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# Design and development of an adaptable, lan-based training module for object lessons

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**Abstract**

A training module, which is intended for object lessons of especially technical students has been developed through this work. The training module runs in the physical LAN environment that consists of a server and workstations that are connected to it. That module has been designed to be used for various different courses. Infrastructure of the developed software is flexible, versatile and updatable. Hardware infrastructure has been built and tested for sample course applications. Experiments and observations have revealed the fact that faculty members, as well as students, seem to be more eager and productive when working with visual applications.


*Keywords:* Computer-aided education, training module, adaptable software, lan-based application .

## 1. Introduction

Success of technical students in their respective career fields certainly depends on development of applicational skills they are to acquire throughout their educational lives. Acquirement of such skills depends on the laboratory and workshop possibilities that are to be provided by their educational institutions, as well as on the degree of competency of faculty members. Nevertheless, even if such facilities are provided, they are rapidly becoming obsolete due to fast pace of technological advances, resulting in the necessity of modifying, or totally replacing the equipment in every three or four years. That appears to be a serious problem in both physical and economical aspects (Coskun, & Isık, 2007).

Laboratories that are supposed to be established in order to present contemporary laboratory education for applied courses require large-scale financial investment, besides they usually fail to furnish means for individual education [1]. Before proceeding to the physical implementation stage of projects that are to be actualized for applied courses, finding out beforehand possible flaws of a designed system provides convenience for a student who

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is to perform the design. Moreover, that also provides economical benefits and saves time by minimizing malfunctions that might occur during operation of the actual circuitry.

The “Computer-Aided Education” system has come out as a result of the efforts to make education more efficient and to put into practice the concept of one-to-one training. In this era, which is called “The Information Age”, it has become quite easier to store information in computer media and to access it in a short time from anywhere in the world. In this context, the necessity of raising generations that know how to make use of the possibilities offered by computer technologies that can access information, and the most important of all, that can generate information has made it an obligation to use computer technology in the field of education (Arıcı & Dalkılıc, 2006). In the majority of advanced countries, scope and effectiveness of computer aided education have been increased and new quests and plans have been invoked (Aytas, 1991).

In that case, it is essential to present an educational environment to the students through simulation. Before proceeding to the physical implementation stage of projects that are to be actualized for applied courses, finding out beforehand possible flaws of a designed system provides convenience for a student who is to perform the design, and design of the circuit becomes easier as a result of taking such possible flaws into consideration. Therefore, training of especially technical students in an environment that provides visual content for applied courses, and obtaining simulation of a designed circuit also come into prominence.

This work has been analyzed in two phases and the software has been developed through design planning. First, the required physical environment has been created in order to allow the network infrastructure to be established. A server has been installed in order to provide fast and reliable communication among computers. The software has been designed and developed separately for the server and user workstations. System administrator, faculty member and student groups have been defined within the user software, so that authorizations and permissions specific to groups have been granted.

## 2. The Training Module System Architecture and Installation

Visual Basic, which is an object-oriented (visual) programming language, has been used for the computer software that has been developed for the training module, and MSSQL has been used, which is a database application appropriate for fast program data flow and convenient data transmission over the local area network. The MSSQL software has been installed on the computer that has been assigned as the server and the database tables have been created on the server.

A server, a laboratory that consists of twenty computers, a network and a switch to maintain communication of computers with the server have been used, and the system hardware infrastructure has been completed after finishing the required work pertaining to configuration of the network topology. The resulting hardware architecture of the designed system is shown in Figure 1.

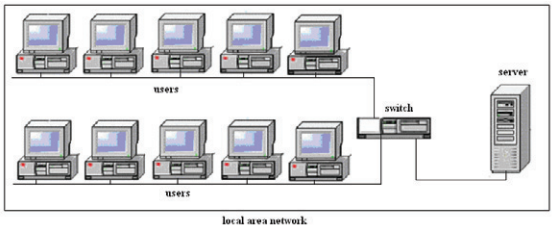


Figure 1. Network topology of the system

After the hardware infrastructure has been established, MSSQL is used as the database, which has strong API, database management control and locking capabilities. Besides, it is free and it is utilized extensively by CGI script developers (Rowe, 1996).

## 3. Design of the Training Module

The developed software package has been designed separately for the server and user workstations. The software package consists of two parts, namely the server program and the user program. The user and server programs have been written in Visual Basic programming language. Data pertaining to program details, such as user groups, login

and editing authorizations that are granted to groups and other authorizations is stored on the server by using the MSSQL database software. The MSSQL software is installed on the server so that the required database tables run on the server. Users can perform several operations by accessing the server over the local area network (LAN), according to their particular authorizations.

