E College: Intelligent Examination Board (EC-IEB)

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Abstract— **Colleges need to deal with huge amount of information in order to manage their issues like student registration, examination …etc., and usually all of these issues are handled manually. Obviously, this conventional method is not the efficient way due to the time and effort it consumes. In this paper a solution to this problem is presented, designed, implemented and analyzed. The proposed system makes a big difference in the way the college deals with its issues by utilizing new technologies and modern efficient system. It is a web-based application with different privileges, consists of three main subsystems: Registration Office Subsystem, Examination Committee Subsystem, and Students Subsystem.**

Keywords- **EC-IEB, MIS, SMIS, Registration Office Subsystem, Examination Committee.**

I. INTRODUCTION

Businesses and organizations are continuously pursuing to seek the improvement and the increased efficiency of their operations in order to achieve higher productivity and high quality of performance. Some of the most important tools for achieving higher levels of effectiveness are Information Systems and technologies [1]. Electronic College (E-College): Intelligent Examination Board (EC: IEB) is a Management Information System, which is mainly developed for the College of Information Engineering (COIE) at Al-Nahrain University in Iraq and it could be applied at almost any college with the same or close regulation as COIE. The system's main job is to maintain and manage information related to college's activities and operations. This system is used to maintain details of students' admission, interim marks, final exam marks …etc. EC-IEB has three general subsystems: Registration Office Subsystem which is a Registration Management System (RMS), Examination Committee Subsystem which is a Student Management Information System (SMIS) and Students Subsystem that offers an Online Examination (OE). EC-IEB is an E-Application that uses a Web-based User Interface (WUI) as its user interface. This system would help the college to manage all students' records, track every student profile, and manage final exams and results. Basically, the system provides major college's Registration Department services that concerned with the students' admission details and registration. It also services the Examination Committee facilities, including student midterm marks, final exams location management, and final exams marks and results. In addition, the system offers an online exam to be taken by the students at the college.

II. MANAGEMENT INFORMATION SYSTEM

Generally, Management Information Systems (MIS) is an Information System that resides at the management level. It serves the monitoring, controlling, decision-making and administrative activities [2]. The idea of MIS has changed over the years covering many different facts of the organizational utility. However, there is no doubt that at the recent years the most important subject that MIS is concerned with is the management of information in an organization using modern information technologies [3].

A. Educational Management Information System

Educational Management Information System is an organized collection of information services. Its job is to process gathering, storing and analysing, in addition to information distribution for educational planning and management. Educational management, policy formulation, and resource allocation can be achieved by the particular tasks of Educational Management Information System [4, 5].

B. Student Management Information System

Student Information Management System (SIMS) provides a simple interface for student information maintenance. Universities, institutes, and colleges use SIMS to maintain and manage the students' records, academic related reports, course details, college details, final exam result, and so on [6]. SIMS can be defined as an integrated information system for gathering relevant data, converting it into proper information and providing this information to mangers to take the appropriate decision [7].

III. PROBLEM IDENTIFICATION

The number of colleges' students is growing up rapidly, which makes managing all administrative work; including handling of their information manually tiresome and sometimes fallible that makes the need of an application to handle this massive information accurately and quickly a must. For example the registration process of student usually requires the student to fill in his information on a

paper then the papers of all students handled by the registration department at the college, this normally takes significant time. As it the case for the examination committee jobs which are: students' marks, final exam monitoring and evaluation …etc. they all require dealing with huge number of papers and student files, this raises the possibility of faults. Beside time and inaccuracy the traditional methods suffer from other drawbacks like the effort it take dealing with physical dossiers and sorting them, the space needed to store these files on shelves and desks, and the fact that physical files are prone to damage and loss.

