Developing a comprehensive online examination system for Institute of Health Sciences

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Abstract :   The online education and online examination system processes have been successfully supported by the modern technologies for many years to became part of innovation. However, the predictable manual system of writing examinations still used by many colleges and schools mostly public institutions. This manual system of writing examination has a lot of demerits. The manual process of taking examinations is not only time-consuming and boring, but unwieldy, hence the need for a better, faster and more reliable means of examining students. The objective of this paper is to provide a report on the implementation of a web-based examination system for Institute. The implemented system was modeled using Unified Modeling Language (UML) diagrams such as Use Case diagram and Activity diagrams. The system was developed using ASP.Net and Hypertext Markup Language (HTML), ASP.Net and C-sharp as front end, Internet Information Services (IIS) as middle ware and Microsoft SQL Server as database. With the online examination system, the process of conducting examinations and processing results is made ease. More so, there is a reasonable level of security and integrity on the conduct of examination.

Keywords - **Online examination system, web system, ASP.net, database, result**

I. INTRODUCTION

Examination is the traditional method for determining the knowledge level, skill, physical and fitness of people. Shen emphasized that examinations measure the educational level as well as societal needs and objectives [1]. Paper and pens examination, presentations and assignments are some of the examination methods have been used in higher education sector as mentioned [2]. These days, internal assessment, assignment and project which given and assessed by teacher are often more emphasis. The (ICT) Information and Communication Technologies quick advancement has affects a lot in shifting the learning, teaching and testing processes from the traditional way paper based to computer based.

Online education and with help of network database and internet development, has become an important process in distribution, innovation and application the knowledge. Therefore, modern education fields have been seeking for making examination more efficient, justice and convenient. However, the predictable manual system of writing examinations still used by many colleges and schools mostly public institutions. It has various issues such as time consuming, uninteresting, ineffective and heavy according to [3]. Developing a paperless or (OES) Online Examination System can be one of effective solutions. Educational institutes and system users can benefit from OES where it provides exams, student and teacher data, answers and test result. The user is given the exam with specific period to answer all the questions. The answers are evaluated via automated process and then the result is shown to the test taker.

 OES has been conducted successfully worldwide by many firms. However, as many educational sectors, Institute of Health Sciences (IHS) staff are still using the manual system of writing examinations. In this paper, the researcher will study the chance of developing a comprehensive online examination system to enhance the educational processes, facilitate staff daily operations and reduce the drawbacks of current system in that area. This paper provides understanding into developing an Online examination system. The rest of the paper is structured as follows. Section II discusses the literature review related to the topic. Section III focuses on a background about the Institute of Health Sciences. Section IV describes the problem definition. Section V presents the architecture of an online examination system. Section VI explains the system implementation. And the last section VII is a conclusion and References.

II. LITERATURE REVIEW

OES) Online Exam System consider as the software solutions which used for creating and assessing examinations purpose and it also called as Computer Based Test (CBT). It a powerful management system which provide innovation assessment and process for any industry to arrange, conduct and manage tests via Internet, Intranet and LAN (Local Area Network) environments [14] as well as high rate of powerful reporting, scorning and real time feedback [16] Due to the online examination system features such as easy to use, forms and time intensive and other structures, it can improve the student's examination standard compared to paper based which requires more efforts from both teachers and students as mentioned by [17] Therefore, it considers as an essential source of examination for universities and colleges because of the network technologies development [3].

Sincero has emphasized that the primary inspiration for implementation the online examination system was to eliminate high costs of grading course works and exams in large class [18]. Parakash have underlined that computerized examination system for mass education consider as an effective solution with estimation and evaluation [19]. Computerized examination system has many advantages compared with manual system such as: time saving, accurate, handle cheating, saving cost and effort, decrease overhead, efficient, reduces the needed resources, scenario based, permits neat handling for the data, using microphone and webcam, continuous monitoring, automated recruitment and tracking activity[19].

