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Design a Virtual Library Application By Java Database Connectivity Driver

تصميم تطبيق لمكتبة افتراضية باستخدام المحرك الرابط لقاعدة البيانات بلغة الجافا

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Abstract:

A Virtual Library also known as an Electronic Library may be defined as a part of a network with linkages to other libraries providing access to information. Universities that offer a distance education facility more often than not have a virtual library for their students. The application of virtual library used network server to communicate with the electronic collage libraries to pass the books and documents to the virtual database that facility to the user the search about specific book or pdf.

In this research, firstly the virtual database will be create with its tables that contain the books and documents by using MySQL statement. Then the network will created to connect with other databases to withdraw the books and store all the books in it, so retrieve a book and search about any book by using one database without back to other databases is be very easy. The JDBC driver using to connect with other databases.

In this research there are many frames will open, one for register a new user and the second is to login a user that is already have a username and password to enter to the library. The other is to search about the book and to view it. The GUI is build by JAVA language.

The conclusion in this research that the researcher can get any book or document in an easy way by using these database that group all the books from the other databases in it by using network between them and using the simple GUI to login , register and search. It is easy to the user to use the library by using the development program that help to connect between the libraries.

الخلاصة:

المكتبة الافتراضية وتعرف ايضا بالمكتبة الالكترونية او الرقمية تعتبر جزء من شبكة الاتصال بالمكتبات الاخرى للتزود بالوصول الى المعلومات. ان الجامعات التي تحتوي على مكتبة افتراضية توفر سهولة التعليم عن بعد اكثر من غيرها.
ان تطبيق المكتبة الافتراضية تستعمل وسيلة الاتصال (الخادم) ليتصل بالمكتبات الالكترونية للكليات وذلك لتمرير الكتب والمستندات الى قاعدة البيانات الافتراضية لتسهل للمستخدم البحث عن كتاب معين.

في هذا البحث، اولا، اقاعدة البيانات الافتراضية سوف تكون مع الجداول التي تحتوي على الكتب و الفايلات باستخدام ايعازات MySQL. ثم سيتم إنشاء شبكة للاتصال مع قواعد بيانات أخرى لسحب وتخزين الكتب في قاعدة البيانات الافتراضية لذلك سوف يكون استرجاع كتاب او البحث عن أي كتاب في قاعدة بيانات واحدة اسهل من البحث في قواعد بيانات مختلفة.سوف يستخدم للربط بين قواعد البيانات وقاعدة البيانات الافتراضية المحرك JDBC.

في هذا البحث سوف يكون هناك اكثر من نافذة في التنفيذ، واحدة لتسجيل المستخدم الجديد الراغب في استخدام هذه المكتبة وليس لديه أي بيانات قديمة، ونافذة اخرى للمستخدم المسجل سابقا والتي تحتوي على اسم المستخدم وكلمة المرور.النوافذ الاخرى سوف تكون للبحث عن أي كتاب او مجله واخرى لعرض الكتاب للمستخدم. تم استخدام لغة جافا لتصميم الواجهات الرئيسية.

تم الاستنتاج من هذا البحث بأن الباحث يستطيع الحصول على أي كتاب او فايل بطريقة سهلة بأستخدام قاعدة بيانات واحدة تجمع كل الكتب المتوفرة في بقية قواعد البيانات باستخدام شبكة فيما بينهم واستخدام واجهات بسيطة للتسجيل والبحث لذلك من السهوله للمستخدم استخدام المكتبة باستعمال برنامج متطور يساعد على الربط بين المكتبات.

Introduction:-

Change has become a way of life for most organizations in the 21st century. In order to withstand profound change, an organization must be flexible and incorporate the ability to adapt and respond to its external environment and its many stakeholders .At the same time, in arena of increasing fiscal constraints, new technologies, and an explosion of information, informatics plays an increasingly important and prominent role in society, in knowledge exchange, in communication, and in commerce between organizations. Accordingly, the most remarkable opportunities and challenges have emerged within academic libraries with regard to the incorporation of technology into daily functioning [1].

