opportunity to create tests that students complete and receive certificates for their results. The features of this system are: creation of test questions that have one possible answer; possibility to select the size of the pages with the questions; possibility of limiting the time for completing tests; activation of tests for students in groups as well as selecting the time of activity; evaluation of completed tests immediately after their completion, even then the students learn their results; possibility to download the certificate affixed to a test of each student.

This system is composed to add and develop the needs of the school. Here are mentioned some of the more important aspects of such a future development:

- A multilingual education system interface can be translated into different languages to facilitate the students.
- It can provide an interface for teachers to translate the tests in different languages.
- For each test could be created set of questions (with a larger number of test requirement) and the questions are selected randomly and mixed.
- It is possible to add different systems for evaluation as required by the school for foreign language education
- It is possible to create a module that controls the content of static pages (eg home page). The content may be stored in different languages in a database and may be adjusted at any time through the system administrator interface.

The mobility and the ability of tests to be completed on-line from remote computers units are factors that greatly assist the participants in distance learning and disadvantaged people. The system has a very intuitive interface and it is easier to use, no further knowledge. No special hardware and software requirements for its use, making access to it free and available anytime, from anywhere, using any type of computers and

mobile devices. It is necessary to equipper with a browser and have Internet access network.

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