Even though online examination system or having exams on have provides many benefits for students and teachers but we cannot have said that this method is totally better than Paper Based system. Secure CBT in educational filed has been addressed as a hot topic in the last decade. In fact, online examination system faces many issues and challenges where be talked about in many studies such as security, human interference, insufficient training for staff and students and hardware and software complexity and issues.

According to Khoshsima plagiarism risk in online tests, lack of IT experience and skills among staff and students, the high level request form organization parties such as academic staff, support, administration and computer services, staff involvement, the need for training, exams management, devices and technical concerns, instructor absence, limited access to computers, instability of internet connection and instability of technical equipment are the most popular disadvantages of CPT [16]. While Bennett has emphasized that computer screen sizes, screen resolution, screen brightness, computer graphics quality are other challenges of CPT may pose drawbacks for the test taker [21].

A set of features have been presented in the existing online examination systems. These features are essential to make each online examination system functionalities meet its requirements and serve their determinations [14]. They can be organized in the following subcategories which are: secure login, resumption capability, Multi instructor, combination of randomization and portability.

Switching process from paper based to completely computerized systems is not without drawbacks. Therefore, many online systems have been developed recently for solving these problems as well as judging the desired features. Table 1. Shows a comparison among some of existing online examination systems features.

#	Authors	Year	Online Examination Systems	Different Features							Type
				Secure Login	Resumption	Portability	Multi-Instructor	Random Question Selection	Random Questions Distribution	Random Choices Distribution	
1	Guzman, E. & Conejo, R.	2005	SIETTE [4]	✓	✗	✓	✗	✗	✗	✗	Web Based
2	USKOV, D., & HENKE, K.	2007	WETAS [5]	✓	✗	✓	✗	✓	✗	✗	Web Based
3	Rashad, M.Z., & Kandil, M.	2010	EMS [6]	✓	✗	✓	✓	✗	✗	✗	Web Based
4	Vasupongayya, S., Kamolphiwong, T.	2010	iEMS [7]	✓	✗	✓	✓	✗	✓	✓	Application Based
5	Sheshadri, R. , Reddy, & kumar, N.	2011	WONES [8]	✓	✗	✓	✓	✗	✓	✗	Hybrid
6	Raj, P., Kumar, P. & Sengupta, S.	2012	NOES [9]	✓	✗	✓	✓	✗	✗	✗	Hybrid
7	Satav, H., Nanekar	2012	SBPES [10]	✓	✗	✓	✓	✗	✗	✗	Hybrid
8	Islam, Z., Rahman, M. and Islam, K.	2013	OESBC [11]	✓	✗	✓	✓	✓	✗	✗	Web Based
9	Fagbola,T. , Adigun, A. & Oke, A. O.	2013	CBTS [12]	✓	✗	✗	✓	✗	✗	✗	Hybrid
10	Younis, M. & Hussein, M.	2015	OLES[13]	✓	✓	✓	✓	✓	✓	✓	Application Based

Table 1. Comparison of existing Online Examination Systems (Researcher, 2018)

III. INSTITUTE OF HEALTH SCIENCES

Several academical institutes are running by (MOH) Ministry of Health in Oman. Recently, there are around 14 training centers/institutes located across the sultanate. The MOH educational institutes are committed to produce reflective Omani health care professionals who are able to provide safe, effective, competent and culturally relevant care to the community. The faculty of these institutes believe that supporting students to learn and succeed depends on inherited professional values, and an educational environment that raises professionalism, innovation, active learning, caring and guided with the principles of quality and improvement.

The Institute of Health Sciences (IHS) is the oldest health institute, established by the Ministry of Health in 1982. It currently offers bachelor's degree programs in 4 allied health professions: Medical Lab Sciences, Medical Imaging, Physiotherapy and Oral Health. Presently, total number of students is around 450 while total number of employees is 70. IHS academic staff are professional educational providers. One of problems they faced is suffering from heavy workload and staff shortage. Information, people and processes can be integrated across the institute by using modern technologies to enable them achieving their work effectively and reducing the workload.