Libraries will identify their own strengths and weaknesses and decide on their strategy for the future according to their own specific situation. One of the important aspects for most libraries deals with the strategy on access and ownership of documents. There is an increasing focus on information management and on selection of relevant information, irrespective of the place where and how the information is stored. This is particularly true for libraries that have limited resources. These libraries have to make firm decisions and choices based on the strengths and scope of their parent institution. The opportunities for cooperation, partnership and creation of consortia will be carefully considered[2].

Most of the Libraries today, offer a wide range of on-line services to their users. And, now, the internet and web technologies are not the new things to any academician hence, it is the time for a Library to be virtual and develop its on-line presence in order to further facilitate and enrich the educational processes. In this direction, Virtual Libraries provides a new way of serving the new generation users of the libraries. Virtual libraries are the new vision of libraries of the future [3].

Virtual library is being introduced to the library system worldwide. The industrialized world is creating virtual libraries because of the high value placed on the availability of information. The increasing acceptance of virtual library might be due to the diverse information that they contain, the options for what they can include are virtually endless, as well as becoming more and more boundless as technology advances. With virtual library, the quality of academic library collections will be bolstered up, staff and students will be able to access databases for teaching and research. [4].

1-Literature review:

1- **In 2011**,Naomi C. Broering create **A "virtual medical library" .** It has a library information system that provides direct access to multiple modules, including print and non-print formats, bibliographic indexes and abstracts, electronic journals. Even beyond basically making these resources available, the virtual library guides users to information and offers integration, or at minimum interfaces with medical systems such as drug information, cancer treatment, diagnostic and a variety of patient care laboratory, x-ray reports and research systems[5].

2-In 2011, Karthikeyan Balaji Dhanapal make a Personal Virtual Multimedia Library **that** content (audio, image, video) being generated due to the ease of generating such content with the everyday devices, such as, mobile phones and also due to the plummeting cost of media-generating devices, such as, digital cameras which have made them ubiquitously available[6].

3-In 2008, Dr Jianxiang Cao and Dr Bin make Virtual Home Library (VHL) is an integrated IT system that utilizes virtual reality technology and an IPTV set-top box (STB) to virtually construct a 'library' and the relevant reading environment on televisions in people's home. Unlike the online e-book reading applications, Virtual Home Library system can be applied on televisions – the world's most convenient and most efficient communication tool [7].

2-Virtual Library:

Virtual Library is another kind of Digital Library which provides portal to information that is available electronically elsewhere. This is referred so to emphasize that the Library does not itself hold content. Librarians have used this term for a decade or more to denote a Library that provides access to distributed information in electronic format through pointers provided locally.

A Virtual Library has been defined by Gapen (1993) as, "the concept of remote access to the contents and services of libraries and other information resources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources". The speedy and wide access to current information contents makes virtual libraries a global symbol of the information access paradigm [8].

The Virtual Library has changed the traditional focus of librarians on the selection, cataloguing and management of information resources such as books and periodicals. The virtual library is putting emphasis on access without the need to allow for the time required by these technical processes. Virtual Libraries have induced libraries, scholars, publishers and document delivery vendors to develop new partnerships that are working for the good of scholarly communication in both developed and developing countries [3].

3-Advantages of Virtual Library:

There are many advantages to going virtual. Some of the advantages include the following:

- It saves and/or reduces the physical space taken up by library materials.
- It often adds enhanced searching capabilities in a digital format.
- The library materials are available at the user's desktop, regardless of where the user is physically located.
- It allows for the inclusion of materials only available on the Internet or in digital format.
- It provides the user with the capability to download and manipulate text.
- It often allows for multiple, concurrent users.
- It eliminates the problem of a book being missing or off the shelf.
- It is less labor intensive.

