

# SYSTEM FOR EDUCATIONAL PROCESS ADMINISTRATION IN COMPUTER ROOMS AND LABS

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**Abstract:** *An approach for improvement the organization of educational process in computer rooms and labs in university is examined in the current publication. A web based system for administration the educational process is offered. The information related with the educational process is managed through the system. The concomitant activities are given assistance that results in quick and effective decision making and makes students and lecturers to be better informed.*

**Key words:** *Information's System, Communication Systems*

## I. INTRODUCTION

The successful educational process in computer rooms and labs could be result only from the successful work and coordination of all the units involved in its organization and execution. These units are - section "Education" which work is to build terms schedule, section "Students" which work is to distribute students into groups and rooms, section "Information technologies" responsible for rooms technical support, the necessary software, multimedia technique and training appliances, and the university faculties. Sometimes the embarrassed dialog between higher up listed units, the absence of timely presented actual information to lecturers and students, the presence of human mistake most commonly results into work effectiveness reduction, makes conditions for having a chaos and lectures failure especially in the beginning weeks of terms.

Not rarely exactly the change of courses names, the time and place they are read converts into resource of commotion and puts lecturers and students to confusion. The unexpected change of computer systems condition (works, does not work) impose limitations in count of working places and reduces the work quality of those who participate in the educational process, especially when the last ones are not timely informed about the unexpected situation. The overlap of different courses in place and time unavoidably calls the failure of one of the two. Such an overlap could occur when a course is set in the same time when a prophylaxis must be done in the computer room. The hard task to find out an optimal decision for room schedule never succeeds from the first time, especially when there is an absence of coordination between the listed above units and absence of product that helps finding such an optimal decision.

Mistakes like the discussed ones deteriorate also the work's effectiveness of the coordinators who serve the computer rooms and labs.

The continuous increase in count of the multimedia technique still can not satisfy the high-speed increase in orders for their usage in lectures. The lack of proper instrument for quick and easy management of such an information could result in having conflicts in the orders, failure of educational activities because of the continuous appearance of other activities unplanned in the beginning of the term.

## II. PROBLEM RESOLVE

The discussed problem could be resolved by development of computer system for management the information about the educational process and helping the activities that correspond to it. The system should possess properties to classify and systematize data about lecturers and students, computer rooms and labs, exam and lectures; computer system data, multimedia projectors and training appliances data. The system should build connections between the different types of data for causing high-speed searches and effective information management. Of paramount significance is system development to be done in way convenient for use by users with different statute: administrator(s); employees each one of who should add, use and actualize different types of data; lecturers; students. As an effect of that it is hardly recommended to be supported different

levels of access that allow different rights over data: rights for read; rights for read and write over selected types of data; and rights for read and write over all of the data. The support of user accounts and user's passwords defence is absolutely necessary. The effectiveness will be markedly increased if there is a possibility to log in the system through internet as well as to send a wide variety of queries. Finally the availability of the system in internet is a must. Sending messages and e-mails is a plus and increases the level of effective communication.

### III. NECESSARY INSTRUMENTS FOR PROBLEM TO BE SOLVED

The problem should be solved by development of computer system - client-server type web-based application. It would provide continuous access through internet and will satisfy the necessity of interactive connection between server and users for various types of query processing. Developers could choose between many possibilities. But not all of them are open coded, simple to use and multi-platform. The financial aspect should also be taken under consideration.

The technologies could be divided into two groups – client sided technologies and server sided technologies. According to that all an analysis of the existent program tools has been made for the development of web-based system and it figured out that it is most advisable and there were used the following instruments - HTML, JavaScript, PHP, MySQL and Apache Server.

### IV. SYSTEM PROJECT

For the problem to be resolved it is necessary to be developed automated system that should consists of user interface, database and modules as follows:

