

**BUILDING THE ELECTRONIC DOCUMENTATION
SYSTEM FOR STUDENTS OF THE GENERAL
AUTHORITY FOR APPLIED EDUCATION AND
TRAINING USING DISTRIBUTED DATABASES**

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ABSTRACT

The study aimed at building a system of electronic documentation using Oracle language using the distributed database model to manage the postgraduate unit and linking it with the administrative units in the Public Authority for Applied Education and Training in the State of Kuwait for the importance of official documents and books which are subject to many problems in traditional methods. Modern methods to deal with these documents and official books.

Key Words: Building - Electronic Documentation System

INTRODUCTION

The use of distributed databases, which is a form of central processing after the expansion of the use of computer networks that provide messaging services and transfer data between a set of computers, and this link to several forms according to the design imposed by the system to be implemented, and a lot of governmental institutions, They have networks made up of interconnected terminal units used to complete their work. These peripheral modules can be configured to run distributed computing to achieve high-speed jobs, in parallel to the benefits of using the Vailable and reduce the time needed to solve computer problems. (Magdalena, 2011)

A database is a form used to store a large amount of data that links to each other in tabular form and provides the possibility to enter data and retrieve it using the means provided by database management programs without the need to deal directly with data files. (Sikora, 1997)

Distributed database systems are a combination of the database system and the computer network technology. For the first time, it seems paradoxical, as database management essentially transformed data control from applications, as in the old ways, to centralized control of data access. (Ezéchiel, *et al.*, 2019)

Unlike other network systems that are concerned with distribution, we know that the database is not really interested in the centrality of data management, because it allows data integration and provides different ways to access To the data, this means that there may be a mixture of networks and databases called distributed database systems.

Known as a database where the storage devices are not connected to a shared processing unit such as the CPU in the computer, they may be stored in multiple devices and are located in the same physical location or may have disappeared over a network of connected devices. Unlike parallel systems where processors are tightly interconnected and represent a single database.

A database distribution means a database that is not limited to a single system, but distributed across different sites, that is, on multiple servers or across a network of servers in multiple locations. It is a database consisting of two or more files. A distributed database system exists on different sites that do not share physical components. This may be necessary if a particular database must be accessed by different users around the world, be it on the

same network or on completely different networks. Parts of the database are stored in multiple physical locations and a conversion is distributed to multiple database servers. You must manage the database in a way that looks like one database for users. (Muhammad, *et al.*, 2019)

The distributed database contains several scattered work sites that do not actually exist in the same place. The data set as an example in the database may be distributed to multiple physical sites.

A distributed database may exist in a shared Internet server, intranet, extranet, or any other network within the company. Duplicate and distributed versions of the database contribute to improved end-user database performance. To ensure that the distributed database is up to date, there are two processes: (Ezéchiél, *et al.*, 2019)

- **Replication:** It ensures the use of specialized software in the search for updates in the distributed database. When an update or change is found, the recurrence procedure circulates the change to all databases. The repetition procedure may be very complex and takes up too much time depending on the size and number of distributed rules. This process may require a lot of time and computer resources.
- **Cloning:** On the other hand, it is not complicated. The clone simply identifies a particular database, assigns it as an original, and then copies it. Reproduction is usually done after a certain time. This is to make sure that each distributor place has the same data. In this procedure, the changes are only allowed in the original database. This is to ensure not overwriting the local data. Using any of these procedures ensures that data is up-to-date in

all locations where databases are distributed. In addition to the replication and fragmentation of the distributed database, there are many different distributed database design techniques. For example, distributed database technologies in self-synchronization and synchronization. The application of these techniques depends primarily on the business needs and the sensitivity of the information to be stored in this type of database as well as on the budget allocated to ensure the confidentiality and correctness of the information.

RESEARCH PROBLEM

Official documents and books are important data to be dealt with by administrative systems and are subject to many problems when using manual methods to manage and organize them. This led to the use of modern methods in dealing with these documents and official books under the title of electronic documentation:

- 1- Is it possible to design a distributed database management system that links the departments of the Public Authority for Applied Education and related training to participate in the participation of official documents and books?
- 2- Do database systems have the ability to handle data in terms of ease and speed in the definition, retrieval and creation of reports and forms?

