System for Archiving and backup data A case study in the General Directorate of Education in Thi Qar province

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نظام الأرشفة والنسخ الاحتياطي للبيانات دراسة حالة في المديرية العامة للتربية في محافظة ذي قار

الخلاصة :

في العقود الأخيرة ، شهد العالم تسارعًا في تطوير تكنولوجيا المعلومات وقد استند سبب الانتشار السريع ولا يزال الى عاملين: الأول هو التكلفة المنخفضة نسبيا لامتلاك المعدات وسرعة ايصال البيانات ؛ العامل الثاني هو اعتماد معظم الشركات والمؤسسات الحكومية على التكنولوجيا لتسهيل أعمالها. إن نقص الطاقة الكهربائية في العراق يقلل من أهمية تكنولوجيا المعلومات ويجعلها عبئا أكثر من كونها مفيدة. هذا البحث طور نظام قاعدة بيانات للمستندات في مديرية التربية بمحافظة ذي قار لأرشفة الوثائق وربط عدة وحدات إدارية خارج المديرية لاسلكيا و بناء ذاكرة داخلية لتخزين البيانات في حالة انقطاع التيار الكهربائي عن الخادم المركزي الموجود في المديرية لتخزين وإرسال البيانات المخزنة بعد الاتصال مرة أخرى إلى الخادم حيث لن يكون هناك هدر للبيانات و جهد الموظفين باستعمال لغة برمجية السي شارب في بيئة الدوت نت في إدخال البيانات الاسكيوال سيرفر كقواعد بيانات. لتقييم البحث، تم استعمال الاستبانة (SUS) لتقييم النموذج الاولي وكانت العينة من موظفي مديرية التعليم في ذي قار. برنامج الإحصاء (SPSS) استعمل لتحليل الاستبانة وكانت النتيجة إيجابية .

ABSTRACT

In recent decades, the world has witnessed acceleration in the development of information technology. The reason for the rapid spread has been based and is still dependent on two factors: firstly the relatively low cost of owning the equipment and the speed of delivery of the information; the third factor is the adoption of most of the companies and governmental institutions on the technology to facilitate their business. The lack of electricity in Iraq eliminates the importance of information technology and makes it a burden rather than a useful one. This research developed a database system for documents in Thi Qar Education Directorate to archive documents from several administrative units outside the Directorate by building an internal memory to store data in the event of power outages from the central server located in the Directorate using the Visual Studio Net , CSharp as programming language and the SQL server to store and send Stored data after the connection back to server. There will not be waste of data and then no lose of the effort of employees in data entry. To evaluate the research, the questionnaire (SUS) was used to assess the prototype and the sample was from Thi Qar's education Directorate staff. Statistical program (SPSS) used for the analysis of the questionnaire and the result was positive.

Keywords: archive, database system, System Usability Scale, electricity

1. INTRODUCTION

IT is the area of managing technology and spans wide variety of areas that include but are not limited to things such as programming languages, computer software, computer hardware, information systems, processes, and data constructs. In short, anything that convert data, perceived knowledge or information via any multimedia distribution mechanism in any visual format, is considered part of the domain space known as Information Technology (IT) [1]. Moreover, the need to strengthen using of computerized management information systems in all its elements and components of being a substantial variable which contributes to the influence on performance development and an outcome for that improves the economy [2]. According to [3] the Database management system (DBMS) is the most important tool developed to render multiple users in a database environment composed of programs that enable users to maintain and create a database.

1.1 Problem

The electricity use and access are strongly correlated with economic development, however electricity Supply is important for economic growth[4]. Based on above and orientations of Iraqi government after 2003 using E-government and computerizing the documents related to Iraqi citizen and employees in all institutions but beside that there is an obstacle is so common in Iraq it is the electricity shutdown especially in summer. In addition the General Directorate for education of Thiqar has a standalone program (Microsoft Access 2007) for archiving the documents in General Directorate for education of Thiqar with small storage. Moreover, the archiving done in separate way each department

Figure 1: Electronic Archiving system in General Directorate for education of Thiqar

1.2 Research Objectives

1- To identify the requirements to a database management system for General Directorate for education of Thiqar (GDET)

2- To develop a database management system for General Directorate for education of Thiqar (GDET) using Visual Studio.net 2012, C Sharp as programming language and SQL Server 2012

3- To test and evaluate the performance of system prototype for General Directorate for education of Thiqar (GDET), using questionnaire.

1.3 Research Scope

The scope is connecting The General Directorate for education of Thiqar and Nassiriyah department with wireless network PTP(peer-to-peer) using advanced program to improve the document management .Moreover, Programming internal database to store data in case losing the connection with the server then sending stored data when the connection returns.