Although a virtual library does not require as much time from the library filers and shelvers, it takes a lot more time from a librarian, and/or possibly someone in the IT department, to learn how to install, maintain and use the product [9].

4- What Is JDBC:

Java Database Connectivity (**JDBC**) is a standard Java API to interact with relational databases form Java. JDBC is a Java API for executing SQL statements. It consists of a set of classes and interfaces written in the Java programming language. JDBC provides a standard API for tool/database developers and makes it possible to write database applications using a pure Java API.

Using JDBC, it is easy to send SQL statements to virtually any relational database. In other words, with the JDBC API, it isn't necessary to write one program to access a database, another program to access an Oracle database, another program to access an Informix database, and so on. One can write a single program using the JDBC API, and the program will be able to send SQL statements to the appropriate database. And, with an application written in the Java programming language, one also doesn't have to worry about writing different applications to run on different platforms. The combination of Java and JDBC lets a programmer write it once and run it anywhere [10].

5- The JDBC Architecture:

The JDBC Architecture consists of two layers:

- The JDBC API, which provides the application-to-JDBC Manager connection.
- The JDBC Driver API, which supports the JDBC Manager-to-Driver Connection.

The JDBC API uses a driver manager and database-specific drivers to provide transparent connectivity to heterogeneous databases "generic SQL database access framework". The JDBC driver manager ensures that the correct driver is used to access each data source. The driver manager is capable of supporting multiple concurrent drivers connected to multiple heterogeneous databases. The location of the driver manager with respect to the JDBC drivers and the Java application is shown in Figure (1) [11].

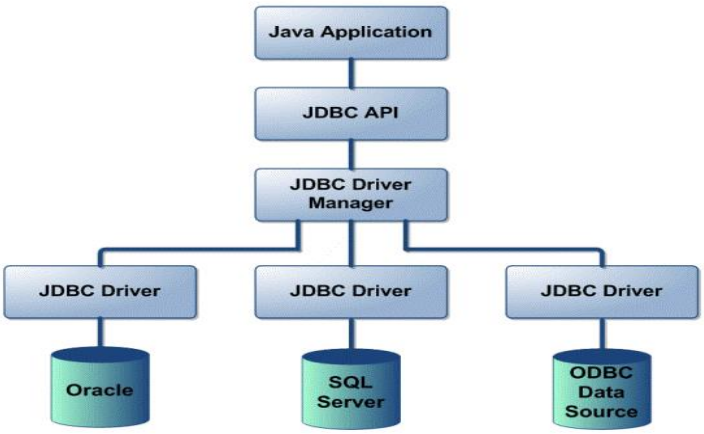

Figure (1) JDBC Architecture

6- Virtual library application:

The virtual library application is designed by using JDBC drivers and MySQL in java. The JDBC driver will be used to connect the java with MySQL database. The driver use to receive the login and register information. The database is used to receive the books from different electronic collage database to re-arrange these into a virtual library database by using the server to connect with it. The virtual database diagram is illustrated in Figure (2).

The server of the virtual library application will not be a GUI, its need network programming concepts to build it in java, so after that the connection with the collages will be trust, so the collages will send the book database automatically to the virtual database.