RESEARCH IMPORTANCE

The importance of research lies in the following points:

- 1- Facilitating the work of the administrative units and divisions within the Commission.
- 2- The use of electronic correspondence system between the administrative units in the Commission.
- 3- Not allowing unauthorized persons to enter the system.
- 4- Copies of the official electronic documents and their annexes and the directory of the Commission should be included in the database tables.
- 5- Copies of the official electronic documents and their annexes and the directory of the Commission should be included in the database tables.

RESEARCH GOAL

The basic objective of the research is a system of electronic documentation using the language of Oracle and through the design of a distributed database model for the management of the graduate unit, and linking them with the administrative units and scientific sections of the Authority to facilitate access to electronic documents.

The operation of the system requires the provision of physical components of an interstellar LAN, in addition to an operating system Windows XP, oracle, with programs in the language of Oracle, represented by Developer6i, report6i, adobe acrobat.

Electronic Documentation:

Electronic authentication or documentation using modern technologies that are used to transfer and preserve the exact image of the content of any document using digital technology so that it can be consulted at any time and in one or more internationally accepted research methods and thus contribute to the development of solutions to paper content problems of documents.

The electronic documentation is more accurate and faster way to access the information regardless of where it is located, and the location of the researcher or beneficiary, and a better way to monitor their changes and follow the development of less effort and relatively low cost. (<http://www.nswnma.asn.au>, 2010)

Requirements for electronic documentation:

The main requirements of the electronic documentation process can be summarized as follows: (Public record office, 2018)

- Activate the internal information networks, if any, and use e-mail as much as possible, and then develop mechanisms for exchanging correspondence within the employer electronically.
- Distribution of instructions and legislation electronically.
- Receipt of final project plans electronically.
- To maintain a single copy of the important paper documents with the importance of taking them into the computer through the scanner and save them electronically.

Stages of Electronic Authentication:

The stages of electronic documentation are divided into two basic stages: the first is schematic and the second is operational:

- Planning stage :

These include: Stage of study and survey, phase of analysis, stage of plan construction, software selection stage, and database preparation stage. (The University of Reading Statistical Services Centre, 2018)

Operational stage:

This is done by photocopying or copying old documents that are difficult to digitize directly (converted into digital format) or which do not include aspects of them to be processed and clarified through specialized systems, such as Photoshop and other image processing software, digitized documents encoded according to a predetermined classification system, And to mark the documents to distinguish them and facilitate their return after the end of the project. (Kellerman, 2003)

The main objectives of electronic documentation:

The main objectives of electronic documentation can be summarized in the following points: (Fulton, 2015)

- Providing spatial space, facilitating the process of transferring messages and electronic documents.
- Link the parts of the organization, regardless of the divergence and speed in providing service to beneficiaries.
- Monitoring documents and their changes and monitoring their development within the organization (Workflow).
- Provide a backup copy of the documents if the assets are damaged due to any natural or human factors such as fire, theft, loss of documents, damage to air or other factors.

- easy retrieval of documents required by using different methods of research, with the possibility of putting more than one formula to search for them.
- Easy exchange of documents inside and outside the workplace.
- Make documents accessible to many people at the same time using electronic networks.

The role of the information specialist in the process of electronic preservation:

The role of the information specialist in the e-newspaper process is the following points: (Ekwelem, 2011)

- Transfer electronic data from a database to another database.
- Converting paper documents to electronic documents.
- Make current (electronic) files usable in the future.
- Copy the documents to make backup copies in order to avoid losing them in the event of disasters.
- Protect human intellectual works from threats to them due to their vulnerability to natural and human disasters.
- The development of standard methods to facilitate the task of identifying the digital container and its form and the applications necessary to view it.