As a result of this study can extract the data in fast, more accuracy and more control on data. In addition, save the time and effort of data entry employees.

2. LITERATURE REVIEW

2.1 Information Technology (IT)

Information technology is beginning to spread farther than network technology and the conventional personal computer, and more into integrations of other technologies such as the use of automobiles, televisions, cell phones, and more, which raise the demand for such jobs [1].IT professionals carry out a variety of functions from installing applications to designing information databases and complex computer networks.

Awareness of benefit of human resource management in the area of information technology and itsprojects management is one of the most important columns in management and ignoring it causes failure of information technology projects [5].

2.2 Human resources Information system

Human resources represent a driving force and a key success factor of an organization in the 21st century that faces the phenomenon of rapid information technology expansion. The ability of an organization to follow trends, engineer major human resource activities, and accept the new methods of business performance supported by modern technologies, depends largely on effective management of human resources [6].

According to [2] the need to support the use of computerized management information systems in all its elements and components of being a valuable variable which contributes to impact on performance development. Ministry of education and the Iraq government push to Automate and computerizing the human resource (HR). This research aims to add a contribution to computerize

the human resource in different units of General Directorate for education of Thiqar .

2.3 Wireless technology

Wireless technology describeswireless devices that communicate with radio frequency signals. Wireless technology is used in a set of modern devices to provide mobility and comfort. Wireless peripherals play a valuable role in Internet and voice communications. There are many devices used for wireless communication, such as GPS, satellite TV, ZigBee Wireless technology, cell phones, Wi-Fi, Wireless phones and wireless equipment. Current wireless phones include Bluetooth, 3G and 4G networks, and Wi-Fi technology.

By using wireless technology connect the two buildings The General Directorate for education of Thiqar and Nassiriyah department with wireless network PTP (peer-to-peer) by NanoStation devices.

Figure 2**: PTP (peer-to-peer) network**

Creating a Transparent Wireless Bridge for Nanostation and setting up the networks by Giving the both network a static IPs and setting up SQL Server configuration manager to enable TCP/IP for SQL Server with port (1433) and reserve the static IP for SQL Server computer in router in forwarding section. In this setting can access to SQL Server from any computer in the network.

2.4 Electricity Problem in Iraq

Electricity is one of the top inventions in our lives. Anything and everything that we see runs on one or the other form of electricity [4]. Moreover, the electricity is the significant factor to support development, electricity inIraq is still non-reliable. Iraqi household receive a daily average of less than tenhours of electricity from the national grid [7]. According tothe Ministry of Electricity,"

 Iraq is only generating 8,000 of the 13-15,000 megawattsof power currently required to meet Iraqi needs today" [8].Iraq needs toextend the power plants as well as improving the transmission units.

With the non-reliable power supply and very hot summer temperatures exceeding45°C Iraqis have to pay to get extra electricity generated by small private dieselgenerators placed in the neighborhood [9].
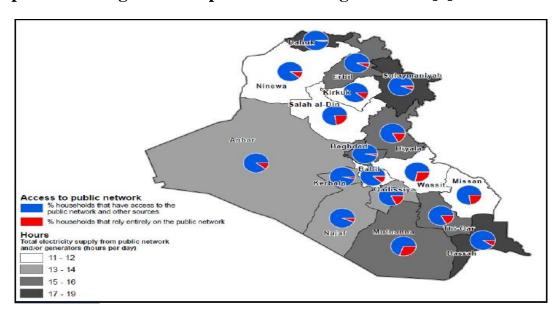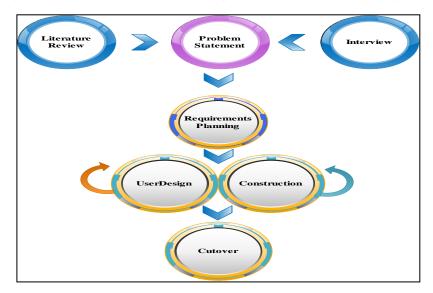

Figure 3**: Access to private and public electricity in different Iraq provinces [8].**

Research Methodology

This study used the rapid application development (RAD) as methodology. According to [13] the most successfuland revolutionary change in IT business practices today is the RAD. The RAD shows important advantage over other methodologies. The project is started as early as possible The fundamental principle of RAD is one of these advantages, project is started as early as possible, and the prototype can be modified after evaluation [10]. According to [11] "The RAD is a Lifecycle design development to give a development that is much faster and results of higher-quality than those achieved through the traditional Lifecycle."
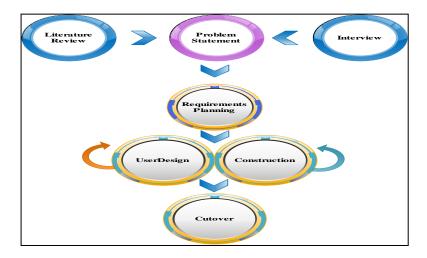
Figure 4: *Rapid Application Development (RAD)*

In general, the RAD development life cycle allows software to be written much faster, and requirements in turn can be changed much easier. RAD consists of four phases: i) requirement planning phase, ii) user design phase, iii) construction phase, and iv) cutover phase.

