Design and implementation secured and user interactive Electronic Examination Committee Management System

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Abstract

Nowadays, database systems have played an important role in all walks of human being life, where database systems are used often in every field because the costs of introduction and running of the database system became low. The system is presented in the paper is used to management collage examination committee work. Electronic Examination Committee System (EECS) is a software that helps collage management, committee staff, and members efficiently do all examination committee work electronically fast and safe, like add new student, add subject, add degree of each student, find results.   Besides that, the system could compute the annual final results, the average, and the estimation, also it could query for a specified student name, students' degree, final results, and the sequence for passed students. Farther more, the software supported to provide printed reports for first semester result, second semester result, and annual total marks, for all studied subjects of specified stage, with capability of display statistic for the pass ratio, total number of students and the number of passed students of each stages, with printed capabilities. In addition, can be import and export the data to Microsoft Excel tables and more.

I.   INTRODUCTION

In the present day, we are living in technology age that depends mainly on information. In the information domain, there are many types of data characteristic which are sensitive. All organizations are looking for a reliable solution, where its data is maintained safely and is available and easily reached to everybody. For the data storing and sharing requirement, the database turn out to be the best solution. In fact, the database building is a continuation of the human's activities that has been existent meanwhile beginning of writing. The major objective of database application which is store, maintain and management of important information. The systems of database provide best methods of compress big data beside that they simplify communication of stream information [l].

The database system focuses on the data architecture, integration, validation, interaction, and definition [2].

Human Computer Interaction (HCI) is youngest field of computer science [3]. It is the result of mixing of two sciences, which are Cognitive Psychology (CP), and Computer Science (CS). HCI is focus on designing of the system then make evaluation of it and finally implementation, with taking into consideration to make the system simply used by the user. In addition, HCI take cares of information transmission among human and machine, and HCI intended to provide usable, effective, satisfactory and interactive product based on the real user's opinion [4]. In order to design interactive system, the developer must use HCI principles, which are user control, easy to use, intuitive, visibility, consistency and timely response [5].

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It is often the case, where the manual filing system and paperwork requirements of the examination committee needs a great effort and long time to enter data of student's records. Besides that, the effort when perform the necessary calculations to finding successful students, failed students, calculate averages, find sequences of students and results especially the records are usually need to be up-to-date and all this works are rapidly at least once every semester. Therefore, that is advantageous to these departments maintaining their own information records using database systems.

Using EECS system, committee staff and departmental administrators can access records of students and modify it, maintain the student's records thus relieve some of the committee works burden for faculty in our institution.

II. RELATED LITERATURE

The researcher in [6] presented a computer program by using Visual Basic language V.6 for implementing the calculations of the Master sheet, which includes the grads of the student's exams and the total average. The project has been designed without accepting any errors by shutting down the program or by a warning message, also gives an acknowledgement message in case of entering, updating, and deleting the information correctly. While the researcher in [7] presented a software for examination committee work management using Visual FoxPro programming language. The software has the ability to display the students' marks after data insertion. These data are gained from Microsoft Excel tables. In addition, the software could compute the annual total marks, the final marks, the average, and the estimation. Besides it could search the database for a specified student name. The students' marks, the final results, and the sequence and estimation for passed students could be organized as a printing material.

III. SYSTEM DEVELOPMENT

To develop the entire Examination Committee system, an iterative process based on Analysis, Design, Development, Implementation, Evaluation model (ADDIE) are used. Table 1

Table 1. The ADDIE model to the EECS.

	Stages	Steps
A	Analysis	1. analysis the contents of EECS 2. analysis the task of Users 3. EECS job analysis 4. analysis the Resources must provided to system & constraints
D	Design	1. Design System Environment 2. Design Database Architecture 3. Design System GUI 4. Design System Functionalities
D	Development	1. GUI development 2. Databases development 3. Content Management System 4. Security development

E	Evaluation	1. Formative Evaluation
		2. Summative Evaluation
		  a. by User
		  b. by Expert
		3. Subjective Evaluation

I	Implementation	1. Planning user's strategies 2. EECS instructions 3. Creating main users 4. Check Accessing roles 5. Testing all functions of system

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shows steps of ADDIE model, which has been extensively   applied to develop systems in related applications [8, 9, and 10].

In the analysis stage of the EECS, we used qualitative research approach for study the existing manual examination committee work. Besides that, many interviews were conducted with people who work in the examining committee for different departments. Furthermore, examining the current master sheet to collected required data, which is being used to register student marks. Once carrying out all the interviews with related persons, then the thematic approach is used to analyze and interpret the data in order to organize content [11].