Distributed Databases:

The importance of distributed databases over the past decade has emerged in information processing, and its importance seems to be growing rapidly for technical and organizational reasons. Distributed databases are defined as any system consisting of a set of sites that are logically linked to each other through the communications network, Each site is in turn a stand-

alone information system in terms of availability of a site data manager, terminals, beneficiaries and a communications manager who is responsible for the activities of the controller To exchange data and information between other sites in the system. (Pradeep, *et al.*, 2010)

The advantages of distributed databases can be mentioned in the following points: (Pradeep, *et al.*, 2010)

- **Data Independence:** Distributed database enables users to manipulate local data as independent data and to identify local data that can be shared with other users at other sites.
- **Data sharing:** enables the user to handle data distributed in different locations as a single database located in one location.
- **Reduce the cost of data connection:** Put the most used data in the same location or the nearest sites for the user.
- **Increased reliability:** If a site or several sites stop working for a specific group, the rest of the sites can continue to work until the sites that have stopped working.

Database Distribution Strategy:

There are five main organizational methods for designing a distributed database: (Ekwelem, *et al.*, 2011)

- A central database is accessed by a number of sites.
- A database that has a periodic update response with partial or total replication.
- A real-time response database that is partially or completely replicated.
- One database is divided into several parts distributed across multiple sites.

- Separate databases distributed among several sites.

Choose the appropriate distributed database strategy:

Choosing the best strategy at a given time depends on several factors, including: (The University of Reading Statistical Services Centre, 2018)

- **Organizational capacity:** availability of funding, independence of organizational units and need for security.
- **The need for reliability:** the extent to which an organization can afford a partial or total disruption of the database.

Distributed Database Types: In which the databases and management system exist in all sites, Are all similar (Fox pro), (Access), And similar traditional database systems, and the following diagram illustrates homogeneous distributed database systems. (Haitham, 2010)

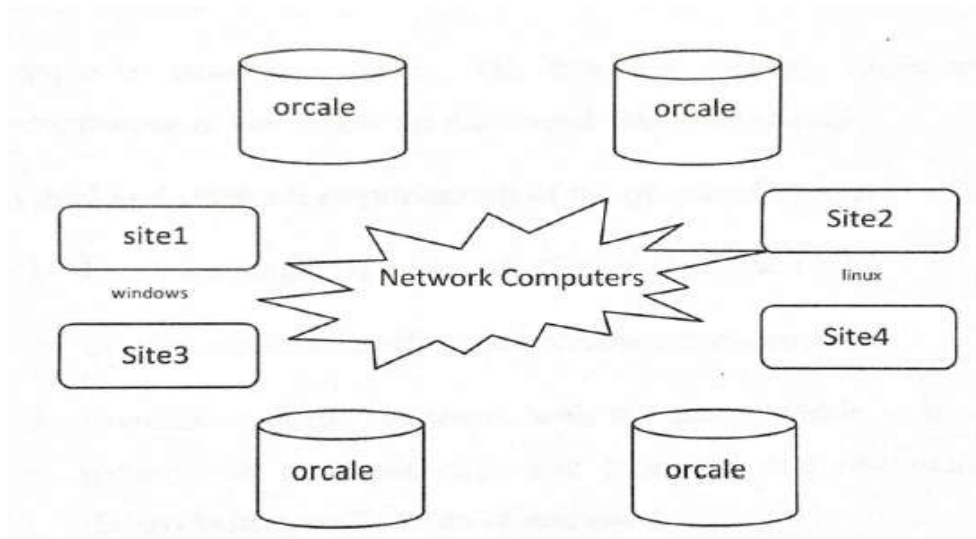


Fig (1): Harmonized database systems

Heterogeneous and distributed databases:

Where databases and their management system are different from each other, such as in some locations (Access) and (Fox Pro). (Ozsu, et al., 2011 : 239)

The management of the distributed database becomes more difficult with the increasing heterogeneity of more than one type of database and the presence of more than one version of the database management system in these locations. The difficulty lies in the partial processing and execution of operations (Transactions) , Which requires the fragmentation of the single process into a set of mini operations and implementation on the various databases in order to bring the parts of data stored in them and merge them and provide them to the user as integrated data (Integrated Data), This reflects the principle of data transparency, The following diagram illustrates heterogeneous or heterogeneous distributed database systems.