3.1 Requirements planning phase

In this phase researcher conducted interviews with human resources, Information Bank and Computer department employees in General Directorate for education of Thiqar to identify the requirements of system functions then starting design the software.

The main steps for interviews are:
  i. **Choosing the interviewees.**
  ii. **Formulating the question for interview.**
  iii. **Conducting the interviews.**

In addition to interviews the research depend on literature review to gather the requirements of design. The questions have been typed in Arabic language in interviews.

3.2 User design phase

The data entry will interact with system analysis. According to the requirements that obtained by the researcher in planning phase from the interviews with human resources, Information Bank and Computer department employees in General Directorate for education of Thiqar and literature review, this phase will shows the experimental design of the system using UML. Use case diagram have actor and use case, in this study have two actors and use case depend on.

The first actor is General Directorate for education of Thiqar can do many functions (log in, save, delete and search) and the second actor do what the GDET do and addition to that refresh the grid view in case the connection to server is interrupt, sending the data that saved in internal database to server when the connection to server return in.
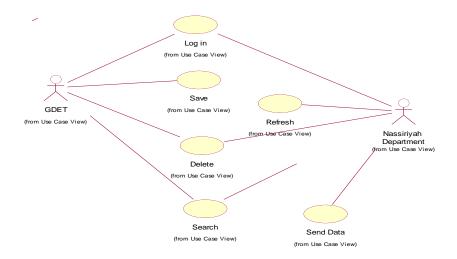
Figure 5: UML Diagram (Use Case)

3.3 Construction phase

This phase focuses on programming and development the application side. The visual studio 2012 was used in this study to develop a prototype of archiving system. Using C Sharp as programming language to design the class with forms instead of the ASP.net for interfaces because in ASP.NET the client need to connect to server first then the server send the ASP page and when the server disconnect there is no interface to enter the data for the database . SQL Server as a database of the prototype.

Figure 6: Archiving System interface

By the sending function the user can copy the data from the internal database to server database.

```
Private void Send_Click(object sender, EventArgs e)        {
// create server connection
```

```
SqlConnection server = new SqlConnection (@"Server=192.168.1.3, 1433; Initial
Catalog=SADER_WARED; Integrated Security=false; User ID=sa; Password=123");
 // create client connection
 SqlConnection client = new SqlConnection (@"Server=M-PC; Initial
Catalog=SADER_WARED; Integrated Security=false; User ID=zain;
Password=123");

            // Open clients and server connections.
            Client. Open ();
            Server. Open ();
            // Select data from sader1 table
            cmd = new SqlCommand ("SELECT * FROM Sader1", client);
            // execute reader
            SqlDataReader reader1 = cmd.ExecuteReader ();
            // Create SqlBulkCopy
            SqlBulkCopy bulkData1 = new SqlBulkCopy (server);
            // Set server table name
            bulkData1.DestinationTableName = "Sader1";
            // Write data
            bulkData1.WriteToServer (reader);
            // Close objects
            bulkData1.Close ();
            Server. Close ();
            Client. Close ();
            MessageBox.Show ("Data sent ,successfully");
                                Send data function
```

3.4 Cutover phase

This phase is the final phase of testing and developing the system prototype. Moreover, this phase determine and evaluate the uses and the operability of the system prototype. The evaluation has done through a questionnaire .The testing will follow System Usability Scale (SUS) proposed by Brooke [12]. In addition, the (SUS) questionnaire has twelve questions to assess the Archiving prototype.

Likert scale format is used to answer the questions and consisting of five degrees as follows: 1 = (Strongly Disagree), 2 = (Disagree), 3 = (Natural), 4 = (Agree), 5 = (Strongly Agree). The questionnaire consists of 12 questions reflects the conviction of the participantand answered by ticking the box that as shows in theAppendix. All questions were extracted from previousstudies in the same subject related to this study.