The results from these interviews besides current master sheet aided us to draw and identification the system requirements.

As part of the system functionality, the main Examination Committee System interface is containing on six sections, which are subjects, students, degrees, results, reports, and statistic. In main UI, user will be able to access to each parts of system easily.

As portion of design process, a prototype is ready then started to design the database based on Entity Relationship (ER) diagram as shown in Fig. 1 and Table 2 describe the relations types of the database.
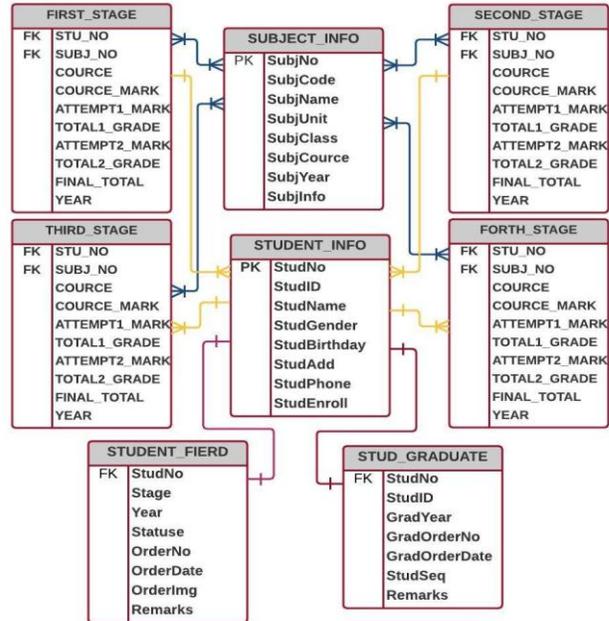
Fig 1. Entity Relationship diagram.

Table 2: The Relation Type of System Database

Table A	Table B	Relation Name	Relation Type
Subject_Info	First_Stage	Subject_First	Many to Many
Subject_Info	Second_Stage	Subject_Second	Many to Many
Subject_Info	Third_Stage	Subject_Third	Many to Many
Subject_Info	Forth_Stage	Subject_Forth	Many to Many
Student_Info	First_Stage	Student_First	One to Many
Student_Info	Second_Stage	Student_Second	One to Many
Student_Info	Third_Stage	Student_Third	One to Many
Student_Info	Forth_Stage	Student_Forth	One to Many
Student_Info	Stud_Graduate	Stud_Grad	One to One
Student_Info	Student _Fired	Stud _Fired	One to One

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After imagining out the database tables, case diagram is used to gain the roles of various users. After that, we began to design the main UI. The design contained a particular descriptive of each function with object diagrams and flowcharts. Taking into consideration design easy-to-use UI screen but difficult to misuse with reduce number of clicks to implement a certain task.

The EECS was developed on VISUAL SUDIO IDE V2013 using C# Language, the database of the system including eight related tables and this database was created by SQL Server. Afterward development the database, we going to build and test the EECS with all its options. Each one of developed task was tested using many valid and invalid data.

IV. SYSTEM DESCRIPTION

EECS was developed to maintaining student's information and their degrees easier. Furthermore, the multiple interface screen provides users with many selectable functions to make user work easy. Through *Subject menu, Student menu and Grades menu* see Fig 3, Fig 5 and Fig 8 sequentially, the user could add, update, delete and display or search on subject, student, grades successively. Additionally, the user could also import data to the system from excel file. Beside that each menu has options related to its work like transfer student screen in student menu which move students to new class automatically after enter grades option is completed and in the grade menu, the subject and student's name are loaded from database as soon as when selected year and course to reduce user exertion and avoid entering unacceptable data. Additionally, provide search capability of specific student when add degree. The *Result menu*, see Fig 13, *i*s responsible on display all degree details of one or two courses that student got during his study in a stage. First attempt, and second attempt submenus are display result of student with the possibility of printing. Also, the system has capability to provide user with necessary list when using *View Lists menu,* see Fig 11, *and Statistic menu,* see Fig 12. Two

more functions of EECS, the most momentous function is print all student details including student information, student degrees and student result of each class on a paper by using *Master sheet menu*, see Fig 14, Furthermore, this system is designed to provide student certificate with marks in two languages, Arabic and English by just one click.