IV. PROPOSED SOLUTION

The proposed system comprises three physically separated subsystems, (Examination Committee Room, Registration Office Room, and Online Test Hall) all connected through intranet network. Figure 2 shows the physical layout of the system.
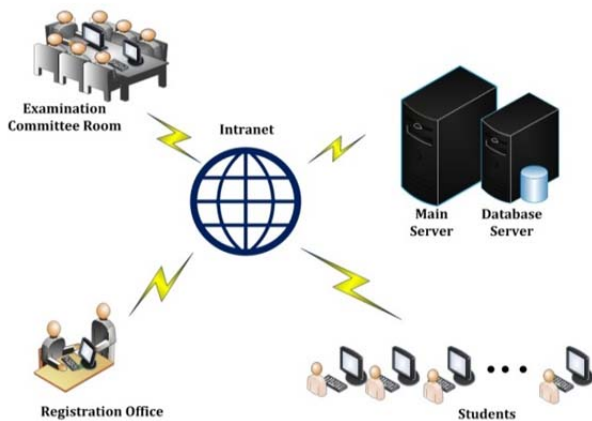

Fig.2 EC-IEB System Layout

For software system architecture, the most common architecture topologies (Client/Server architecture and Browser/Server architecture) are used. Each of them has its own advantages and disadvantages. However, the designer of the application must make a trade off and choose the best UI that suits the application. The potential utilization of users' abilities to process information is one of the most important advantages of Client / Server architecture. Although Client / Server architecture has many advantages, but it is not necessarily the most effective option. That it requires additional supportive software on the client computer [8]. While Client / Server architecture has converted the user interface to a more appealing, easy to handle one. Browser / Server architecture has further revolutionized user interface concept in terms of computation speed, flexibility and control. Browser/Server architecture is more preferred than the Client/Server architecture for two reasons: accessibility and the lower maintenance and implementation cost [8, 9]. These facts made Browser/Server architecture very popular and that is why it has been chosen for EC-IEB application.

V. SYSTEM DESIGN

In order to let the system works most properly and efficiently, system design has to be set well and carefully that specifies each function of the system clearly. Figure3 presents the system flow for the project.
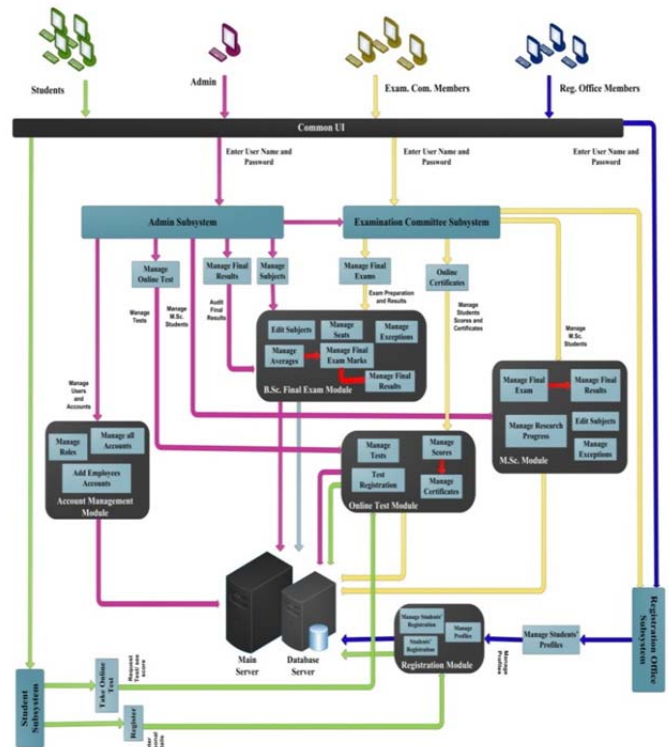

Fig.3 EC-IEB System Flow

As it clear from the figure 3 that the system has four types of clients, the Registration Office Members, who is responsible for the registration process and hence will access the student profiles and their results (after being approved by the Examination Committee Subsystem), The Examination Committee Members and Admins, who has the biggest job and allowance to access the whole database which contains the student profiles, student's Final Exam marks, student's Online Test scores, online Test certificates and the accounts of all users. The final type of clients is the Students, which can register students and complete student's profiles, and the second thing is to take the Online Exam that the college offers

