

Design and Implementation of Web-Based Distance Learning System for Computer Architecture Subject

SALLY ALI ABDULATEEF
UNIVERSITY OF AL-MUSTINSIRIRYAH / COLLOGE OF
EDUCATION / DEP.COMPUTER SCIENCE

Abstract

This research aims at designing and developing an interactive distance learning system based on Internet, called Web-Based Distance Learning System (WBDLS), which manage Internet class activities and e-learning resources. This system integrates Web technology with database technology and provides a user-friendly teaching and learning environment for both instructors and students . It consists of a course server where the course contents are installed, and many client PCs from which instructor and students interact with the server using WWW as the interface.

تصميم وتنفيذ نظام التعليم التفاعلي عن بعد لمادة معمارية الحاسبة

الخلاصة

يهدف هذا البحث الى تصميم وتطوير نظام التعليم التفاعلي عن بعد على اساس استخدام شبكة الانترنت ويدعى النظام القائم على التعليم عن بعد يدير هذا النظام النشاطات الصفية والتعليم الالكتروني عن طريق شبكة الانترنت، و يتم عن طريق دمج تكنولوجيا الويب مع قاعدة البيانات وهو يوفر خدمة التدريس للعائلات وبيئة التعلم للمعلمين والطلاب على حد سواء .وهو يتألف من خادم للبرامج الدراسية حيث يتم تثبيت البرنامج الدراسي وهناك الكثير من الحاسبات الشخصية التي هي للمعلم والطالب تتفاعل مع الخادم من خلال واجهة بيانية .

1. Introduction: - Online media are made accessible by a set of interconnected computers through a foundation set forth by the Internet. It is well recognized that the Internet has had a major impact on publishing, research, and commerce [1]. The potential of the Internet for knowledge dispersion will effectively influence nearly all lifestyles and the method in which business is conducted. This trend will continue to become evermore

dominant as the new millennium begins. One of the main reasons why the Internet has had such a major impact in the world around us, in addition to the innovation of electronic mail (e-mail), is due to its graphics-based front end: the World Wide Web (WWW) [2]. The World Wide Web (WWW) or Web is a global, interactive, dynamic, and cross-platform graphical hypertext information system running over the Internet [3]. The paper is divided into web application and non web application .A web application represents the proposed site which is designed and implemented for internet access and use. While the non web based application represent the administrator model.

2. Basic Principles of Network Interaction: - Currently, the most common network interaction takes place in the form of client-server interaction between two computers. In this interaction, one computer takes the role of server, and the other client. The client requests information from the server. Usually, communications in this interaction are enabled by Transmission Control Protocol / Internet Protocol, usually known as TCP/IP, which is a suite of networking protocols that have been used to construct the Internet [4]. TCP/IP defines the methodology for sending data packets between computers on a network. .

3. Web Database: - Web database is a new way to publish information electronically. Because of this dynamic attribute, it provides flexibility therefore commercial and informational databases can be edited, added or deleted in minimal time by filling out the requested forms [5]. Atypical Web database system has a Web browser as its user interface, a database server as its information storage, and a Web server connecting the Web browser.

4. Web Application: - Web applications are application in the traditional sense, in that they provide a service to the user of the application. They are different in the way that they created as well as in the components that make them up. A traditional application requires a special set of files during development but distributes different outputs, for example a visual Basic application has a .vbp project file, multiple .frm, .cls and bas files. Prior to the application being distributed, these files are compiled into a set of executable files for distribution and execution the resulting executable does not require the presence of the source code files that were used to develop it. Script-based web applications, on the other hand are composed of the same set of files used during development and after deployment. There is no compiled executable file produced that becomes the web application The source code, or script, in these Web files is executed on the client or server only when a browser requests the Web pages .Creating these application builds upon the architecture of the World Wide Web, but

there is some added complexity and functionality in order to have these files as an application. In a web application, we will look at using a browser as the primary user interface. The information in the web application will flow from server to client using the HTTP protocol.

4.1 System Site Architecture:-It is Client-Server based information system. The clients here are the user machines (student, instructor) and the servers are the host computers supplying the information, as shown in Figure (1) server provide documents written in Hypertext Markup Language (HTML).

