

## Design and Implementation of Secure Management System for Electronic Library

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### Abstract

Recently the digital libraries are created for diverse communities and in the different fields, in which large numbers of users that are distributed geographically can access the contents of large and diverse repositories of electronic objects such as, images, audio, video and files. Storage and copying of information are done either by downloading or by printing from a master file. In this work MySQL database and PHP language is used to design the web site of university (Madent Al-Elem University College) and as a part of this web site is an electronic library that specified for the students of this university only.

**Keywords:** Database Systems, Electronic Library, website.

### الخلاصة

#### تصميم وتنفيذ نظام إدارة أمن للمكتبة الإلكترونية

في الوقت الحاضر يتم إنشاء المكتبات الرقمية لمختلف المجتمعات وفي مختلف المجالات، حيث يتم توزيع أعداد كبيرة من المستخدمين جغرافياً لمحتويات مستودعات كبيرة ومتنوعة من الكائنات الإلكترونية مثل الصور والصوت والفيديو والملفات. يتم تخزين ونسخ المعلومات عن طريق التحميل أو عن طريق الطباعة من الملف الرئيسي. في هذا العمل يتم تصميم موقع على شبكة الإنترنت للجامعة (كلية مدينة العلم الجامعة) وكجزء من هذا الموقع هو مكتبة إلكترونية تحدد لطلاب هذه الجامعة فقط باستخدام قاعدة البيانات (MySQL) ولغة php.

**الكلمات الرئيسية:** أنظمة قاعدة البيانات، المكتبة الإلكترونية، موقع الكتروني

## 1. Introduction

A **website** is a combination of related web pages, including multimedia content, that identified with a common domain name. a website is published on at least one web server and it is accessible via a public Internet Protocol (IP) network by referencing a uniform resource locator (URL) that identifies it.

Web pages, which are the building blocks of websites, are documents, typically composed in plain text interspersed with formatting instructions of (Hypertext Markup Language(HTML, XHTML)) .

The Hypertext Transfer Protocol (HTTP) is used to accessed and transported the web pages , which may employ the (HTTP Secure, HTTPS) to provide the security and the privacy for the user [1].

Hyper linking between web pages transfer to the reader the site structure and guides the user of the site, which starts with a home page that containing a directory of the site web content. Some websites require user registration or subscription to access content [2].

A static website is the website that has web pages stored on the server in the way that is sent to a client web browser. It is primarily coded in (Hypertext Markup Language (HTML)). Cascading Style Sheets (CSS) are used to

control appearance beyond basic HTML [2].

Images are commonly used to effect the desired appearance and as part of the main content. video or Audio might be considered "static content" if it is generally non-interactive. The static website usually displays the same information to all visitors and it provide consistent, standard information for an extended period of time. Although the static website owner may make updates periodically [3].Dynamic websites can display dynamic or personalized content and it usually interact with data sources and web services [4]. Server-side dynamic pages are generated by computer code that produces the HTML (CSS are responsible for appearance and thus, are static files). There are a wide range of software systems that are available to generate dynamic web systems and sites(The software systems such as CGI, Java Servlets and Java Server Pages (JSP), Active Server Pages and ColdFusion (CFML)).[3]

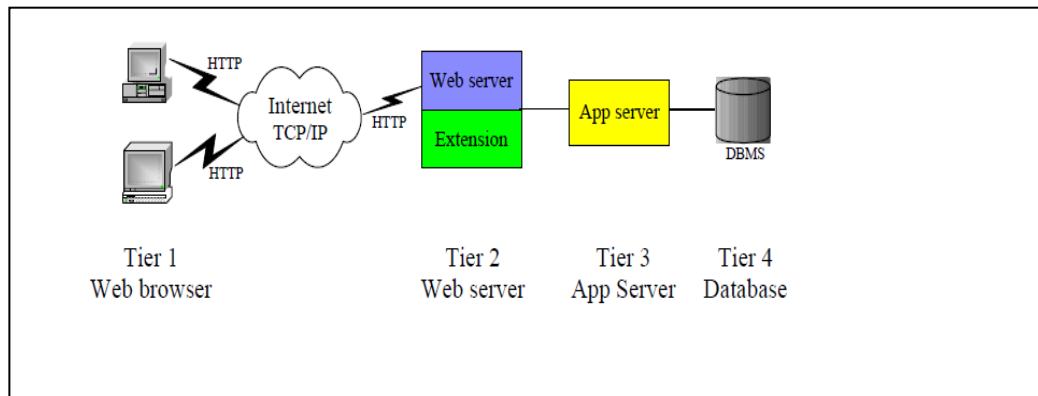
## 2. Web Architecture

A web application includes four tiers as depicted in the figure(1).