A. Registration Office Subsystem

This subsystem is responsible for managing student registration process and updating and managing students' profiles. Though, this subsystem looks simple however it is the foundation stone of the system. Figure 4 shows the use case diagram for students' registration module.
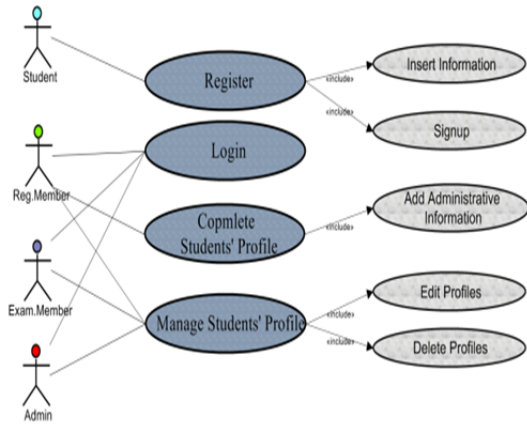
Fig.4 Reg. Module Usecase Diagram

B. Examination Committee Subsystem

The Examination Committee subsystem takes the most important and biggest responsibilities and major duties, like managing the online test and certifications, and of course the subsystem's largest task is the final exam preparation, which includes student seats managing, intermediate marks entry and finally managing the final results of students' marks at each semester. Examination Committee subsystem mainly responsible to manage three courses: B.Sc. course, M.Sc. course, Figures 5 illustrates the use of case diagrams for B.Sc. course.
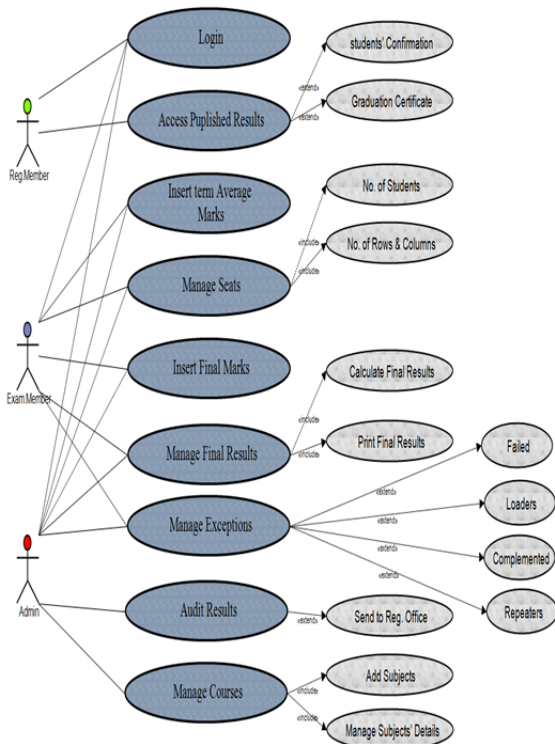

Fig.5 B.Sc. Course Usecase diagram 1

C. Students Subsystem

Student's subsystem comprises how the tow activities students will be able to perform on the system. The first activity is the registration through Registration Module, which was explained in Registration Office subsystem section above. The second activity is the online testing. The Online Test is the accessory component for this system. This subsystem provides electronic testing mechanism that allows the college to offer online tests for the students. The college could offer any number of tests and specify the test details as they want. The students register for online test and choose the test they want to sit. Answers are sent to the server to be marked. The score appear to the students directly, but the certificate will be printed out by the examination committee. Figure 6 presents Online Test Module usecase diagram.
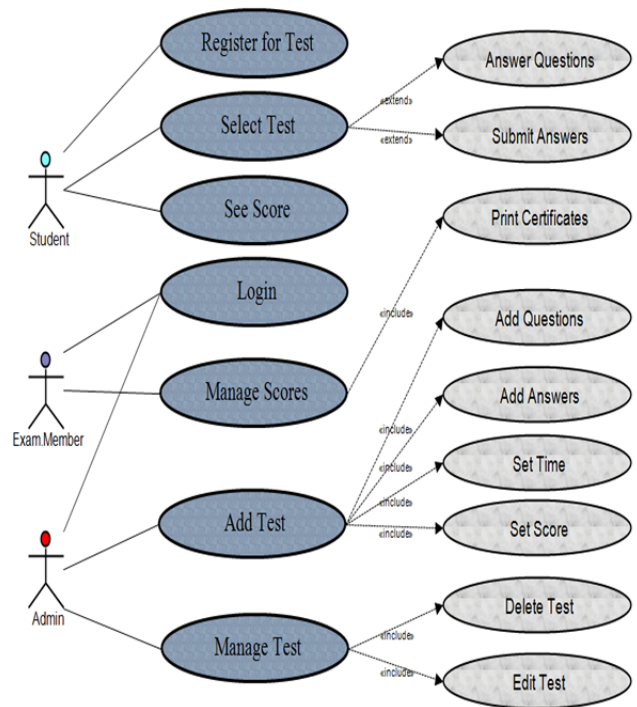