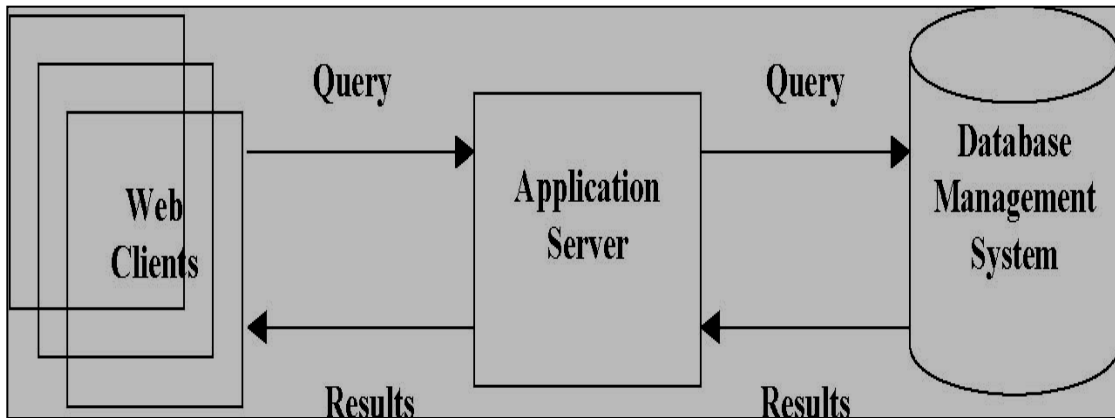


Figure (1) Site Architecture

The Web browsers from the user machines send the URL request to the server. The server in this paper is the Microsoft internet information service (IIS) which receives the requests and based on the type of request it sends an HTML document or runs ASP programs and accesses the database (MICROSOFT SQL-SERVER 2000) then sends the resultant HTML document to the client. The web browser on the client machines receives the HTML document from the server and decodes it and shows the document on the screen.

4.2 System Site Block diagram:- The proposed system Web-Based Distance Learning System (WBDLS) site includes designing and implementation of a site which is used by many instructors and many of them teach the same course. The basic design of the system is such that an instructor can setup a class using content in the system, but it is not designed to allow instructors to develop new course content (i.e.) the instructor or the professor who wants to use the system does not have the option to create his own content. Figure (2) shows a diagram visualizing the system's site.

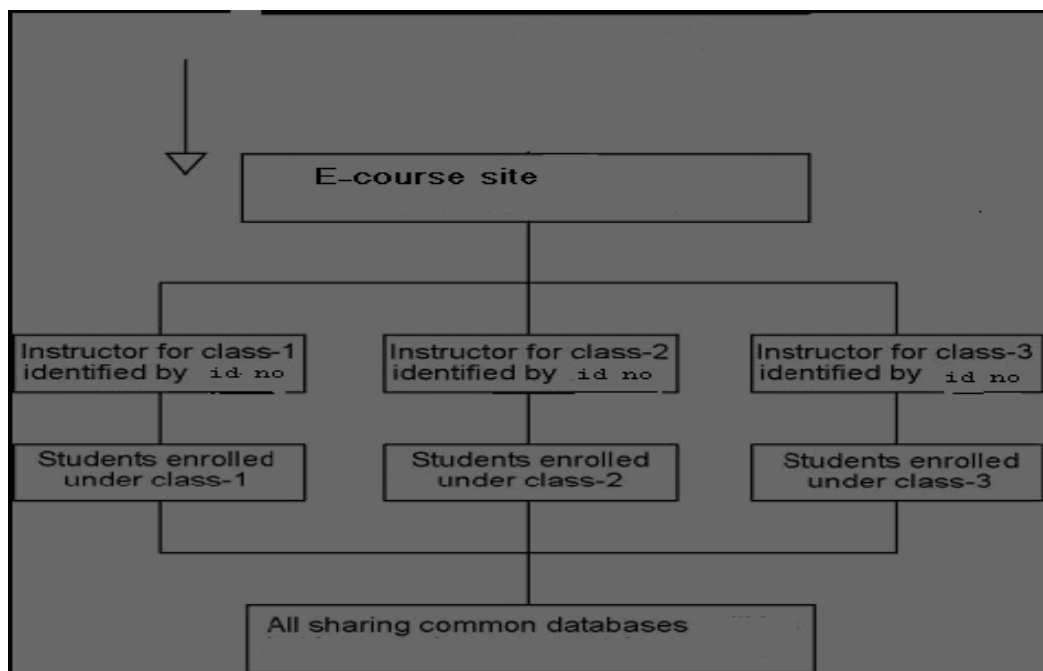


Figure (2) Block Diagram of the WBDLS Site

From figure (2) every time a new instructor is adding to the list of the instructors who teaching in the course, they are allotted an id number. This number is used to identify the class in a particular course. Individual class's setup under each course is completely independent in operation from each other. Student can enter to the available classes in the course and participate in the activities offered by these classes. All classes share the same content and instructor can access a common database in which all information related to register student are stored.