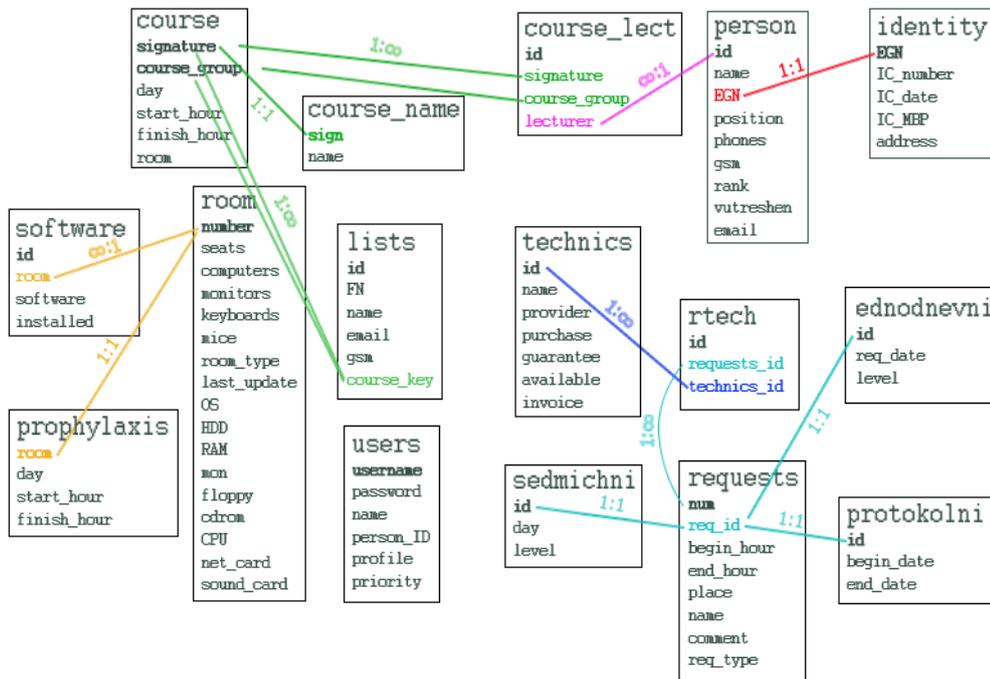
#### Data base

Database is realized for storage and management of data about employees and lecturers, data about training rooms and labs, computer systems and all the information related with the educational process – count of working places, ordered and installed software, computer system hardware characteristics, term and session schedules, courses and lecturers which these courses belongs to, and students enrolled in these courses. There is a tool for storage and management of data about position, rank, addresses, contact numbers, identity cards, e-mails and mobile phones of physical persons like employees and lecturers. There is also a storage place and tool for data management about multimedia projectors, laptops and orders for their usage.

A relational database is constructed. The relational model presents data like sets from relations. The discussed database consists of the following relations:

- ❖ course – This relation presents object *course*.
- ❖ Course lect – This relation presents object *lecturers* who read lectures in a concrete group of course. One group could be associated with one or more lecturers.
- ❖ course\_name – This relation presents object *the name of the course*.
- ❖ person – The object *employees and lecturers* is described by this relation.
- ❖ identity – This is a table about *private data* of employees and lecturers. This relation does not provide information for all employees and lecturers. Therefore it is isolated into a separate table.
- ❖ users – System *users* relation.
- ❖ room – Relation about object *room* – training rooms and labs.
- ❖ software – Relation about object *software*.
- ❖ prophylaxis – This relation presents object *room's prophylaxis*.
- ❖ technics – Relation about object *technics*. Multimedia projectors, laptops, cameras are included into this set.
- ❖ Lists – Relation about object *lists with students*. Lists with students are associated with exactly one group of course.

- ❖ Requests – This relation presents object *orders* for technique. This one aggregate the next three which ones are logically different.
- ❖ ednodnevni – This one describes orders for technique about *concrete date*.
- ❖ sedmichni – This one describe the orders repeated *every week* during the term.
- ❖ protokolni – This is a relation about orders for a *concrete date out of the NBU biuldings*.
- ❖ Rtech – This is a relation that describes which order how much and exactly which ones technique engages.



The scheme on the left presents the way tables are connected to each other. Their names are written in bigger size of font. Main keys are written in bold. The indexes are formatted with different colors and the connections are shown through colorful lines. The way of connection could be 1:1, 1:N and

Figure 1

N:M. To accomplish N:M one must use median relation. An example about this case is the group of relations *requests*, *rtech* and *technics*, where *requests* and *technique* are connected according 1:N type with *rtech* and by this way they accomplish N:M connection between each other.

The indexes of tables are considered with the attributes that play decisive role between the tables. For example, the attribute EGN connects the relations *person* and *identity*. It is main key in *identity*. It is secondary key in *person*. Therefore it is recommendable to make it index in *person* table. The indexes speed up the execution of SQL queries, especially when the relations power increases considerably. If some field in the table will participate most in SELECT queries it is implicitly to create index on it. Most commonly these fields are secondary keys. When one creates index on them the SELECT query execution will accelerate considerably. Indexes sometimes when they are not created properly could slow down the query's execution. They could slow down UPDATE and INSERT queries. Therefore one should figure out in advance what should be the most frequently sent queries to the server and according to that to decide if and what exact indexes to create on tables.