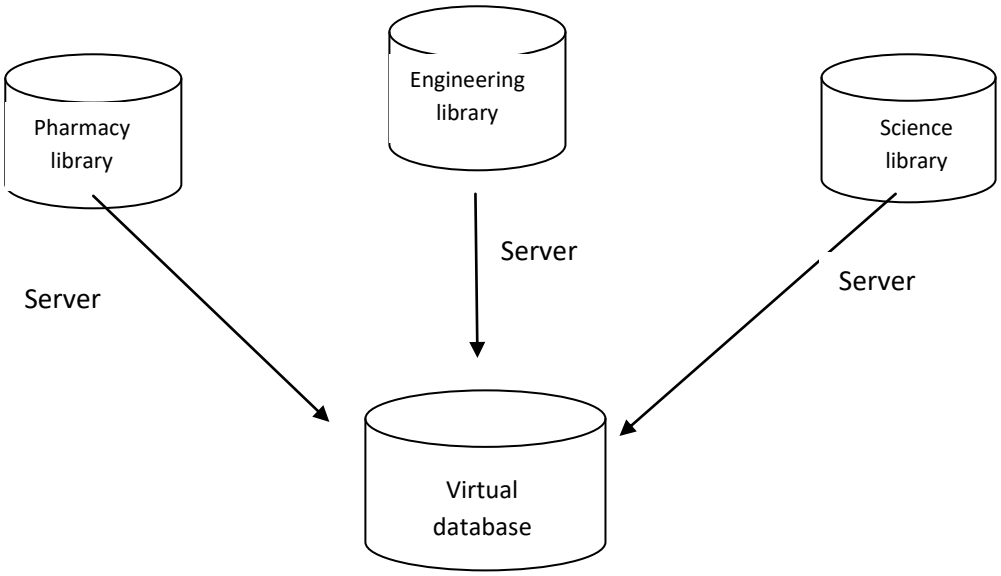

Figure (2) virtual library database

To establish a server in java requires five steps:

Step1: create a Server Socket object such as

Server Socket=new ServerSocket (portNumber, queueLength)

The **portNumber** is used by Clients to locate the server application on the server computer. Each client will ask to connect the server on this port. The **queueLength** specifies the maximum number of clients that can wait to connect to the server.

Step2: the server listens for attempt by a client to connect.

Step3:get the **OutputStream** and **InputStream** objects that enable the server to communicate with the client by sending and receiving bytes. The server sends information to the client by an **OutputStream** and receives information from it by the **InputStream**.

Step4: the client and server communicate by the interface object.

Step5:when the transmission is complete then the server close the connection.

After the connection between the collages database and virtual database trust as above, a Java program will interact with a database, the program invokes the methods of the JDBC API. The JDBC API then calls the JDBC driver and submits the queries to it. The JDBC driver then converts the queries to a form MySQL statements that a database can understand it. After the query has been performed, the JDBC driver retrieves the result of the query from database, so the result is converted into JDBC API classes that can be used by the Java program. MySQL is the international standard language used with relational database to perform queries and manipulate data.

6.1 Welcome interface:

In the beginning of run VLA system, the **welcome interface** wills appear. It's containing two buttons, **Login** and **Register** as shown below in figure (3).

Figure (3) Welcome interface

6.2 Login interface:

The login information generally includes username and password. When the user enters his information in the login interface as shown in figure (4) that show login interface. The JDBC driver will be connected to receive this information. The driver will check the validate of the information, if the username and password are registered early, then the welcome message will occur to the user and then the search interface will appear to search about any book. If the information of the user is not found then the error message will be send from the server to the login interface that tell the user to rewrite the correctly information or the user must register at first as shown in figure(5). The interaction between login interface and JDBC server is shown in Figure (6).

The JDBC has eight steps to connect with the program and receive the information:

1. Importing Packages.
2. Registering the JDBC Drivers.
3. Opening a Connection to a Database.
4. Creating a Statement Object.
5. Executing a Query and Returning a ResultSet Object.
6. Processing the Result Set.
7. Closing the Result Set and Statement Objects.
8. Closing the Connection.