4.3 SQL Server 2000 Database Design:- Structured Query Language (SQL) is a standard interactive and programming language for getting information from and updating a database [6]. The proposed system (WBDLS) database was built using SQL Server 2000 database. SQL server offers a rich set of tools for database architecture. The proposed system

(WBDLS) has a database called administrator database which includes three tables: Result table, Total table and Students table. Result table and total table are used in exam management .Result table and total table are manipulate by the administrator only , for security reason the manipulation of these tables are done in non web application (i.e. they manipulates from the server not from the web browse), while instructors can accessed the students table and manipulates it from the web browser

A-Result Table Definition:-This table stores information about the exam such: student name degree, date of exam .Any student who take the exam will be stored in this database, so this table is important to give a report about the exam. If a student wants to take another chance in the exam first the administrator must delete the student from this database then enter to exam. The structure of this table is shown in Figure (3) which include student first name student_ second name, student _last name, degree ,and date of taken exam .

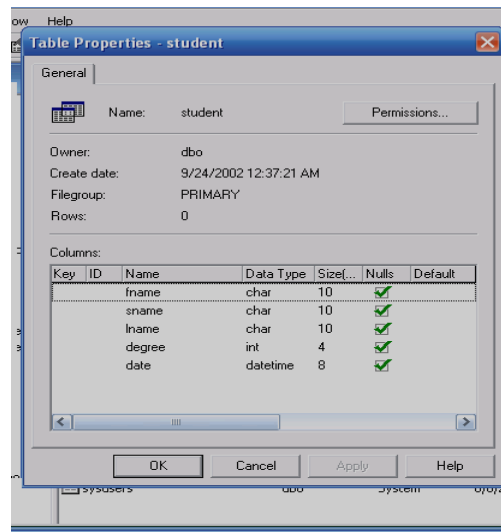


Figure (3) Result Table

B- Total Table Definition:-This table is used to stores all the questions and their answers. It can store a huge number of questions. The questions types are multiple choice questions true and false. Administrator only can access this database and manipulate it.

C- Students Table Definition:- This table stores all information about the registered student in the available classes. It is used only by the instructors to manage their classes by performing operations such as: add new student, delete student from their class, list the students in the class and update student's information. Its columns are: student id, student name, student password, e-mail, instructor id. [7]

4.4 Database Operations:- In the proposed system (WBDLS) there are four database operations performed they are:

- **Add Operation :-** This is an Active server page program which performs add operation This operation is activated when instructors want to add a new student to their classes and/or administrator want to add new questions to the question database .

- **Delete Operation: -** It is also an Active server page program which performs delete operation .This operation is activated when instructors want to delete a student from the available classes or /and administrator wants to delete an old question from the database.

- **Update Operation: -** It is an Active server page program which is used to update stored information for specific students according to the student _id or/and update an existing question in data base.

- **List Operation: -** It is an Active server page program which is used to list all stored information about registered students in the class or/and list the available questions in database.[8]

4.5 System Site Navigation:- The system (WBDLS) site is a simple, clear web site. It consists of HTML pages and active server pages. It is organized around one main homepage this homepage is the entry point for the site .While there is only one main homepage, there can be any number of subsidiary homepages (called tool pages).A tool page behaves exactly like the main homepage except, it is not reached immediately on entering the course. Instead, a tool page is reached by clicking an icon on the homepage, or another tool page. Thus the homepage and tool pages can form a hierarchy of pages with the main homepage at the root. When users access the site from the browser by typing its URL, they will be presented with the main home page which contains three links instructors' interfaces, available classes and reports about the exam .Students click on the available classes while instructors click on instructor's interface. Administrator Report exam interface gives a report about students result in the exam. Once users click on these links in the homepage this will take them to the next page of content a single click returns them to the point from which they left the path also they could exit at any page of the site by clicking exit button. When the students click on the available class's link in the home page they will be presented with another html page which contains a list of instructors name teaching in the course. If student clicks on any instructors name he will be presented with a login page asking for student name and instructor id, if this student is register in the class then successful login and students will enter to the class's page in the course. This page includes information about the instructors and]]link to e-books

page, at any part of navigation student can exit by clicking close button or can return backward. The second link in the homepage is the report link this link is used to give a report about the result in the exam for specific student .Because there are many instructors in the class and to protect the information about the exam, administrator only is responsible for exam generated and gives report about student result. Instructors click on the instructor interface link in the home page then they will be presented with a login page asking for password ,if this password is correct they will enter instructors page, else access is denied The instructors interface page contains four operations links which performed only by the instructors, these links are: add, list, delete, update operation.[9]

