

# 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.



## 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.

¢	E-College
	ريب و معرفته: و بعد بعرين معرفين
	جلمة التورين كلية هلسة المؤرمات قسم هلسة الملومات
	تطبيق الكلية الالكثرونية . لجنة الاستمان الذكية
	Designed and Perspectrated by Daming Adultiments, Michiganaw

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.

	espr E-(	Colle	ege	
21.4-	النجل الدهول النجل	و مغربت تفلک	تلقية والمتحل الطريري	ترسية و صبير
	سات الاولية	الادارية لطلاب الدرا	المعلومات	
	• 3	رنا حميل على عبد الر	اسم الطالب و	
		12345678912	الامر الوزاري	
		12345678912	الامر الجامعي	
		b2345678912	الإمر الإداري	
	9			

Fig.9 Add B.Sc. Administrative Information

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

	ض معلومات الطلاب
Show	الدراسة : الدراسات الاولية
لتغاصيل	Name
التغاصيل	انس سعدون حارث شـاکر
التغاصيل	ايمن حليم توفيق كاظم
التفاصيل	ضحى حسين وهيب نواف
التغاصيل	غيث فريد علاء نصيف
التغاصيل	اسراء عبد الله على ليث
التغاصيل	مريم احمد عمران فؤاد
التفاصيل	مصطغى ايهاب مروان ظافر
التغاصيل	رنا جميل على عبد الرزاق
التفاصيل	رقية اسماعيل رائد كاظم
	الم الم الم الم

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.

	<ul> <li>السمار الله، ( ( ( المنان ( الكروني السمار الله ول)</li> </ul>
ئوڭ 01:00:00	الاسم : مروح عبد الحسين عبد الامبر
ئېقى من الوقت : 0:59:28	Management Information : اسم الامتحان Systems
Which of the following is(are) true of	of the EDP auditors?
• they should have computer expertise	
<ul> <li>they should have computer expertise</li> <li>they will be replaced by traditional a</li> </ul>	auditors in the near future
<ul> <li>they should have computer expertise</li> <li>they will be replaced by traditional a</li> <li>two of the above</li> </ul>	: unditors in the near future

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.

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									عرض البيانات
				Stage 1 -	Semester 1 - C	iomputer - Atter	npt 1		
النغييم	النئبة	الدرحة الكلية	النهائې المملې	النهائب النظري	سەب المىلې	السەب النظري	السنة الدراسية	اسم الطالب	0
F	Repeter	42	2	20	2	18	2016 - 2015	انس سعنونا خارث شاگر	0
F	Repeter	37	4	15	3	15	2016 - 2015	ایمن حلیم توفیق کاظم	0
ε	Pass	53	5	22	6	20	2016 - 2015	فحن حسين وهيب نواف	0
D	Pass	63	7	29	5	22	2016 - 2015	غيث فريد علاه نصيف	0
D	Pass	69	6	33	7	23	2016 - 2015	اسراء عبد الله على ليت	0
с	Pass	75	8	34	8	25	2016 - 2015	مريم احمد عمران فؤاد	Ø
8	Pass	85	9	40	9	27	2016 - 2015	مصطفى ايهاب فروان طافر	Ø
8	Pass	85	9	41	9	26	2016 - 2015	رنا جميل على عبد الرزاق	Ø
с	Pass	78	8	38	7	25	2016 - 2015	رقبة اسماعيل رائد كاظم	Ö
D	Pass	67	5	33	6	23	2016 - 2015	مفا احفد عباس قياض	Ø
						l.		حساب الدرمات	

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.

دراسات عليا - مرحلة البحث							
دنيا احمد كاظم كاظم	• 0						
	تاطر کاطر	لاسم: دنيا احمد )	i.				
	<u>نعديل ا</u>	2015-04-07	ناريع الماسرة:				
, sur	لغديت		: امر المانترة				
	<u>سر.</u> ا		اسم المشروع:				
	استر		السرد :				
	استر		الحلقة الدراسية الأولان :				
	اعديل		الشيع:				
	. تعديل (		الطلبة الدراسية النائية :				
	<u>مدنل</u>		النسم :				

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.