Users constitute three separate groups in the software structure that has been developed, according to their authorization levels (Figure 2). Those are: System Administrators Group, Faculty Members Group, Students Group

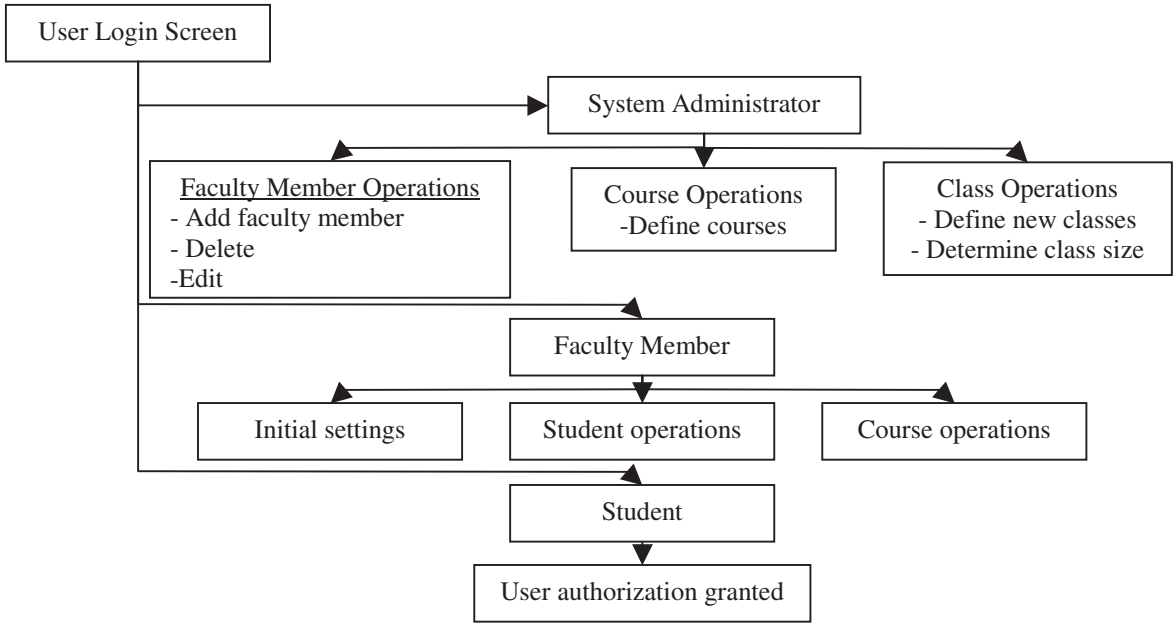


Figure 2. User groups diagram

Members of the system administrators group fulfill data definition tasks related to faculty members group, such as arrangement of classes and courses (Figure 2).The system administrator can add new faculty members, delete or edit existing ones through the “Faculty Member Operations”; s/he can define new classes or determine class sizes through “Class” and s/he can perform course definitions through “Courses”. Database associations are completed by assigning faculty members to the classes and courses that have already been defined. Any faculty member is supposed to be registered in the database by the system administrator in order to initiate lessons. Such users from the faculty members group are supposed to login to the system and complete student addition operations pertaining to the classes that have previously been defined in the database.

Users who are included in the students group in the database can start their courses in the classes to which they have been assigned by their faculty member. Users who are members of the students group can login to the system over the local area network. Students must have already been registered in the database in order to log on the system.

## 4. The Software

Digital system design is traditionally taught through a process that involves a tutor, work pertaining to design at a laboratory, and projects. Interactive software development gives the student a chance to put into action the otherwise thoroughly theoretical information related to a particular design, alongside with the opportunity to build new circuits (Franklin & Noakes, 1995). In fact, engineering students prefer such simulation programs, being aware of the fact that they considerably contribute to training process. The students have stated that simulation programs have been user friendly and attractive (Sharp & Hall, 2000).

The system administrator, the faculty member and the student can access the server via the entry screen of the training module (Figure 3). They have the possibility of working with different forms (screens) according to their particular authorization levels, depending on the groups in which they have been registered in the database.