IV. PROBLEM DEFINITION

As many educational sectors, Institute of Health Sciences (IHS) staff are still using the manual or paper based system of writing examinations. Time consuming, need for many observers, difficult to analyzing tests manually, errors in results calculation and losing or manipulation in exam marks are some of the drawbacks faced by this traditional method. By the help of IT development, above issues can be overcome by implementing an (OES) Online Examination System. It is an effective solution for providing exams via internet or intranet in modern way with many benefits for both teachers and students. It has mainly students, test and admin modules. Saving time, reducing efforts, autograding, shown results after the test, time limit, avoiding human errors and mistakes, random questions, authentication and neat handling of data are set of essential features can be provided by OES.

V. ARCHITECTURE OF AN ONLINE EXAMINATION SYSTEM

A layered architectural model has been used to design most of the online examination systems [20]. Presentation layer, Core layer, Server layer and Storage or database layer are the main components of this model. Various ranges of devices such as laptops, desktop machines, mobile devices, tablets and smart phones which can be access the system via the internet are presented on the Presentation layer. The second tier, Core modules which is the middleware of the system and it contains the main modules as per the user request. In some systems, administrator, department and student's parts are consider as the main modules. Server layer is referring to deployment tire of the system where it can be web application or other type. The most popular server which has been used in such implementation is the Apache web server. The repository of required data, questions, computing results and authentication modules such as username and password are existing in the storage or database layer using (RDMS) Relational Database Management System.
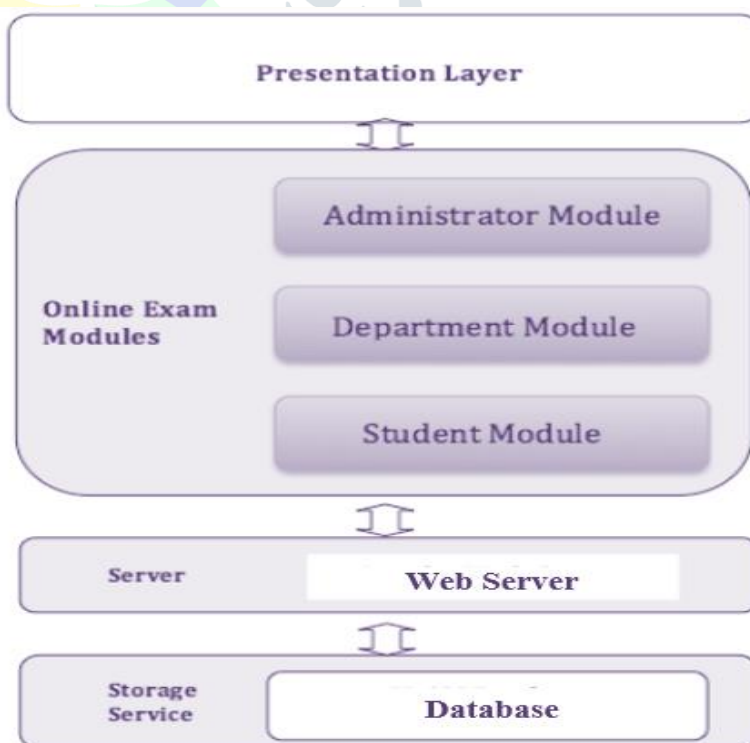

Figure1. OESs Architecture [4]