4.6 The Process of ODBC Drivers: - Open Database Connectivity (ODBC) is a standard database access method that allows access and modification of data from any application, regardless of which database management system is handling the data. In order to log to a database, that database must be set up as an ODBC source on the server system. This identifies to the ODBC driver what type of database with which it will interface, as well as where that database is (local or network).In this proposed system (WBDLS) a database is a create using the SQL Server 2000 as database program. Then the administrator creates a data source name files (DSN). The DSN links a database file to a driver and provides a central location for accessing databases on a given computer in other word the DSN file contains necessary information to make a physical connection to the database. Once this is done, the database will access with the proposed application. The following steps are to set up an ODBC DSN, do the following:

1-In the Control Panel window, double-click on administrative tools then double click on ODBC icon.

2-In the Data Sources dialog box, click System DSN and click Add.

3-We will choose the type of driver for which to setup database source, in the proposed system the data base is SQL so we choose SQL Server then click finish.

4- In the next step will enter the data source name of database and its description also the server name.

5-Next we should enter the password and login ID. [10]

4.7 Implementation of the System Site:- The homepage of the environment is designed to contain a brief introduction to the environment with three links: Available class's link Report link and Instructors interface link.

4.7.1 Design of the Students' Interface: - The Students enter into the environment by clicking on available classes in home page as shown in Figure (4)

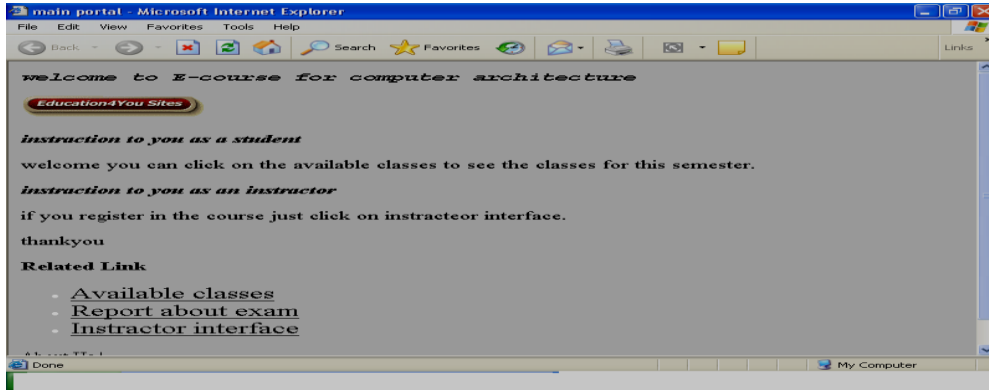


Figure (4): Home Page of the Proposed Site

Then a login page will display asking for student name and instructor ID
If the students are register in the classes then they will enter available classes in the course, else they are not permit to enter but they could enter by clicking on add new student link in the login page, this link will access an insert record page, a student must fill the information form after that clicks on submit button. After a successful adding operations a confirm message will appear to ensure the adding operation, students will enter the available class's page Figure (5) which contains a list of instructors name teaching in the course.