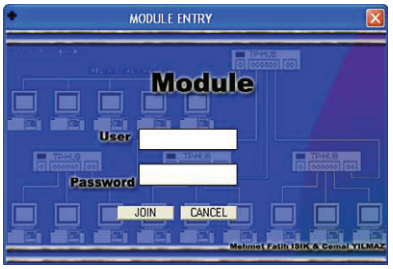


Figure 3. User entry screen

The system administrator that logs into the system is supposed to configure the network and carry out the required operations according to authorizations and permissions that have previously been granted, in order to allow a lesson to begin. The form shown in Figure 4 is used for that purpose.

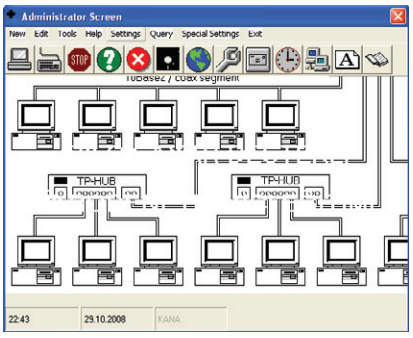


Figure 4. System administrator operation screen

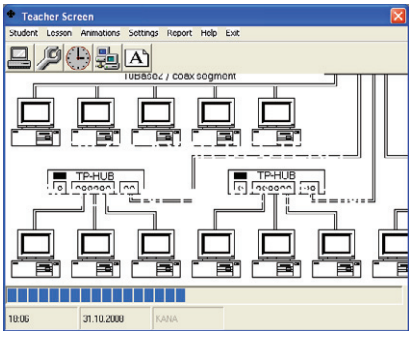


Figure 5 .Faculty member operation screen

The faculty member, who logins by typing username and password through the entry screen possesses the privileges granted to the group, in which s/he has been included (Figure 5). By this way, s/he starts the lesson by following the steps illustrated in Figure 2.After the faculty member has logged into the system, s/he is supposed to add students to the class that has previously been added to the system by the system administrator. Username and passwords must be defined, as in the manner faculty members are added to the system, so that the added students can login (Figure 5).The next step for the faculty members, who are defined in the faculty members group, is preparing the lesson contents. One of the essential points here to pay attentention to is the arrangement of lessons. As known, education is a steady process; hence, the course content of the education to be given should be well-organized. To add a lesson, first, a field is created in the database for each lesson to be added. This can be done through menus specific to that operation (Figure 6).

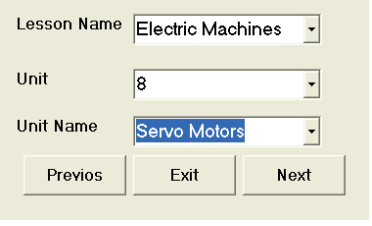


Figure 6. Add course wizard startup form

After the creation of required fields for the lessons, course documents in the rtf format, which have previously been created by using one of the word-processing programs are transmitted to the central database. The faculty member may optionally do settings pertaining to track records of students through the field specified as “initial settings”. Default values are available, which are determined by the software. Faculty members can change those values according to characteristics of each course. They can also measure performances of students through tests. Any student who fails to accomplish the criteria for success may have to take the course again, this may be arranged.

Students who have been registered in the database as a member of the students group can login to the system through any computer on the network, with their own usernames and passwords. The system is so arranged that the student can start definitely with the first lesson of the course following the first login to the system. The student must fulfill the success criteria set by the faculty member, in order to proceed to the next lesson. S/he is considered to have accomplished the course, provided that s/he accomplishes the entire lessons of a course. Figure 7 depicts the class environment and the server that are part of a sample lesson application of the training module software, which has been designed and developed for students in an applied course.

Figure 7. The class environment created for students and the server

## 5. Conclusion

A module has been prepared that would create an educational environment for the purpose of allowing faculty members, who have problems with applied courses, to improve both themselves and their students by employing computer technologies that play a more and more important role each day in educational life due to rapid technological advances. In order to establish a learning environment, MSSQL has been installed on the server so that the training module serves over a local area network to create a virtual classroom. The trainer can adjust program settings upon wish or according to the condition of the class. S/he may also use default program settings, if s/he prefers so. Another piece of software, which can run on the local area network, has been developed in Visual Basic language for the user side of the training module as well, to be used by students. The software also offers the possibility of assessing learning achievement by collecting data from both student and tutor sides. Besides, student-oriented animations can be created for the training module and can be transferred to the database. Such animations increase the attention of students to lessons. The training module has been prepared in installation format so that it can be loaded to desired computers.

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