V. SYSTEM SPECIFICATION

A. Authentication and Authorization

To secure access to content on system, authorization in combination with authentication are used. Once the user is identified, an authentication process is invoked to make a grant or deny decision on the access request. The authentication presents a way to distinguish a user, when use a valid user name and password in order access to the system. The process of authentication is based on every user must have a unique log in information to gaining access. If the user enters different credentials, the authentication will fail and access to system will be denied. After authentication process, a user should have authorization for achieve specific tasks. The purpose of authorization determines which resources users can access or cannot. Therefore, that, this system has three authorization levels, administrator, user and gust. Administrator can execute all tasks of system like, add, alter, search and delete data, while user level are having same activity of administrator except the permission of delete data. However, gust level can search or preview data of system only.

B. Register Who Responsible

When user like insert, alter and delete sensitive data takes actions, the user name of this user will be saved in database with time and date of the event occurs to register whom responsible of this action. Thus, the advantage is to make certain the sensitive data will be protected.

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C.   SQL Injection Attack

SQL injection is a kind of attack types where the attacker tries to inserts a malicious SQL query into the program via appending it to the input parameters. The injection occurs when developer use a dynamic query, which it is be concatenated with variables from the user side. Stored procedures consider a best way to prevent SQL injection. Using stored procedures in this system can be supportive to evading SQL injection through determinate kind of statements, which can be passed in to SQL parameters. In addition, parameterized queries also used to make certain the attacker cannot variation the SQL query.

D.   Protecting Data

Make a backup is recommended process for any importance files to a user. It is considered essential to keep a backup of any data. This system has screen to generate backups, hence if data lost can be recovered from another source via restore screen.

E.   Effective Design

The UI has been achieved of our application depending on the existing HCI principles, in order to make UI more beneficial to users. The interface characteristics of this system can be shows as following:

1) The simple interface of system which is axiom but not inflexible.
2) Easy operation.
3) The System meet the user required.
4) Avoid writing too much, to avoid ambiguity>
5) User have the feeling of being serviced.
6) Instant and intimate notice information
7) Comprehensive and effective energy analysis

VI. CONCLUSION

After the development of this system, by a series of running tests and the sample of execution of most important jobs for EECS are shown in appendix, it has included all the system specifications requirements as presented in the analysis step of this paper. All user interfaces are implemented in an attractive user friendly. Implementation of this system very easy to use, efficient and more comprehensive functions. Benefits are providing in EECS will encourage committee staff to take system more seriously the reflect better on committee work and the committee staff will be find that system is very easy to use. On the other hand, by running our system can be reducing the overall system cost. As result, in few words, the whole system is meet all examination committee requirements.

Appendix

In the next section, a preview for most important screen in
the Electronic Examination Committee Management System.

Figure 2: Main Menu of the System.

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Figure 3: New Subject Add Screen.

Figure 6: Student Add Screen.

Figure 4: Subject Add from previous years Screen.

Figure 7: Search On Student Screen.

Figure 5: Student Information Screen.

Figure 8: Degree Add Screen.

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Figure 9: Decision Marks Add Screen.

Figure 11: Lists Screen.

Figure 10: Graduate Student Info Screen.

Figure 12: Statistics Screen.

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نظام اللجنة الامتحانية

طباعة النتائج /كريستال تقرير

جميع الطلاب | طالب واحد | طالب واحد

نتائج المرحلة الاولى
الدور الاول - للفصل الدراسي
الاول و الثاني

| السنة | ٢٠١٣ / ٢٠١٢ |
| اسم الطالب | سارة محمد |

جميع الطلاب

التسلسل	المعدل	النتيجة	العام الدراسي	اسم الطالب
١	٧١	ناجح	٢٠١٣ / ٢٠١٢	سارة محمد

٣ / ٣

الفصل الثاني

التقدير	درجة الاستحقاق %١٠٠	الدرجة النهائية %١٠٠	الامتحان النهائي %٦٠	السعي %٤٠	اسم المادة
جيد جدا	٨٨	٨٨	٥٦	٣٢	التصميم المنطقي
جيد	٧٣	٧٣	٤٠	٣٣	برمجة المواقع الاكترونية
مقبول	٥٨	٥٨	٣١	٢٧	برمجة متقدمة
جيد	٧٠	٧٠	٤٣	٢٧	تفاضل و تكامل (٢)
جيد جدا	٨٤	٨٤	٥١	٣٣	ديمقراطية
متوسط	٦٣	٦٣	٢٦	٢٧	منهج البحث
جيد	٧٤	٧٤	٣٦	٣٨	هياكل متقطعة