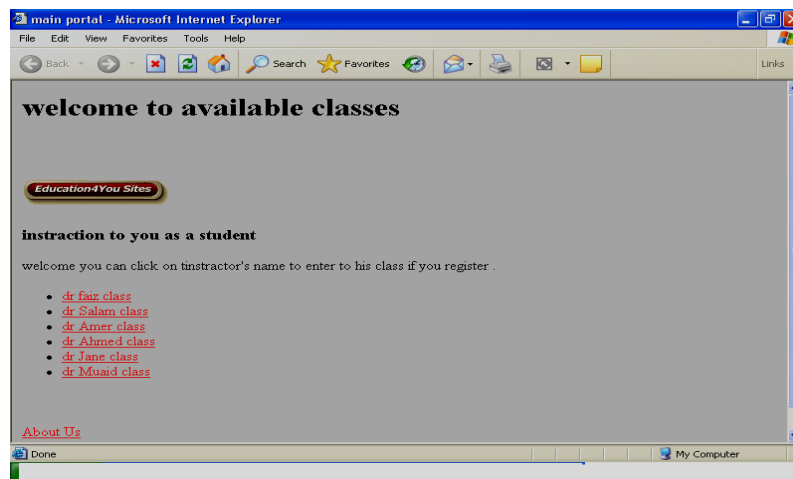


Figure (5): Available classes in the course

Student can enter to any classes by clicking on the instructor' name then he will enter class and take benefits from the e-classes services, Class activities are: course info, attended lecture, examination, useful link E-

library. **A- Course Info:** This button gives information about the course and about the instructors and their e-mails .This link is so important for student because it is defines the course to them as shown in Figure (6)



Figure (6): Course info

B - Attend Lectures: This button displays a list of available lectures which are taken in the course .These lectures are open in Acrobat Reader program and students can read or download it easily without any charge as shown in Figure (7)

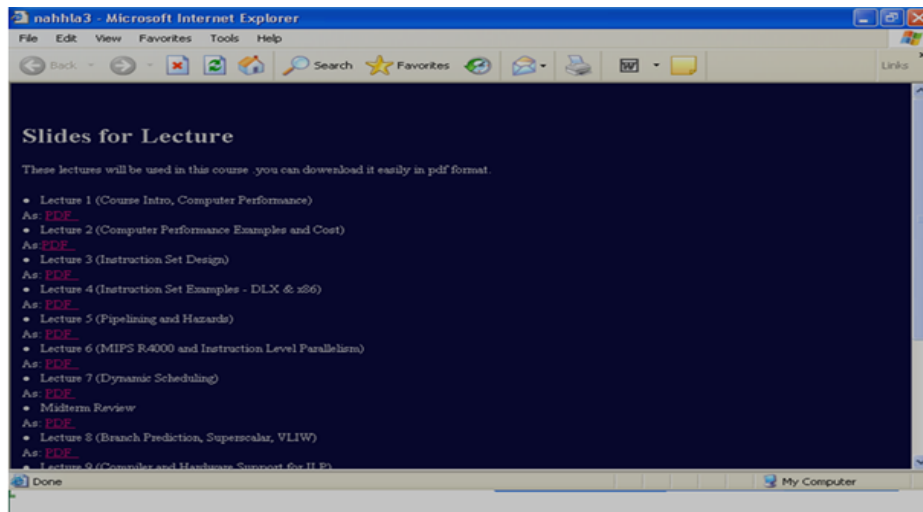


Figure (7): List of Lecture

When user's clicks on any link, the available lecture will display and users can read or downloads it easily without any charge, as appears in Figure (8)

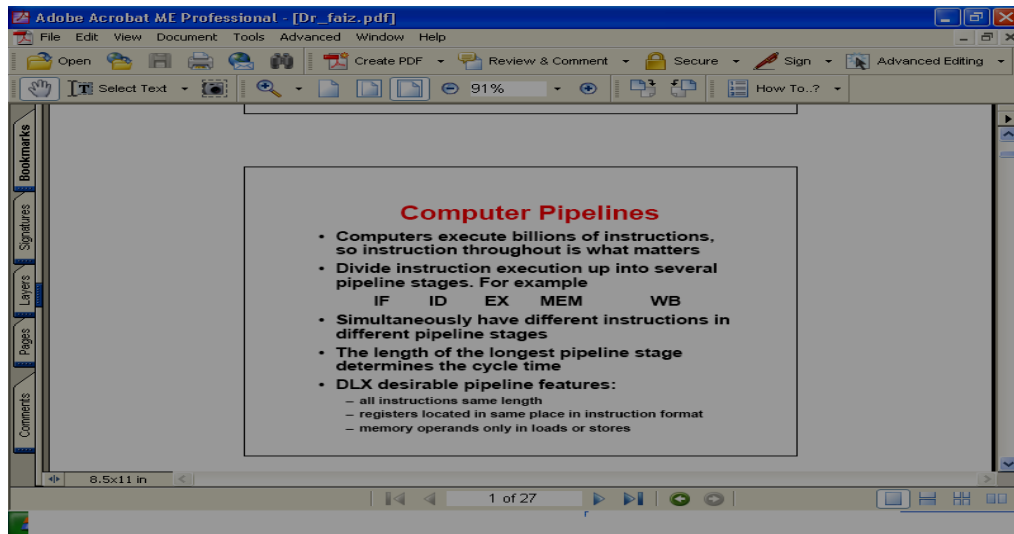


Figure (8): Available Lecture

C- Examination: Students can click on this link to see the available exam in the course they also can take the exam and see the result in online mode as shown in Figure (9).