Physical and Software Requirements of the Proposed System:

- 1- Install language (Developer6i), (Oracle Database 10g).
- 2- Configure a distributed database on the server computer.
- 3- Connect students' computers with the server within a local network Of the stellar type and using the data distributor (HUB) With specific terms of reference.
- 4- Use the scanner device To photocopy the official books and instructions for studies and accurately (Scaling 150% , resolution 200%dpi) For the purpose of saving such documents in the system database.

- 5- Use a program (Adobe PDF files) In the integration of photo attachments to official documents and books, merge the photographs of the Graduate Guide to store them in the database.
- 6- Implementing system-specific software on the server and giving users authority.

Requirements for database configuration on the server:

In any site (server) the database that is configured with Oracle has a common name and this database contains the following (Ceria, et al., 1987 : 542)

(A) Schema:

Schema: Is the collection of database objects that the database user owns, and this name is Schema Is the name of the user who owns it, and this objects Schema Includes specific structures such as presentations, table, Indices, Codes stored software (Java, PL/SQL).

(B) Data Types: Data types must be specified in the database tables on which we work.

(C) Data Integrity: The following integration restrictions are restrictions placed on input column values: (Ozsu, 2011: 240)

- Not Null.
- Primary Key- PK.
- Foreign Key – FK.
- Referential Integrity Constraints.
- Check constraints.

(D) Entity Relationship: Inter-entity relationships are classified into three types (one – to – one) Coding (1:1), (one-to-many) coding (1:M), (Many-to-

Many) coding (M:M), Entities , names of the tables , Attributes , Are the columns or fields in these tables.

Proposed system data:

(A) Schema: The user name is set (NATHER) And composition (Schema) Its contains all the objects that we need in this database Be the owner of the Schema Full control over their objects and can allow other users to use those objects, and the tables are configured under the name (NATHER – Schema), These tables have a name, structure, and type of data attributes (fields or columns).

(B) Tables: Seven tables of the proposed system are configured, using the tool:

(1) **Doc_out:** This table is used to hold outbound information, and contains a field that is a prime key (book_id) It helps him to map out the originals of the book (book_image) And the table of book attachments (book_attach) It also contains a foreign key (Copy_id) Helps to link to the table of copies of administrative units and sections (book_copy) It also contains a foreign key (box_id) Helps to link to the table of place of preservation (book_box).

(2) **Doc_in:** This table is used to hold outbound information, and contains a field that is a prime key (book_id) It helps him to map out the originals of the book (book_image) And the table of book attachments (book_attach) It also contains a foreign key (Copy_id) Helps to link to the table of copies of administrative units and sections (book_copy) It also contains a foreign key (box_id) Helps to link to the table of place of preservation (book_box).

- (3) **Book_copy:** This table is used to retain the names of administrative units and sections, and contains a field is the key to the head (copy_id) Helps to link to the outgoing table (Doc_out) Table received (Doc_in).
- (4) **Book_box:** This table is used to hold the conservation place of the graduate unit, containing a field that is the head opener (box_id) Helps to link to the outgoing table (Doc_out) Table received (Doc_in).
- (5) **Book_image:** This table is used to hold images of official book assets, and contains a foreign key (book_id) Helps to link to the outgoing table (doc_out) Table received (Doc_in).
- (6) **Book_attach:** This table is used to keep official book attachments and contains a foreign key (book_id) Helps to link to the outgoing table (Doc_out) Table received (Doc_in).
- (7) **Photo:** This table is used to hold a post-graduate-type photograph (Adobe PDF file) It is saved in (OLE control) , This table is used to assist the graduate unit and departments to see the instructions issued by the Authority's administration.

Design of the proposed system database:

First: Building Concept Model (Entity Model and Relationships)

In order to draw a model of entities and relationships of the system, the following entities were counted as the basic components of the system (issued and received, copies of administrative units and sections, place of preservation, As follows :

- 1- Exported and imported Documents, Its qualities include (book_id), (book_no), (book_data), (name), (send), (received), (copy_id), (box_id), (no2), (data2).