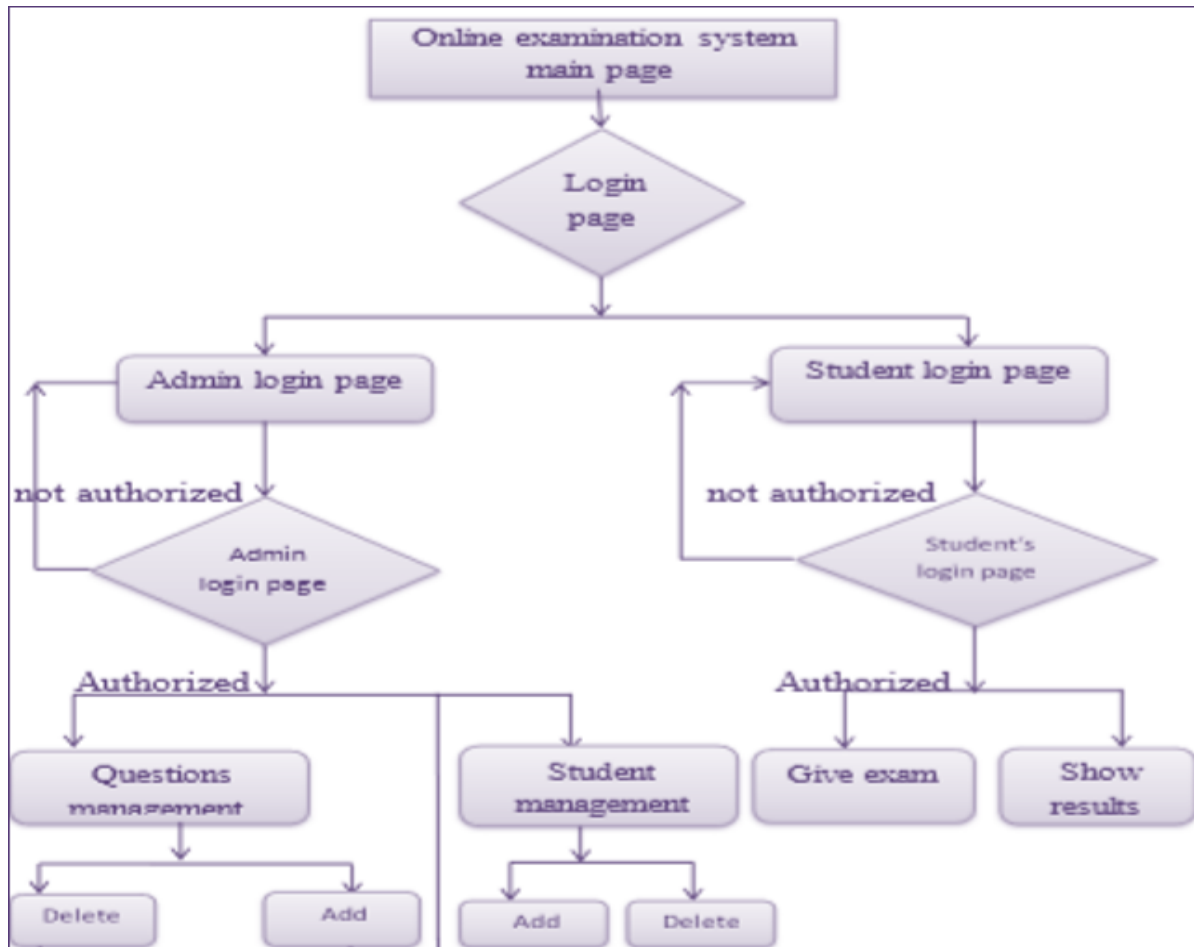## VI. SYSTEM IMPLEMENTATION

Figure2. General diagram

Home page:

The system home page contains many parts as follows:

1. System name and logo.
2. Main menu which includes: Registration / Login section, Practice section. Exam section and rules.
3. Different programs information.
4. Syllabus details
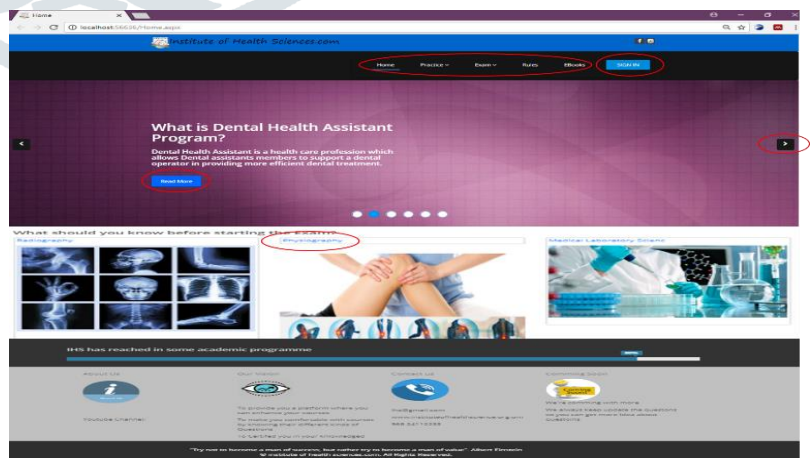5. Others such a: About us, contact us, vision, and coming soon.

Figure3. Home page

• Sign up and sign in pages

For accessing the system, the user either sign up or sign in.

1. In case the user is entering for the first time, He/She will be direct to registration page to sign up where the following details required to be filled which are: Full name, Email id, Mobile number and Password.
2. In case the user is resisted on the system , He/She will be direct to the login page where only the Email id and password details are required to access.
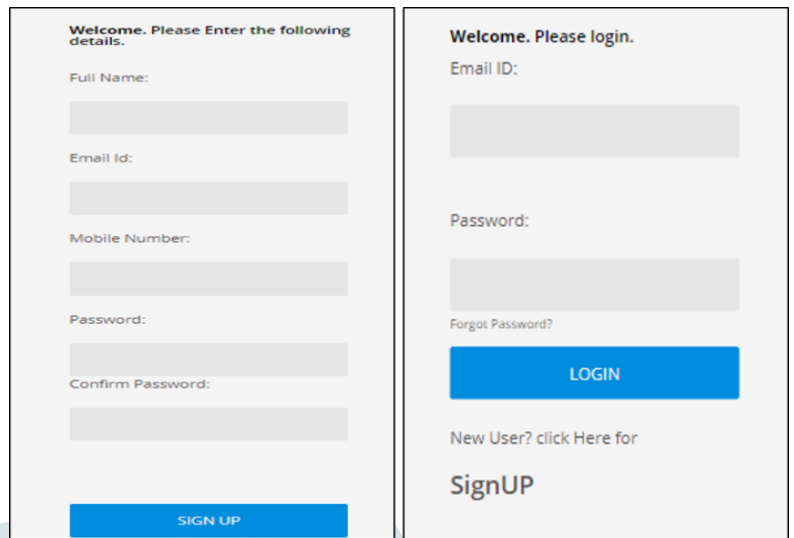3. Both pages are containing a forgot password part.