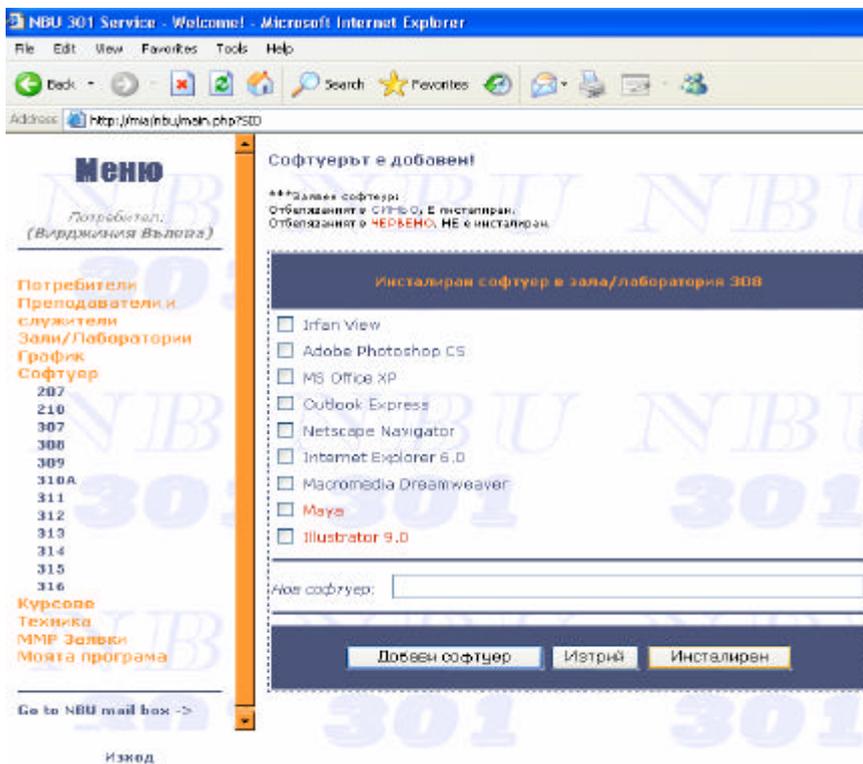
## Modules

The system consists of several modules. They differentiate the package of services the system provides and are related between each other according to the way of presentation and information support. The following modules are realized:

**Computer training rooms and labs:** This module manages the information about computer rooms and labs. The information requires support tools and instruments to be actualized. A wide spectrum of data comes here: room numbers and count; count of the places of work and the currently available ones; data about computer systems – operating system, hardware characteristics, etc.; room type – training or laboratory; prophylaxis time.

This set of data allows the persons concerned to be timely informed about the room condition that frequently changes. The module provides information management tools – adding, editing and deleting rooms; manipulating data related to the places of work and computer systems. It stores and manages information about the prophylaxis.

**Software:** Owing to this module system provides actual information about software products necessary for lectures to be hold. System distinguishes two types of software – ordered and installed. Thanks to that users could make inquire about their software – if it is ordered and if it is already installed.



Software information management form is shown on figure 2. Left part of the browser window consists of the navigation menu that allows users to get to different objects. Such an object is “Software”. When the user clicks over it it expands and shows its submenus. The submenus are the numbers of all computer rooms and labs. User must choose the concrete number with the mouse to receive information about software products in it. Right part of the window presents the working area. The result of any query sent to the server is loaded here.

Figure 2

**Courses:** This module manages the information about courses in computer rooms and labs. The information includes course’s signature and all of the groups it is divided into; name of the course; lecturers who read it; time of begin and end hour; day of the week. The system provides tool for searching courses by signature or part of the signature.

**Lists with students:** This module manages the information about different groups of students enrolled in a concrete course. This information is accessible only by the lecturers who read the same course (including the administrator(s) of the system). This module provides data like faculty numbers, students name, mobile numbers and e-mail addresses. There is a method provided for sending mails and SMSes by the lecturers or the coordinators to one or more students from a group simultaneously.

**Employees and lecturers:** The module manages private, official and contact information about employees and lecturers. This information is necessary to get in touch with the persons. The reason is the necessity to manage large quantity of orders for multimedia technique, the association of courses with lecturers and changes made over courses and lecturers. The official data are visible for all of the system’s users. Private data are accessible only to the administrator(s) and to the possessor if he/she is registered user.

The module provides mechanism to search a concrete person by name or part of the name.

**Technique:** This is a module about multimedia technique. It supports the possibility to enter into database new technical appliances. The “multimedia technique” means projectors, laptops, cameras, etc. These ones are involved in the educational process, in academic activities, seminars, etc. This type of information is necessary especially in the management process of orders for techniques usage. Data like count, type, make, model, availability, guarantee period, provider, serial number must be known.

**Orders:** There are three types of orders: orders for particular day of the week, repeated all over the term; a concrete date orders; a concrete date orders outside the university's buildings for one day or more or inside the university's buildings for more than one working day. The management of such an information requires to know the type of the appliances and if the technique is available or not. Data about the ordered, place and duration of the request, count and type of ordered technique are required too.

**Schedules:** The presentation of educational schedules in the form of tables make information more scan able then presenting them in the form of long lists. Therefore the system realizes a mechanism for table visualization. Tables are not just a static construction of data. They are built from a great number of hyperlinks allowing the authorized persons to manage (change) the content of the schedules through choosing a desired object from the table with the mouse. The module provides the possibility to view and manage the week schedule for an arbitrary former or future week by selecting a date from this week.