- 2- Copies of administrative units and sections (Book_copy), Its qualities include (Copy_id), (Copy_name).
- 3- Safe (book_box), His qualities include (box_id), (box_name).
- 4- Photos out of the book (book_image), His qualities include (book_id), (image).
- 5- Attachments of the book (book_attach), His qualities include (book_id), (image_pdf)

The following figure illustrates the entities and relationships of the proposed system:

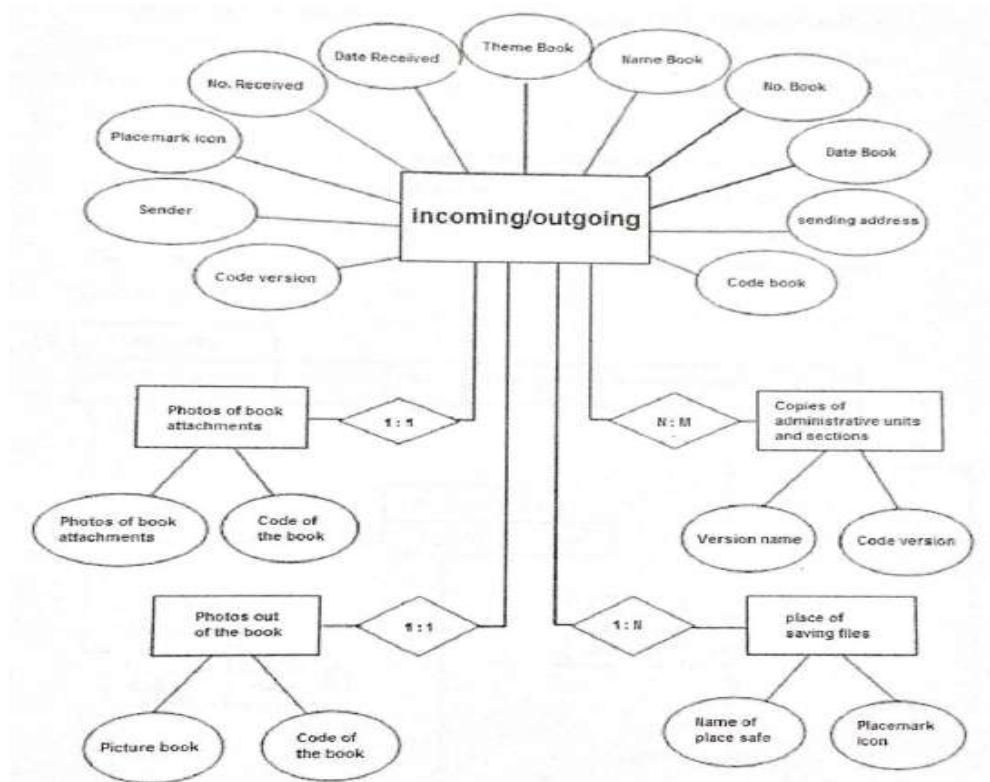


Fig. (2): Entity Model and Relationship to the Open System Database

Second: Transforming the entities and relationships model into a relational database:

After defining entities and relationships, the design process of the entity and relationship model is transformed into a relational model to make it easier to implement this model in a database (tables made up of a set of columns) and to put the resulting relationships in standard format to eliminate redundant data. A relationship with all attributes.

After the process of transforming the entities and relationships model into a relational database, the standard format representing the database's associative pattern can be drawn, and the following diagram shows the logical diagram and the physical schema of the proposed system database.