الفصل الاول

التقدير	درجة الاستحقاق %١٠٠	الدرجة النهائية %١٠٠	الامتحان النهائي %٦٠	السعي %٤٠	اسم المادة
مقبول	٥٤	٥٤	٢٩	٢٥	اساسيات برمجة
جيد جدا	٨٣	٨٣	٤٩	٣٤	اللغة الانكليزية
امتياز	٩٣	٩٣	٥٦	٣٧	اللغة العربية
جيد	٧٤	٧٤	٤٦	٢٨	تفاضل وتكامل (١)
جيد جدا	٨٠	٨٠	٤٦	٣٤	حقوق الانسان
مقبول	٥٠	٥٠	٢٠	٣٠	مبادئ تركيب الحاسوب
متوسط	٦٦	٦٦	٣٩	٢٧	مهارات الحاسوب

Figure 13: Two Coerces Result Screen.

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طباعة

صورة الطالب	العنوان	تاريخ الميلاد	النسلسل	المعدل العام	جنس الطالب	اسم الطالب	رقم الطالب
لا يوجد صورة	البصرة	٢١/٠٦/٢٠١٦	الثاتي	٦٨,٤٢٨٥	انثى	سارة محمد	٣

مجموع الوثيقة	سنة التخرج	اسم المدرسة	الهاتف	المباشرة	سنة القبول
٦٠٩	٢١/٠٦/٢٠١٣	الإعدادية المركزية		٢٠١٢ / ٢٠١٣	٠١/٠٩/٢٠١٣

المرحلة الأولى

المرحلة	السنة	النتيجة	المعدل	الدور
المرحلة الأولى	٢٠١٢ / ٢٠١٣	ناجح	٦٦,٥١٤	الثاني

الفصل الاول

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٥٢			٥٢	٣٣	١٩	٢	اساسيات برمجة
	٨٨			٨٨	٥٢	٣٦	٢	اللغة الانكليزية
	٧٨			٧٨	٤٦	٣٢	٢	اللغة العربية
	٦٨			٦٨	٤٢	٣٦	٢	تفاضل وتكامل (١)
	٧٧			٧٧	٤٧	٣٠	٢	حقوق الانسان
	٥٠	٥٤	٣٠	٤٤	٢٠	٢٤	٢	مبادى؛ تركيب الحاسوب
	٦٦			٦٦	٣٥	٣١	٢	مهارات الحاسوب

الفصل الثاني

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٧١			٧١	٤٣	٢٨	٣	التصميم المنطقي
	٦٤			٦٤	٣٧	٢٧	٣	برمجة المواقع الالكترونية
قرار	٥٠			٤٨	٢٧	٢١	٣	برمجة متقدمة
	٦١			٦١	٢٥	٣٦	٣	تفاضل و تكامل (٢)
	٧٦			٧٦	٤٥	٣١	٢	ديمقراطية
	٧٠			٧٠	٣٢	٢٨	٢	منهج البحث
	٧٩			٧٩	٤٥	٢٤	٣	هياكل متقطعة

المرحلة الثانية

المرحلة	السنة	النتيجة	المعدل	الدور
المرحلة الثانية	٢٠١٣ / ٢٠١٤	ناجح	٦٠,٩٧١	الثاني

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الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٥٧			٥٧	٣٢	٢٥	٣	ماتلاب
	٥٠	٥١	٢٩	٤٧	٢٥	٢٢	٢	مبادى؛ الاحصاء و الاحتما...
	٦٥			٦٥	٣٧	٢٨	٢	مبادى؛ الادارة
	٨١			٨١	٤٩	٣٢	٢	نظم و تكنلوجيا المعلومات
	٦٠			٦٠	٢٤	٣٦	٢	نظم وسائط متعددة
	٥٣			٥٢	٣٠	٢٣	٢	هياكل البيانات والخوارزم...