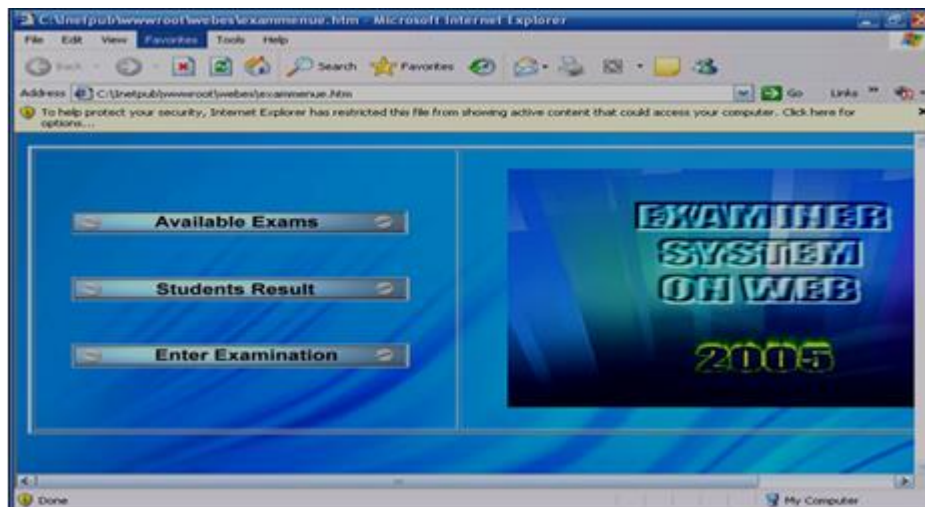


Figure (9): Exam Page

A student is only allowed to take the examination once. The administrator is responsible for random exam generator and exam management. (see Non web application) .The questions are multiple choice questions type .since everything is web based ,so students will access the questions through the Internet and they submit all the answers online and receiver the result on line too.

D- Useful Link: This page includes several web sites about the same subject of the course (computer architecture) these links will help student if they want more references this shown in Figure (10)

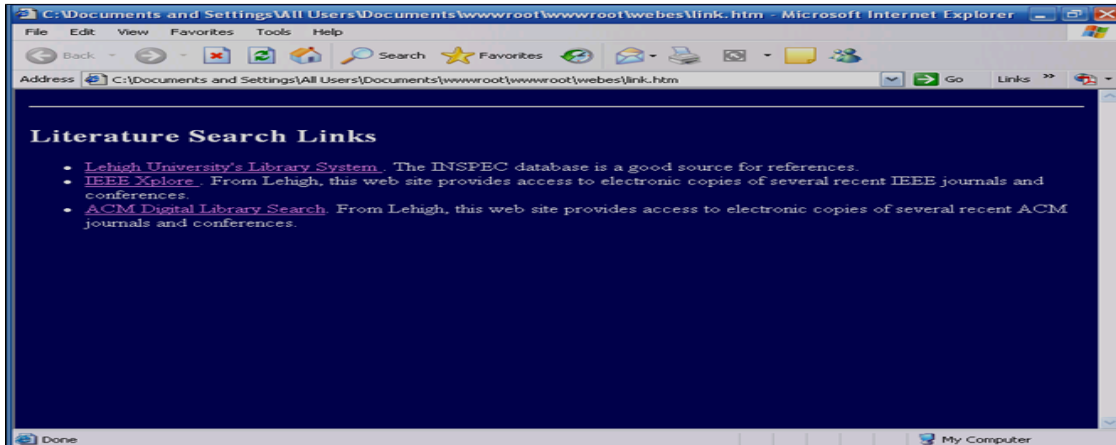


Figure (10): Useful Link

E-library: This page is as a library offered by the course to the student to help them in their education .It includes books, articles, and journals about computer architecture so student can download it and take benefit from, it is also free and available for all.

F- Reference : In this page we find the name of the text books required in the course .