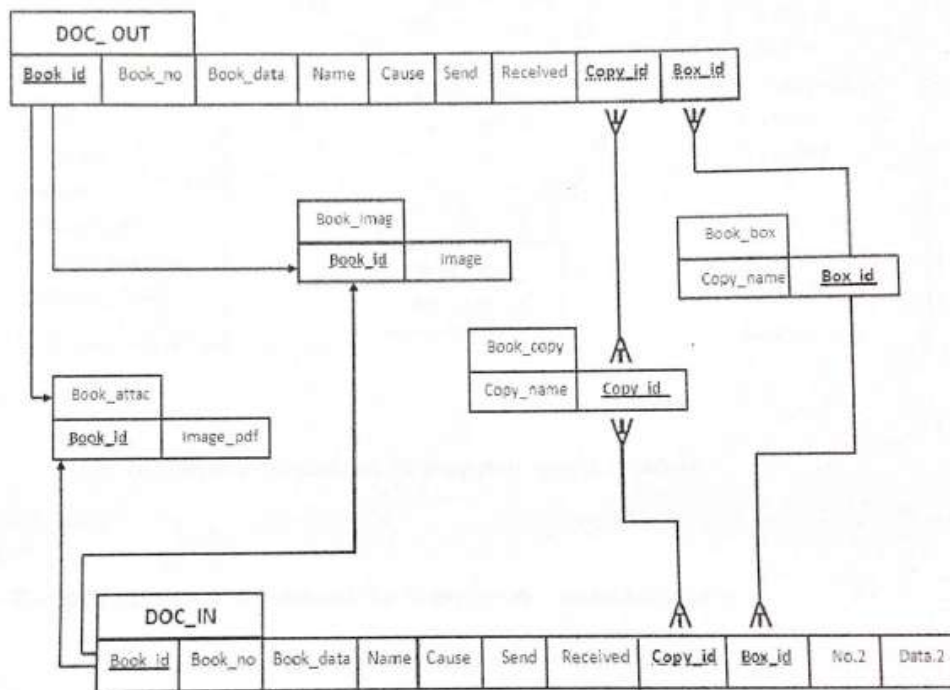


Fig. (3): Logical diagram of the link pattern of the proposed system database

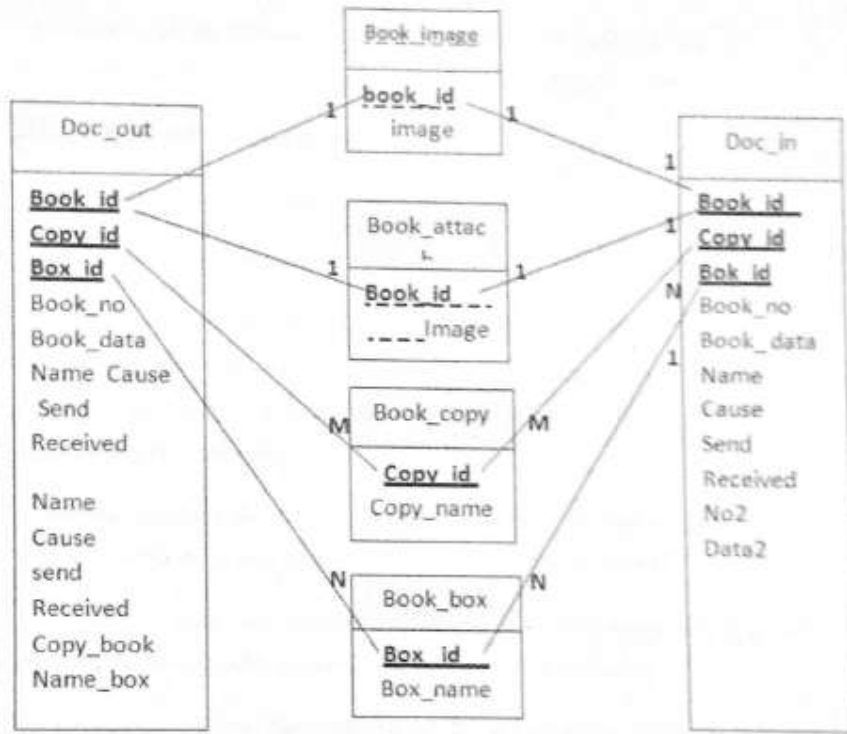


Fig. (4): Physical diagram of the proposed system database

Third: To create a distributed database for the proposed system:

After initializing the main relationships of the general database in the preceding paragraphs, these relationships are distributed using the horizontal division method, based on the output and total output module. The administrative units and the departments have a relationship with the graduate unit in order to establish local relations in the database They are managed by a database management system.

Fourth: Link the Oracle database to users:

- Create Database Link.
- Create Service Name.

When the system is executed, a program window will appear, and the system will then be prompted to enter the user name and password, and when it is confirmed that the authorized user will be allowed access to the system.

When selecting the body directory from the main menu will display a window for all instructions in the form of picture type PDF.

When you select the inbound button, a window will appear that includes the set of books received with the report of the process.