الفصل الثاني

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٦١			٦١	٤٤	١٧	٣	البرمجة الكيانية (جاف)
	٦٣			٦٣	٣٩	٢٤	٣	النظرية الاحتسابية
	٥٤			٥٤	٣٢	٢٢	٢	تحليل عددي
	٦١			٦١	٣٧	٢٤	٢	تحليل وتصميم النظم
	٦٨			٦٨	٣٩	٢٩	٣	رياضيات حاسوبية
	٦٠			٦٠	٤٠	٢٠	٢	معالجات مايكروية

المرحلة الثالثة

المرحلة	السنة	النتيجة	المعدل	الدور
المرحلة الثالثة	٢٠١٤ / ٢٠١٥	ناجح	٧٣,٩٤٣	الأول

الفصل الاول

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
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	٧٧			٧٧	٤٠	٣٧	٢	الرسوم بالحاسوب
	٥٥			٥٥	٢٥	٢٠	٢	بناء المترجمات
	٧٧			٧٧	٣٧	٢٠	٢	قواعد البيانات وادارتها
	٨٩			٨٩	٥٩	٣٠	٢	معمارية الحاسوب
	٨٢			٨٢	٥١	٣١	٢	نمذجة ومحاكاة

الفصل الثاني

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٧١			٧١	٤٥	٢٨	٣	اتصالات وشبكات الحاسو...
	٧٦			٧٦	٤٤	٣٢	٣	تصميم وتحليل الخوارزميات
	٧٧			٧٧	٤٨	٢٩	٣	تفاعل الانسان مع الحا...
	٨٢			٨٢	٥٠	٢٧	٢	فلسفة علم
	٦٩			٦٩	٤٢	٢٧	٢	قواعد البيانات المتقدمة
	٧٤			٧٤	٣٧	٣٧	٣	نظرية الاعداد

المرحلة الرابعة

المرحلة	السنة	النتيجة	المعدل	الدور
المرحلة الرابعة	٢٠١٥ / ٢٠١٦	ناجح	٦٨,٥	الأول

الفصل الاول

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٥٤			٥٤	٢٤	٢٠	٢	امنية البيانات والشبكات
	٦٩			٦٩	٤١	٢٨	٢	خوارزميات جينية
	٦٨			٦٨	٣٨	٣٠	٢	مبادى؛ معالجة الصور
	٧٠			٧٠	٤٥	٢٥	٢	مبادى؛ نظم التشغيل
	٦١			٦١	٣٩	٢٢	٣	مبادى؛ هندسة البرمجيات

الفصل الثاني

الملاحظات	درجة الاستحقاق	مجموع دور ثاني	الدور الثاني	مجموع دور اول	الدور الاول	درجة السعي	عدد الوحدات	اسم المادة
	٧١			٧١	٤٤	٢٧	٣	الشبكات العصبية
	٦٥			٦٥	٢٥	٢٠	٢	مشروع التخرج
	٦٩			٦٩	٤٠	٢٩	٢	نظرية المعلومات
	٨٢			٨٢	٥٤	٢٩	٢	نظم وتشغيل المتقدمة
	٧٥			٧٥	٣٩	٣٦	٢	هندسة برمجيات متقدمة

Figure 14: Master Sheet Screen.

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تصميم وتنفيذ نظام الكتروني امن وتفاعلي لإدارة اعمال اللجنة الامتحانية

محمد أكثم احمد

جامعة تكريت / كلية علوم الحاسوب والرياضيات / قسم علوم الحاسوب

المستخلص :

تلعب اليوم انظمة قواعد البيانات دورا مهما في جميع مجالات حياة الانسان، حيث غالبا ما يتم استخدام انظمة قواعد البيانات في كل حقل او مجال معروف وذلك بسبب قلة تكلفة التنفيذ والادارة. ان النظام المقترح في هذا البحث يستخدم لإدارة عمل اللجنة الامتحانية. ان نظام اللجنة الامتحانية الالكتروني هو عبارة عن برنامج يساعد أعضاء اللجنة الامتحانية بإنجاز جميع الوظائف المناطة باللجنة الامتحانية بصورة الكترونية بسرعة وامان وهذه الاعمال مثل اضافة طالب جديد، اضافة درس، اضافة درجة كل طالب وايجاد النتائج. بالإضافة الى ذلك حساب النتائج السنوية، المعدل والتقديرات بالإضافة الى امكانية البحث عن طالب معين، درجة طالب وتسلسل الطالب الناجح. اضافة الى ذلك الى وجود امكانية طباعة التقارير الخاصة بكل فصل دراسي وطباعة الدرجات النهائية لكل طالب في كل مرحلة وكذلك عرض الاحصائيات الخاصة بنسب النجاح، عدد الطلبة، عدد الطلبة الناجحون في كل مرحلة مع الاخذ بالاعتبار توفر امكانية استيراد البيانات وتصديرها من والى جداول ملف اكسل.