Figure (4) Login interface

Figure (5) Error message

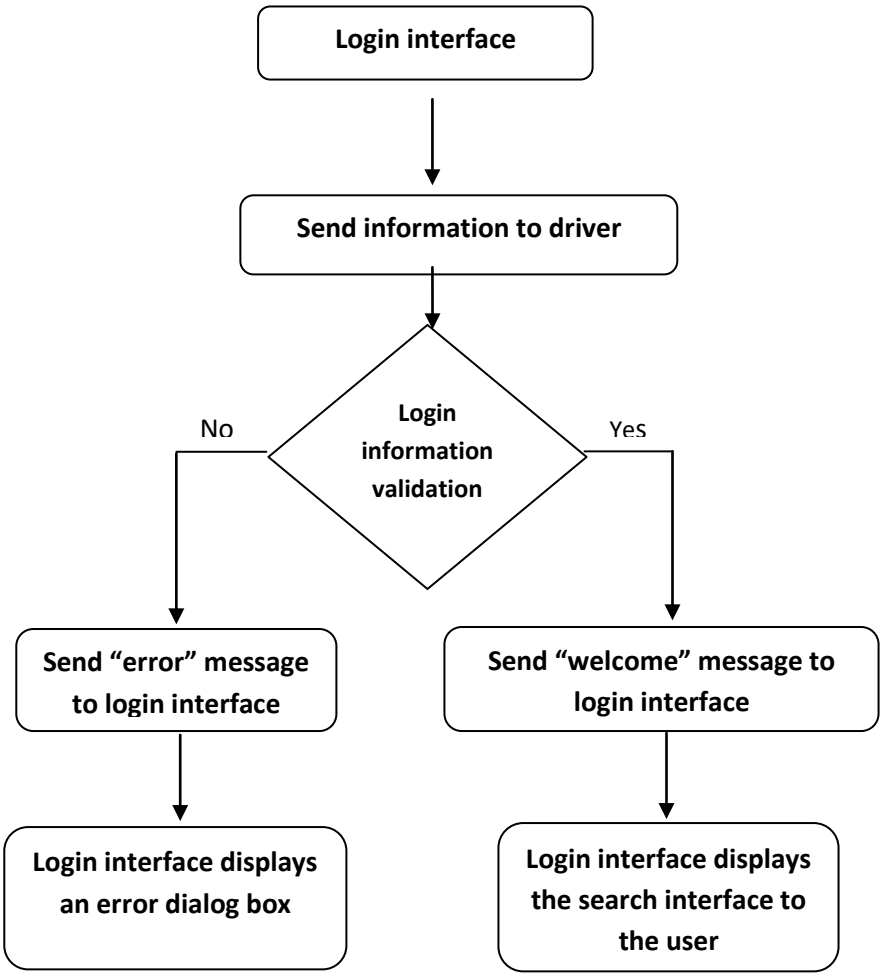

Figure (6) the interaction between login interface and JDBC server

6.3 Register interface:

The virtual library application should enable new users to register with application before login in. The new user will have the freedom to select any username or password (figure (7) show the register interface). The register information will be send to the JDBC server to check its validation, if the information accepted, a welcome message will appear, then the search interface will be occurring. If the password less than four letters then an error message will tell the user to rewrite his password as shown in figure(8). The mail field must write in correct format, for example user@yahoo.com, otherwise the error message will tell the user the correct format as in figure (9). Finally, the user must fill the entire fields and never leave any one blank, if any field forgotten then the message will remember the user as in figure (10).

Figure (7) Register interface

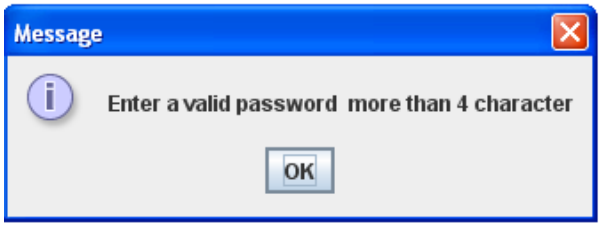

Figure (8) password error message

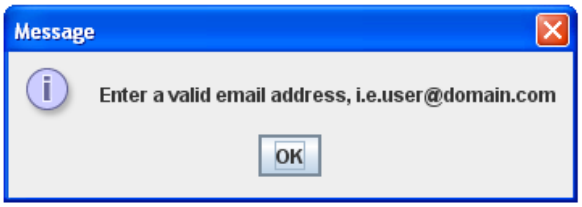

Figure (9) email error message

Figure (10) blank field error message

The figure (11) shows the interaction between search interface and JDBC server.