(		E-	Coll	ege		
		ارسن و مدرسه طلب	ميدوسيد و	وسنان وكاروني 🔹	و سيرتب و	ц.,
			اسم الحد	الاسم الار	الأسم الاول	اسم الموتلف
		اللب المعن	اسم الحد على	السم الل أواقع	الأسم الأول حمد	اسم الموتقد بالمه العربية :
		اللب المقرر	اسم الحد على	الاسم الار ابراغيم	الاسماليق جمد * ذكر () اخر.	اسم الفوتلف بالفه العربية : البوع :
	mm(dd)yyyy	القب الطبيعي عارية الولاية :	اسم الحد على علماد	الاسم الان اوراهم المواد ا	الاسم الاق جمد ی ذکر () اخر هماد	اسم الموتقد بالقة العربية : البوع : عسقط الراس :
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	mm/dd/www	القب المراجع المراجع : المراجع الولاية : hmd@enail.com المراجع :	اسم الحر على المالا البرد الأكبروس البردة الشية	الاسم الآب مراقعہ 1 ماریک 00770100000	الاسم الاق حمد ی فکر () الای مقاد رقم المحمول المرکز:	اسم المولقة باللية العربية : 2 يالية العربية : 3 مسقط الراسي : معلونات الانصال : العملونات الانصال :
	mm/dd/yyyy	اللف التعليدي العام والمراجع ahmed@enail.com مكان وس No file closs	اسم الحد على البرد الأكبروس البردة العلية : n [Choose Fix]	الاسم الار مراقع مکان الدولد : موالد سوالد	الاسم الاق حمد یو نکر () اس ممان المرکز: المرکز:	اسم المولقة باللمة العربية : 2 يالمة العربية : 2 يعمقط الراسي : معلونات الانصال : العملومات الانصار :

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.

in/AddSubjects.aspx	E-Co	ollege	
	و جني و موساط	و جمر بحريم و خما جمعيا	ربيا و ميرييا
	دراسية	, المواد او الكورسات ال	لاضافة او التعديل على
		*	لمرحلة الدراسية : Stage 1 لكورس الدراسي : Senester 1
			صافة مادة
نغمیل	عدد الوحدات : <mark>د</mark>	مدرس المادة : Dr. Muntaz	Distributed Database : 63kall was
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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.

#### References

- K. Laudon, J. Laudon, Management Information Systems MANAGING THE DIGITAL FIRM, Twelfth Edition, Pearson Education, Inc., United States of America, 2012.
- [2] J. O'Brien, G. Marakas, Introduction to Information Systems, Fifteenth Edition, McGraw-Hill/Irwin, United States of America, 2010.
- [3] A. Adekeye, "*The importance of management information systems*", Library Review, Vol. 46 No. 5, Nigeria, 1997.
- [4] C. Villanueva, "Education Management Information System (EMIS) and the Formulation of Education for All (EFA)", UNESCO Almaty Cluster Office, Tajikistan, 2003.
- [5] H. Hua, J. Herstein, "Education Management Information System (EMIS): Integrated Data and Information Systems and Their Implications In Educational Management", in *Annual Conference of Comparative and International Education Society (CIES)*, United States of America, 2003.
- [6] S. Bharamagoudar, R. Geeta, S. Totad, "Web Based Student Information Management System," *International Journal of Advanced Research in Computer and Communication Engineering* (*IJARCCE*), Vol. 2, Issue 6, India, 2013.
- [7] P. Basnet, "Overview of Student Information Management System", Bachelor of Business Administration to Tribhuvan University, Nepal, 2008.
- [8] M. Sakal, "GUI vs. WUI through the Prism of Characteristics and Postures", *Journal of Management Information Systems (JMIS)*, Vol. 5, No. 1, Serbia, 2010.
- [9] S. Ziemer, "An Architecture for Web Applications", *Distributed Information Systems (DIF)* 8914, China, 2002.