Fig.6 Online Test Module Usecase diagram

VI. DATABASE DESIGN

EC-IEB System requires well-structured database to store the information it needs to accomplish its jobs. This information includes information about the student, marks, and etc. The database schema is shown in figure 7. This database consists of thirty tables, each with its specific information, the two main tables contain the basic information about undergraduate and postgraduate students, and some tables are dedicated for each stage's study information. There four tables designed for the Online Test. The other tables are for the different function related to the application, such as accounts, employees, subjects …etc.
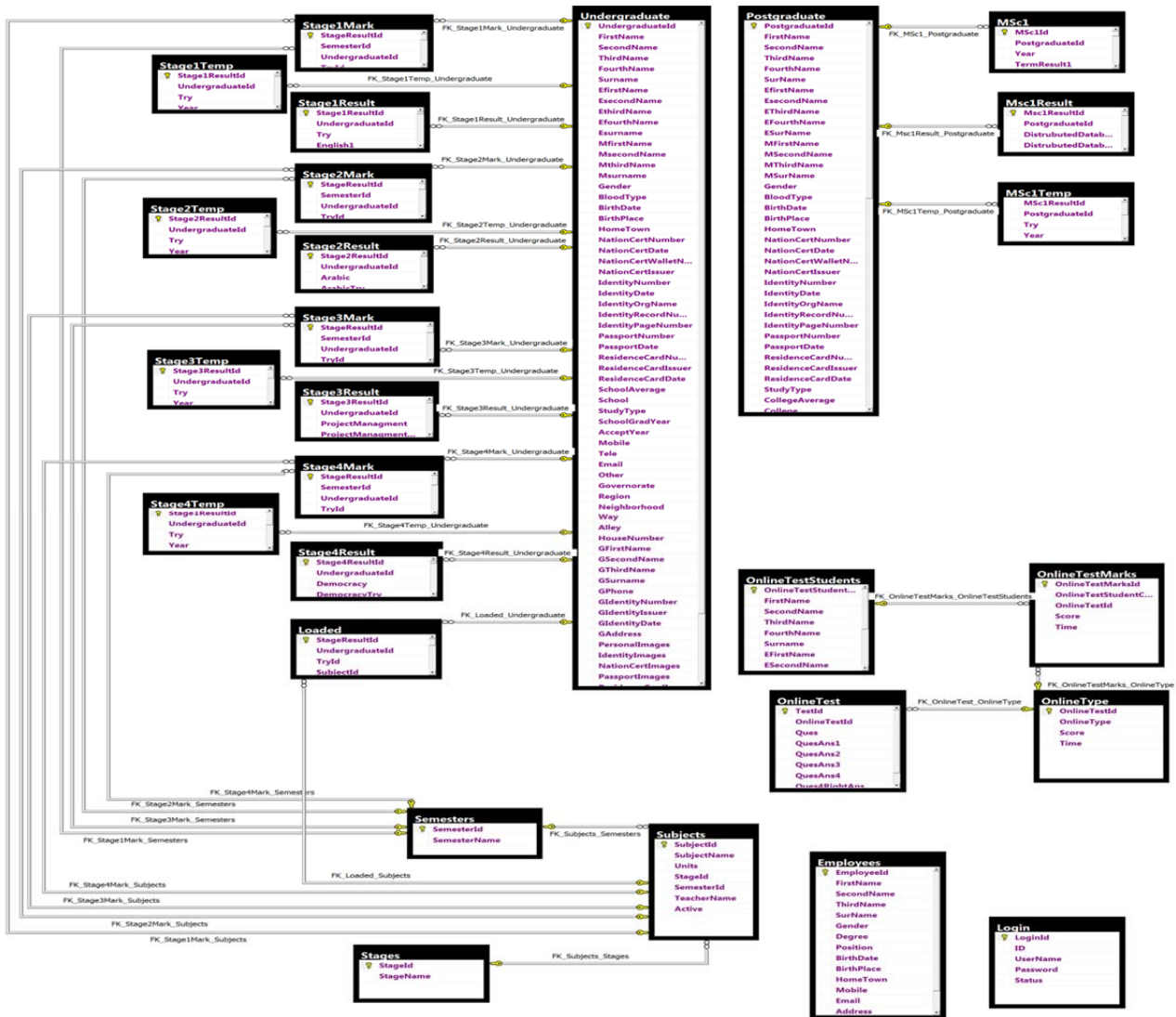
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Fig.7 Database Schema