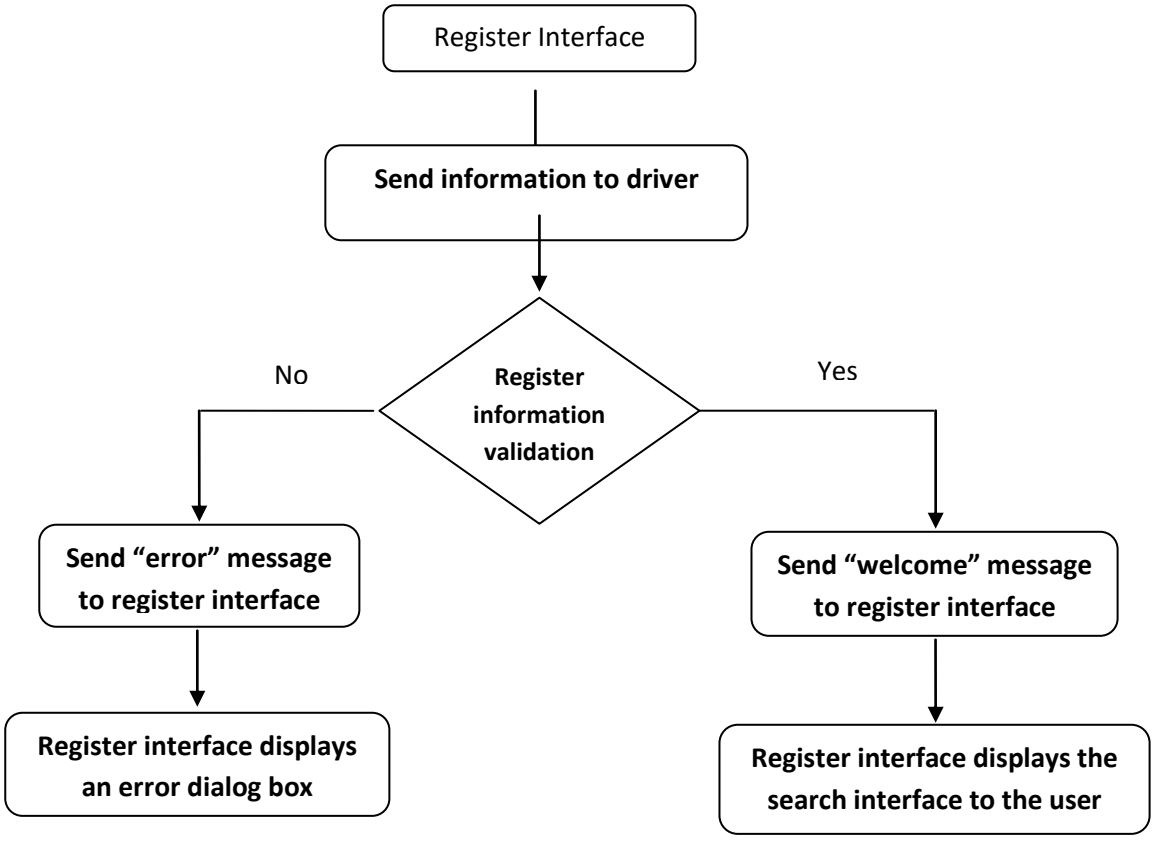

Figure (11) the interaction between login interface and JDBC server

6.4 Search interface:

After all information entered successfully in register or login interface, the search interface will appear to search about any book or document that wants it. As shown in figure (12), when the title is entered and the search button is pressed, the list of books with its authors and it's year will appears, so if the user wants to view any book must selected it and then press on view button to open it as shown in figure (13).