In order to review the published books, the outgoing button is clicked with the possibility of displaying the report of the issued books, which displays all the data by year and within a certain month, and also can identify the division or section that received copies of their books and when choosing to show the picture from the window With attachments.

In order to sort incoming or outgoing data, the Order button is selected. A sub-window appears with a set of options (incoming number, date of arrival, date of the book, name of the book, sender).

CONCLUSIONS AND RECOMMENDATIONS

The research concluded with a number of conclusions:

- Proposed system has achieved the required goal, linking the database designed in Oracle and stored on the server with all users to a local network. The user can log on from any computer in the network to the database if he / she has the authority to enter.

- Proposed system provides the possibility to address the technical problems facing data at work as well as provides a good way to maintain indexing files used with databases.
- It's easy to work with images and files of type PDF Using multimedia databases in database design.
- The use of horizontal segmentation based on the outgoing code and incoming code results in easy retrieval of the data because it depends on the process of associating the lines in the relationships.
- Proposed system provides ease of transition between windows, as well as extracting reports and viewing all electronic documents with their order and search according to a specific standard of research.

RECOMMENDATIONS

Through the results of the study, it is possible to mention a set of recommendations that will help improve the proposed system and lead to the development of future work in the following points :

- Expand the database to include all official documents to include all administrative units and scientific departments in the college.
- Develop a distributed database management system so that the college database server is linked to a central database server.
- Implementation and implementation of information security services is important to the applicable system where Oracle language provides these capabilities to increase the level of security.

- Utilizing the Oracle language interface and linking it with the languages used to program Web sites in order to transform the work into a website.
- Need to make backups of the database and periodically make it possible to provide better data protection as well as retrieve this data when needed.

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بناء قاعدة بيانات بنظام التوثيق الإلكتروني للطلاب بالهيئة العامة للتعليم التطبيقي والتدريب باستخدام قواعد البيانات الموزعة

[٣]

حسن نايف مبارك

الهيئة العامة للتعليم التطبيقي والتدريب، دولة الكويت

المستخلص

هدفت الدراسة بناء نظام للتوثيق الإلكتروني باستخدام لغة أوراكل بالاستعانة بنموذج قاعدة البيانات الموزعة لإدارة وحدة الدراسات العليا وربطها بالوحدات الإدارية بالهيئة العامة للتعليم التطبيقي والتدريب بدولة الكويت، وذلك لأهمية الوثائق الرسمية والكتب والتي تخضع للعديد من المشاكل في الاستخدامات بالطرق التقليدية وهو ما تسعى اليه الدراسة في استخدام الأساليب الحديثة للتعامل مع هذه الوثائق والكتب الرسمية من خلال:

- ١- هل من الممكن تصميم نظام لإدارة قواعد البيانات الموزعة يربط بين إدارات الهيئة العامة للتعليم التطبيقي والتدريب المتعلق بها للمشاركة في مشاركة الوثائق والكتب الرسمية؟
- ٢- هل لدى أنظمة قواعد البيانات القدرة على التعامل مع البيانات من حيث السهولة والسرعة في تعريف واسترجاع وإنشاء التقارير والنماذج؟

وأوصت الدراسة بالآتي:

- ضرورة توسيع قاعدة البيانات لتشمل جميع الوثائق الرسمية في الوحدات الإدارية والإدارات العلمية في الكلية.
 - العمل على التطوير المستمر لنظام وإدارة قاعدة البيانات الموزعة بحيث يتم ربط خادم قاعدة بيانات الكلية بخادم قاعدة بيانات مركزي.
 - استخدام واجهة لغة Oracle وربطها باللغات المستخدمة في برمجة مواقع الويب لتحويل العمل إلى موقع ويب.
 - الحاجة إلى عمل نسخ احتياطية من قاعدة البيانات وجعلها من الممكن توفير حماية أفضل للبيانات بشكل دوري وكذلك استرجاع هذه البيانات عند الحاجة.
- الكلمات المفتاحية: بناء - نظام التوثيق الإلكتروني - الهيئة العامة للتعليم التطبيقي والتدريب - قواعد البيانات الموزعة .