A sample of 36 participants was selected to measure the ease of use and satisfaction of System prototype. The satisfaction and ease of use is the aim of evaluation, as well as, the operability of the prototype. 36 questionnaires were distributed to with human resources, Information Bank and Computer department employees in General Directorate for education of Thiqar; however, 36 copies were collected back from respondents. The questions have been typed in Arabic language

to questionnaire. SPSS version 17 is used in this research for analyzing the results of the questionnaire.

The questionnaire have twodimensions, usefulness and easy to use with mean (4.1528), (4.4074)respectively, which thatmean the mean of eachdimensions is above 4, Table 1 illustratesthe mean for every questions.

Table 1: **Statics for all questions**

	Perceived Usefulness	Mean
Q1	Using EA helps me to be more effective	4.3056
Q2	Using EA helps me to be more productive.	3.8056
Q3	Using EA saves my time when I use it	4.3611
Q4	Using EA would enhance my effectiveness	4.2222
Q5	Using EA would make it easier to do my tasks	4.0833
Q6	EA was everything I would expect it to do.	4.1389
	Perceived Ease of Use	
Q7	EA is simple to use.	4.2500
Q8	EA is very friendly to use	4.3611
Q9	It requires the fewest steps possible to accomplish what I want to do with it	4.6389
Q10	I can use it without written instructions	4.2500
Q11	I don't notice any inconsistencies as I use EA	4.2222
Q12	I can use EA successfully every time.	4.7222

4. CONCLUSION

4.1 Discussion

The purpose of this study is developing an electronic archiving system for General Directorate for education of Thiqar (GDET) to unite all data from different units belongs to (GDET). Connecting the Nassiriyah Department with (GDET) by wireless using NanoStation (peer to peer).in addition, The Manager of human resources can manage and monitor all documents inbound or outbound. Besides that, the citizens can check his documents in any department to save time and effort

Objective1: **the requirements of electronic archiving prototype identified by literature review and interviewing with employees of bank information, human resources and computer department. The requirements as follows : the data entry can search for document by issued number , can add**

,update and delete document .the data entry in any department can save the data in internal database if the connection to server interrupted and send the data when the connection returns.

Objective2: **electronic archiving prototype was developing based on the requirements from first objective. Designing the prototype using UML diagram then determine the functions and programming the prototype by visual studio .Net 2012. C sharp as programming language with SQL Server 2012 express as database in server and clients.**

Objective3: **the performance of system prototype for General Directorate for education of Thiqar (GDET) evaluated and tested by System Usability Scale (SUS) proposed by Brooke [12]. The (SUS) questionnaire has twelve questions to assess the Archiving prototype. The questionnaire have twodimensions, usefulness and easy to use with mean (4.1528), (4.4074)respectively, which tha tmean the evaluation is positive.**

The future works will be connecting the all units belongs to (GDET) in all district by using wireless connection to monitor and control all documents.

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APPENDIX
QUESTIONNAIRE

System to Be Evaluated:
Electronic Archiving System (EA) for General Directorate of Education in Thi Qar province

Objective:
   Obtain your view on the evaluation of EA.
Please answer **all** questions from each segment.

1) General Information
   This segment is about your background information. Please fill up the blanks and mark [√] where appropriate.
   1. Gender: [ ] Male   [ ] Female
   2. Age: [ ] 25-29 years   [ ] 30-39 years   [ ] 40-49 years
   3. Occupation   _____

2) Electronic Arching System (EA)
Please rate the usefulness and ease of use of Electronic Arching System (EA) for General Directorate of Education in Thi Qar province
The scale consisting from one to five degrees:
   1. Strongly disagree
   2. Disagree
   3. Natural
   4. Agree
   5. Strongly agree

English Form

	PERCEIVED USEFULNESS	1	2	3	4	5
Q1	Using EA helps me to be more effective	O	O	O	O	O
Q2	Using EA helps me to be more productive.	O	O	O	O	O
Q3	Using EA saves my time when I use it	O	O	O	O	O
Q4	Using EA would enhance my effectiveness	O	O	O	O	O
Q5	Using EA would make it easier to do my tasks	O	O	O	O	O
Q6	EA was everything I would expect it to do.	O	O	O	O	O
	PERCEIVED EASE OF USE	1	2	3	4	5

Q7	EA is simple to use.	O	O	O	O	O
Q8	EA is very friendly to use	O	O	O	O	O
Q9	It requires the fewest steps possible to accomplish what I want to do with it	O	O	O	O	O
Q10	I can use it without written instructions	O	O	O	O	O
Q11	I don't notice any inconsistencies as I use EA	O	O	O	O	O
Q12	I can use EA successfully every time.	O	O	O	O	O