4.7.2 Design of Report Interface:- When users(student ,parents, instructor) want the result of the student in the exam ,they will click on report interface link in the home page then they will be presents with another html page which asking for the password and the name of students then click on submit query button ,this will access a result database ,SQL statement will retrieve the student's information and display it as HTML page .[10]

4.7.3 Design of the Instructor Interface: - Instructors can manage their classes by performing several operations such as: add new students, delete students, update student's information, and list the student in the classes. To enter to this page, first instructors must click on instructor interface link in the home page then he will be presented with a log in page which asks him instructor's password .

Following successful login the instructor will enter instructors interface page show figure (11).

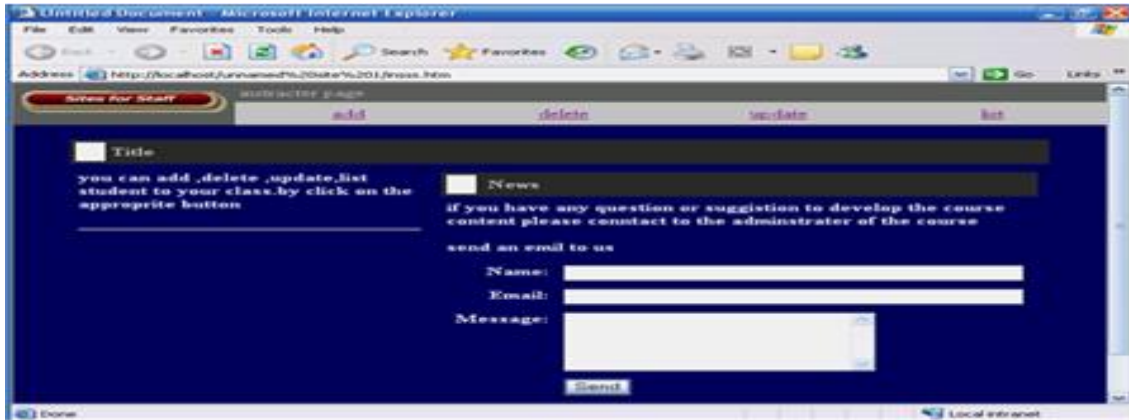


Figure (11): Instructor interface

this page represents the entry point to the instructor to perform database manipulation such as: add student (adds a new student to the class .It can be done either from the instructor interface or when a new student wants to join the class and he is not registered), delete student (This feature allows the instructor to delete all the information about a particular student from the class database. Once the student has been deleted it cannot be recovered, after instructor hits the “delete” button a confirm message will display to ensure the delete process), list student and update student's information (This feature lets the instructor edit information about the student. Figure (12) shows a particular students information that has been pulled up for editing).