The authorized persons could choose an arbitrary object (course/order) from the table of some room or lab and to manage the information related with it.

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Ден/Час	08:00-09:30	09:40-11:10	11:20-12:50	13:00-14:30	14:40-16:10	16:20-17:50	18:00-19:30	19:40-21:10
понеделник	CST219, 1 гл.ас. М. Комитов		CST219, 2 гл.ас. М. Комитов		CST219, 3 гл.ас. М. Комитов		INFM002, 1 хон.ас. Г. Фурнаджиев	INFM103, 1 П. Стайнов
вторник	CST315, 1 хон.ас. Ст. Чакъров	CST315, 2 хон.ас. Ст. Чакъров	CST414, 2 Д. Велчева		CST414, 3 Д. Велчева		INF203, 3 П. Кесерджиев	
сряда	CST219, 4 гл.ас. П. Томов		CST219, 5 гл.ас. П. Томов		CST219, 0 гл.ас. П. Томов		COM527, 1 доц.д-р Р. Маринов	
четвъртък	- ПРОФИЛАКТИКА		INF341, 1 П. Стайнов	INF124, 1 ст.ас. Р. Стефанова	INF124, 2 ст.ас. Р. Стефанова	CST414, 1 ас. В. Тодорова		INF924, 1 Л. Милев
петък	CST315, 3 хон.ас. Ст. Чакъров	CST315, 4 хон.ас. Ст. Чакъров	CAS866, 1 ст.ас. Р. Стефанова	CAS875, 1 ст.ас. Р. Стефанова	INF203, 1 хон.преп. Р. Русева	INF203, 2 хон.преп. Р. Русева	INF203, 7 П. Кесерджиев	INF203, 8 П. Кесерджиев
събота	INF717, 1 хон.преп. Л. Бояджиев	INF717, 2 хон.преп. Л. Бояджиев	INF303, 1 хон.преп. Л. Бояджиев	INF303, 2 хон.преп. Л. Бояджиев	INF203, 5 П. Кесерджиев	INF203, 6 П. Кесерджиев	ART935, 1 хон.преп. Я. Жаблянов	INF203, 9 П. Кесерджиев
неделя	-							

Figure 3

There is a possibility to add new orders for technique or new courses. When the administrator clicks with the mouse over an empty block in the table he/she is redirected to a form for adding new object. When they click over a course/order they are redirected to a form for editing the object. This is a way to avoid the risk of overlapping courses or orders in time and place.

The system supports two types of schedules: week schedule in educational rooms during the term, demonstrated in figure 3; week schedule of orders for using multimedia technique. Figure 3 contains the table presentation of courses in room 307.

**My programme:** When the students enter the enrolled by them courses during the current term in particular form the system generates a table that contains these courses and distribute them in cells according the time and day they are read.

**Printing documents:** The type of information supported by the system requires the possibility to print documents. There is a mechanism to print all schedules of educational rooms and labs, the week schedule of orders for using multimedia technique and the week schedule generated by the "My programme" module – all in A4 format.

**Sending e-mails:** The system supports the possibility to send e-mails to one user or a group of users. Mails could be composed and sent to employees, lecturers and students enrolled in at least one course in the computer rooms and labs. The system allows the user to make a choice from a list of persons with the mouse and to send e-mail to all of them simultaneously. The system by itself extracts their e-mails from the database.

**Sending SMS:** There is a possibility to send SMS to one or more people simultaneously only if there are posted mobile phones for them in the database. The user could choose with the mouse the persons he/she wants to send SMS and then to compose the message and send it through internet.

**Mail client for mail.nbu.bg and students.nbu.bg:** A mail client is developed that serves the mail servers in NBU – students.nbu.bg and mail.nbu.bg. Each user of the system could use the client only if he/she has registered and active e-mail in one of the two mentioned servers.

**User accounts:** The system supports three types of accounts: administrator, lecturer and student account each one of who has different level of access to data. The necessity of defence personal data as well as the necessity of control the possibility to manage data indicates the development of this module.

## V. CONCLUSION

The developed system will make lecturers and students more informed about schedules of courses, usage of multimedia technique that raises the lectures quality, the condition of computer systems and installed software products. The system gives the privilege for students and lecturers to be timely informed about made changes in courses and the time they are read.

Web based automated system is developed and implemented in New Bulgarian University on the basis of this project. This system confirms specified expectations. The conclusion derived from its exploitation is that the system could developed into the following directions: creating connection between the university sections who participate in actualization of information, as well as expanding the information scope related with planned activities; possibility to send messages about technique problems by lecturers and students; developing further the possibilities for electronic communication between lecturers and students, lecturers and employees.

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