VII. IMPLEMENTATION

The 3-tier computing model is followed in implementing EC-IEB system and with high level of separation between the tiers; this modularity provides several benefits such as the easy testing of modular component code and the fact that one component could be used multiple times without the need of rewrite the component. The system implemented using DotNet framework. Asp.net and C#.net are used as server side programing languages. Windows Server 2008 is used as the main server; on the other hand IIS is used as web server and MSSQL sever as a database server. The system consists of a main server and several computers for the system's users all connected by intranet network.

A. System Common User Interface

This constitutes the EC-IEB's home page, which is common to all system users. This page is considered as a portal from which users pass into EC-IEB's subsystems. Figure 8 shows the home page of EC-IEB.

Fig.8 EC-IEB Home Page

B. Registration Office Subsystem

Registration Office Subsystem has two main jobs; the first job is to add the administrative information for the students, which is shown in figure 9, this is for B.Sc. students.

Fig.9 Add B.Sc. Administrative Information

The second job is to manage students' profiles. Figures 10 present this job

Fig.10 B.Sc. Students Profiles Page

C. Students Subsystem

This subsystem is earmarked for the students to register to the college and take online test. The EC-IEB home page contains the links for students' registration and for the online test. Figure 11 shows B.Sc. registration process where B.Sc. students insert their personal information and complete their registration to the college. M.Sc. registration process is almost the same with few different fields.
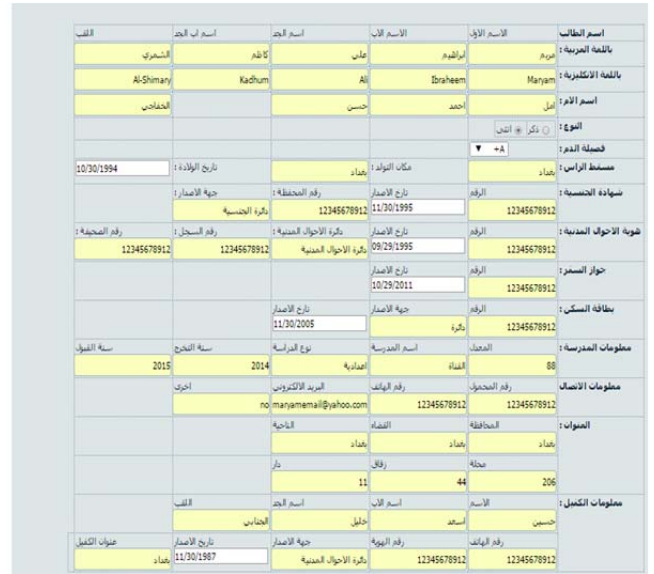

Fig.11 B.Sc. Registration Page

This subsystem also offers online testing facility. Figure 12 and 13 show the main pages for this component. The students register to the test, choose the test and take it, then see their score.