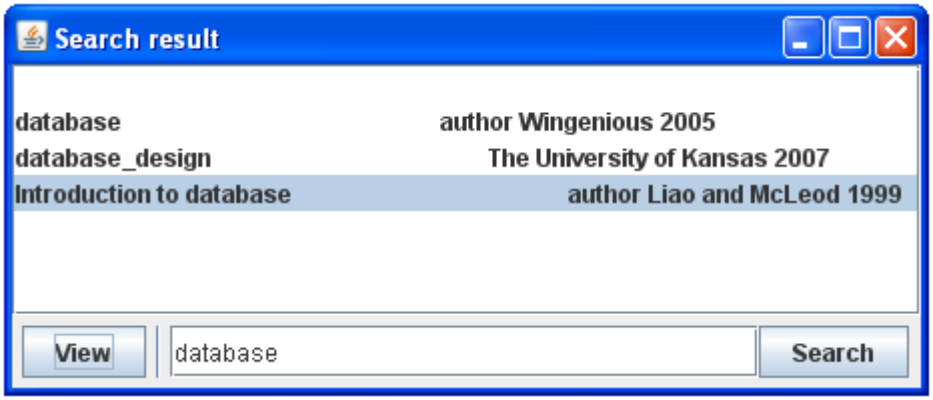

Figure (12) search interface

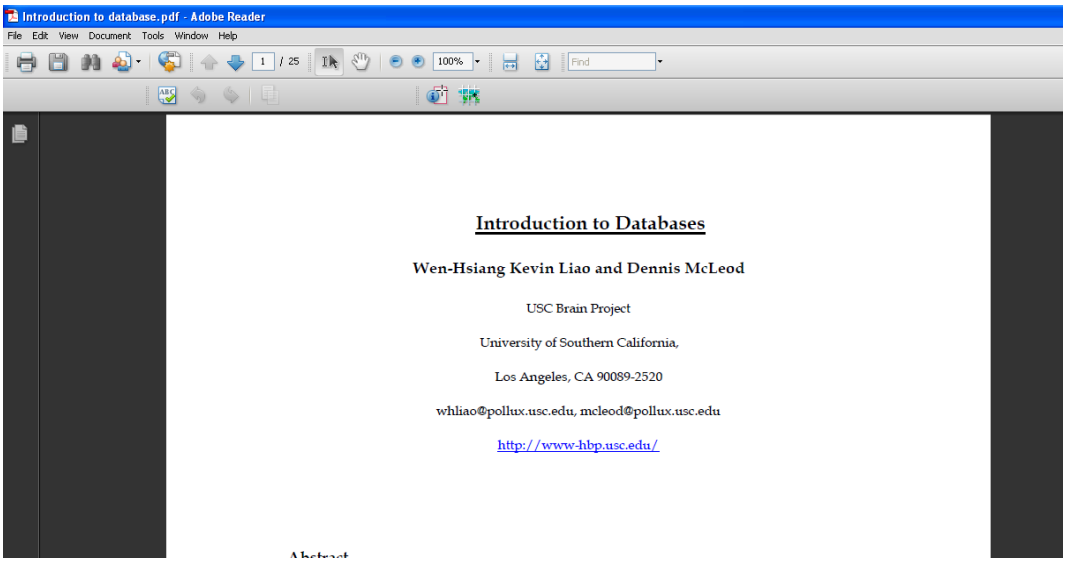

Figure (13) introduction to database book

7. Conclusions and Future work:

This research design the library that is has the information that found in collage librariese.It design also one database that share with the collage databases and store books and documents in it, this database is virtual database. The library and database provide end-user facilities for electronic document request and delivery from it. In addition to facilities, the collage libraries cooperated with each other to send the information and books to the virtual library that is used for the user. The use of this program is for the current development in computer world to reach to the perfect state.

In the future, the suggestion to add a link of Google and any search engine will expand the search for books or any researches or connect the virtual database with the other universities database. The activation of the user will be suggestion is to use PHP language or JSP to develop the interfaces of the library.It can also make an arabic interface.

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