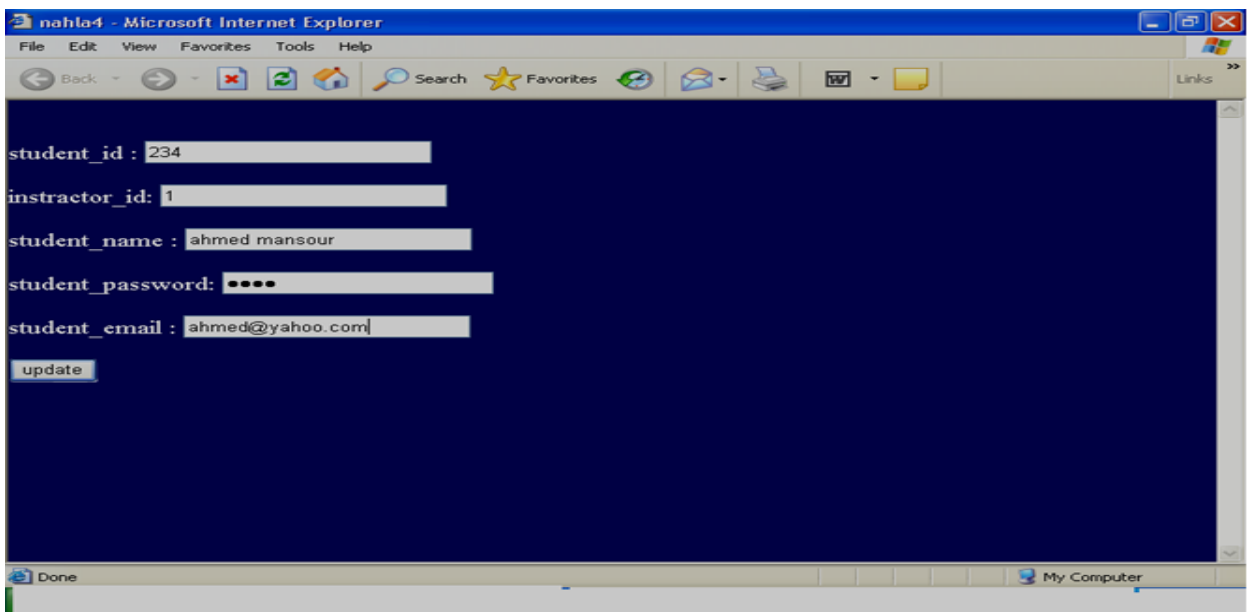


Figure (12): Update Page

The Structured Query Language (SQL) statement retrieves the existing student information and displays the information in a form. On hitting “update”, the information related to the student is updated in the database.

5. Non Web based Application: - For security reasons and for protect the exam database and results of the exam, administrator application are found. It is not web-based system; it’s a windows application (visual basic program) which stored locally on the server. Administrator only can execute this program and know where it's stored. General users of the system do not need to access this program or even know of its existence. The next section will explain this program and its features in more details.

5.1 Implementations of administrator application:- First administrator will running the program (visual basic 6.0 must installed on the computer) ,then administrator will be presents with login page asking for name and password if the input information is correct then program is run else access is denied. Then the program is running and the main from of the program will appear figure (13).

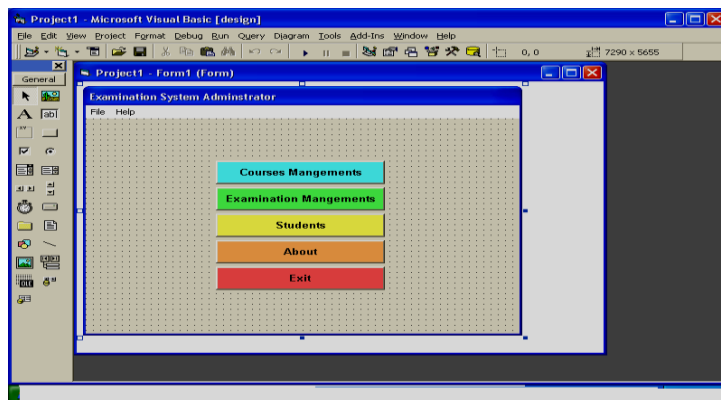


Figure (13): Main Screen of Administrator Application

6. CONCLUSION:- The change in mode of study from the structured units and teaching methods of conventional Open University distance courses to the more open framework of a project-based course makes demands on students, ability to organize their own work plans. The administration's functions are clearly identified to be able to manipulate users' information such as Add, update, and delete students , thus the proposed system is easy and flexible for future maintenance and developments. In order to access this application system, user does not need to install/download any separate software; all that they need is a browser with internet access. The system is user friendly. Navigation through the system is very easy. The labels titles of the pages, the naming conventions of the buttons/menus or sub-menus are quite understandable

and self explanatory. The security of the system is very well implemented. Only the registered users can enter into the system. Only the user with admin role can create new user profiles into the system. Evaluators tested the system with different roles; access to the data is given depending on the user role.

7.References:-

1. **Glossary of Internet Terms** ,URL, September 2011
<http://www.matisse.net/files/glossary.html>,
2. **Internet Fundamentals** ,URL, 1999
<http://www.cl.uh.edu/INST5931>
3. **Internet 101**,URL :
<http://www.internet101.org/>,
4. **Distance Educator** ,URL:
<http://www.daistance-educater.com/>
5. **Interactive Distance Learning**URL, October 2000
<http://www.c-ideas.com/distart.htm>
6. **Distance Learning - a Special report**, from the Wall Street Journal focusing on the business of education, URL, 2001
<http://www.interactive.wsj.com/puplic/current/summarise/ecommerc>.
7. **Internet Detective**,URL,2008
<http://www.sosig.ac.uk/desire/internet-detective.html>
8. **Crouch ,Robert and Amundsen ,Mike** ,"Teach yourself Database programming with visual Interdev 6 in 21 days ",SAMS Publishing,1999
9. www.yourhtmlsource.com/accessibility/navigation.html, 2010
10. **Micrsoft SQL server** ,URL, 2000
<http://msdn.microsoft.com/archive/default>