Fig.12 Online Test Page

Fig.13 Online Test Score Page

D. Examination Committee Subsystem

This is the most important subsystem in EC-IEB; it manages the Intelligent Examination Board that the project offers. Examination Committee members control this subsystem. This Subsystem is consecrated for final examination and students study management which are the main objectives of EC-IEB. In figure 14 B.Sc. final exam marks management is presented.
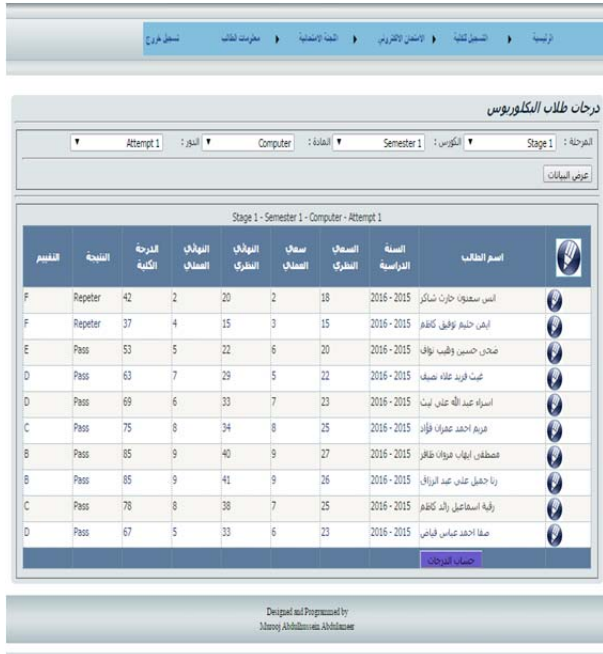

Fig.14 Students' Marks Management Page

The M.Sc. Preparatory stage is almost the same as the B.Sc. mark management. On the other hand M.Sc. Research stage part is dedicated to research stage management. This page is presented in figure 15.
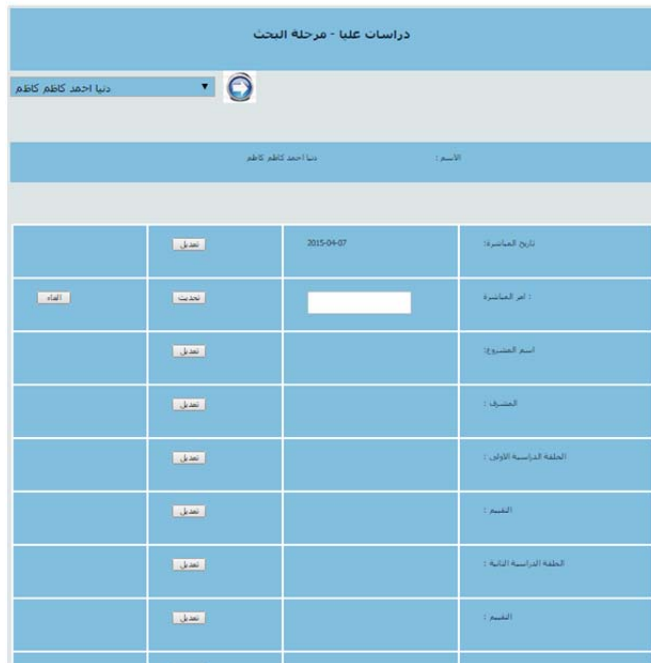

Fig.15 M.Sc. Research Stage Management Page

E. Admin Subsystem

Admins use this subsystem to control the whole application, they responsible of adding the employees to the system, account management, etc. Admins add the employees to the system as presented in figure 16.

Fig.16 Add Employee Page

Admin add the online tests that the college wishes to offer and manage their details as shown in figure 17.

Fig.17 Manage Online Test Page

Admins manage the subjects of each stage and semester as presented in figure 18.

Fig.18 Subject Management Page

CONCLUSIONS

College registration and exam management are very complicated processes that require a lot of effort working with physical papers and organizing files and folders, in addition the time wasted on routine tasks.

Hence there is an urgent need to computerize these jobs. EC: IEB system is designed and implemented to handle colleges' issues in computerized efficient way. Registration of students would become simpler for students and Registration Office employees as well. Examination Committee members would handle final exam and results much easier than normal manual management. In addition EC: IEB system offers Electronic Test facility allow the college to offer tests that could be taken electronically by college's students.

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