Figure4. Registration and login pages

•Exam page

After successful login to the system, the user has the chance to exercise many times by clinking the practice section as well as have the ability to take the exam by clinking the exam section and then he/she can choose the desire course in the home page. In practice and exam pages, the user is recommended to have a look on the rules before starting the practice or the exam. After finishing the practice or the exam immediately, the user can view the test result with the correction. Unlike the practice, the user is given limited time to finish the exam. If the student answer 12 correct answers or more, he/she will allow to get a certificate. Otherwise, he/she can only view the result.
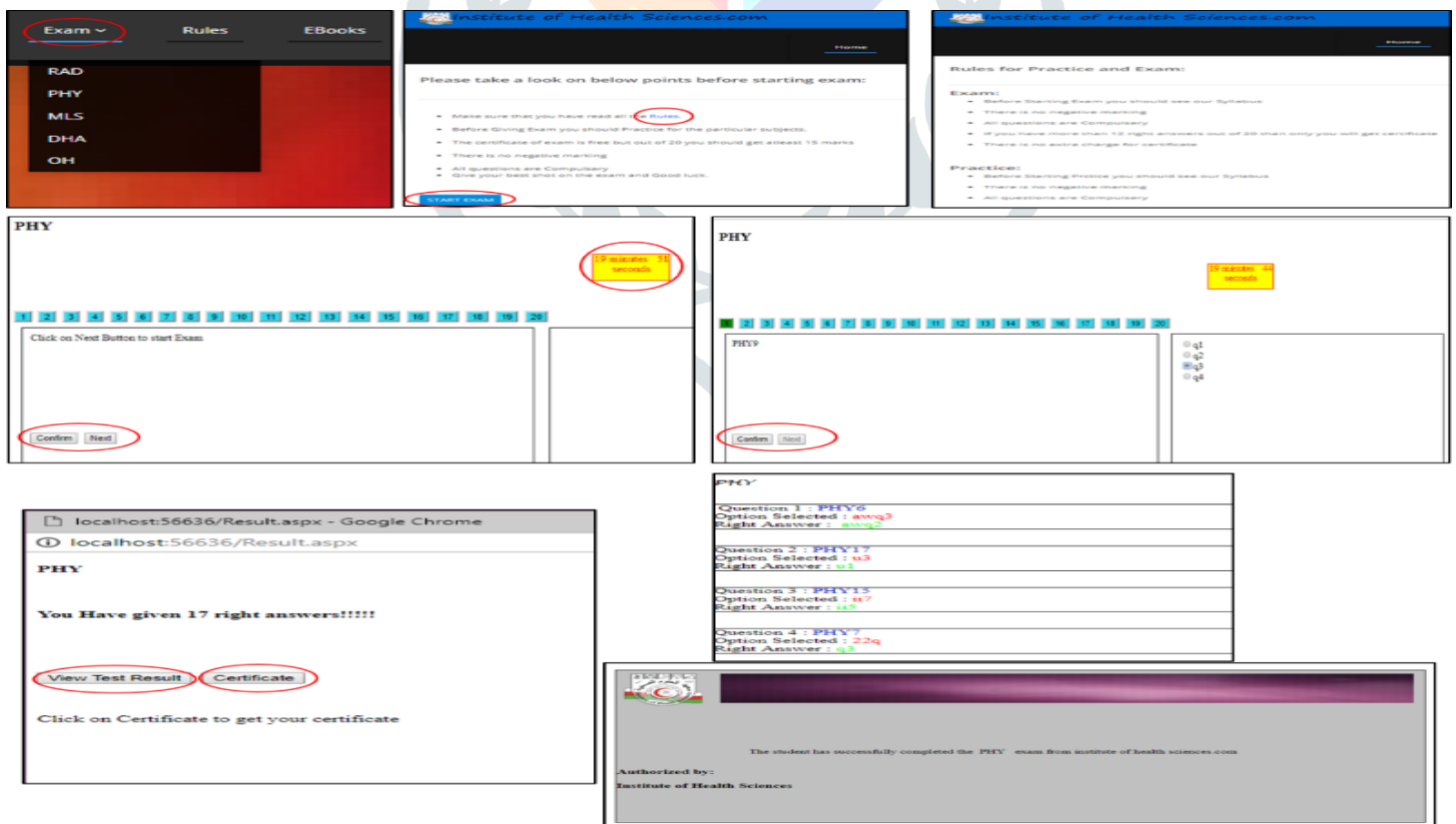

Figure5. Exam process pages

VII. Conclusions

In this paper has been reported an online examination web system for Institute of Health Sciences. This system is an innovation and it provides the facility and students conducting the online examination worldwide. Universities, government and non-government organizations may take the advantages of this system. It will boot transparency of the examinations, reduce the risk of leakage of examination questions due to control of only the admin, and provide opportunity for publishing results immediately after the examinations. Apart from these facilities, large number of participants may sit for the examination from different geographical locations. It will save their time and money. However, ensuring security of the online question bank still remains a challenge for the admin of the system.

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