- Web browsers on the client side for rendering data presentation coded in Hypertext Markup Language .
- Web server program that generates data presentation

- The application server program that computes business logic
- The database server program that provides data persistency.

These types of server programs may run on the same or different server machines [5].



**Figure (1)** web architecture.

Web browsers can run with limited hardware or software requirement on the most operating systems, Web browsers are the graphic user interface for the clients to interact with web applications. IE and Firefox are popular web browsers and Apache, Tomcat and IIS are popular web server programs [5].

### 3. The Proposed Electronic Library of University

The design of **Electronic Library for the university** consists of many phases each phase have an algorithm for it design also there are many tools used to implement the design of web site and the **electronic library**.

#### 3.1) Hardware and Software Requirements

To implement the design of E-library system, the following set of

hardware and software requirements are used:

1. Hardware requirements are divided into:
  - a. **Client:** is a machine used to access and use the designed smart of E-library system through a web interface.
  - b. **Server:** which is a machine used to host the proposed smart of E-library system database and website, To offer the services to clients The wamp server is installed on the server node as a database and web server and it is a windows web development environment. It allows the user to create web applications with (Apache2, PHP and a MySQL database)[6].

#### 3.2) Software and Programming Languages Used

- a. Hypertext Mark-up Language (HTML) is the authoring language used to

create documents on the World Wide Web [7].

- b. JavaScript is a language that commonly used in web development, it used to add dynamic and interactive elements to websites.
- c. Hypertext Pre-processor (PHP) Language is a script language and interpreter that is freely available and used primarily on Linux Web servers. It derived from Personal Home Page Tools, now stands for PHP .
- d. MySQL Database is a relational database server that supports the (Structured Query Language) database language. Therefore, MySQL is named after the language that developers use to store, query, and later update data in a MySQL database and it can be accessed by most programming languages, it is often coupled with PHP because they work together with ease. Information stored in a MySQL database hosted on a web server can be accessed from anywhere in the world with a computer [7].

#### 4. The security of system

To keeping that system secure. There are some tips concerned about the security of Apache server:

- **Enable ModSecurity:** ModSecurity is a free Web Application Firewall that works with Apache. It uses a flexible rule engine to perform simple and complex operations to prevent attacks like (SQL injection ,

cross-site scripting, trojans, bad user agents and much more).

By default, ModSecurity isn't installed[8]. To install ModSecurity, follow these steps.

- Open a terminal window on your Apache server.
- Issue the command `sudo apt-get install lib-apache2-modsecurity`.
- Rename the sample config file with the command `sudo mv /etc/modsecurity/modsecurity.conf-recommended .`
- Open the newly created file for editing with the command `sudo nano /etc/modsecurity/modsecurity.conf`.
- Add the line `SecRuleEngine On` in the rule engine initialization section.
- Restart Apache with the command `sudo service apache2 restart`.
- to edit the ModSecurity configuration file.
- Open that files with the command `sudo nano /etc/apache2/mods-enabled/security2.conf` and add the following lines:  

```
IncludeOptional
"/usr/share/modsecurity-crs/*.conf"
IncludeOptional
"/usr/share/modsecurity-crs/base_rules/*.conf"
```
- Save and close that file and restart Apache with the command `sudo service apache2 restart`.
- **Limit large requests by default,** Apache does not set a limit to the size of HTTP

requests it will accept; this can lead to an attacker sending a lot of data to take down the server. This is configured on a per-directory basis.

- **Restrict browsing to specific directories** the users to don't be able to browse outside of specific directories [9].

## 5. Design Phases

**The design consist of two essential phases and many others sub-phases**

### **1. The First Main Phase (The Administrator Side)**

The administrator login page of the designed E-library website. It contains two fields the username and password. If the administrator enter correct information, the system will redirect the administrator to Admin home page, otherwise the shows a message that the username or password error. The administrator have many responsibilities to do such as check the user that want to register in the electronic library (checking algorithm) ,add, delete new book or thesis, Reports Page and Resource books Report page.

#### **1-1 Checking (Authentication)**

##### **Algorithm**

**Input:** The request of registration

**Output:** Approve / or Disapprove the request of registration

**Step 1:** Begin

**Step 2:** the administrator take the information of user that entered in the registration form (name of user, date of birthday and his department in the university)

**Step 3:** the administrator search the Central Data Base about the information of the user to assurance the authorization (the registration department in the university control and continue update the central data base that have the names of all student and members of university)

**Step 4:**

**4.1** if the information of user found in the Central Database then

**4.1.1** The administrator search the Users Database (the users database control and update by the administrator of the system ) about the username and the password of the user to avoid the confliction and also to avoid register the same user with more than user name ,**if** the information not found in users data base **Then**

- \* The administrator approve the registration request
- \* Add the user name and the password and the registration information to the users database. **Otherwise**

**4.2** The administrator disapprove the registration request

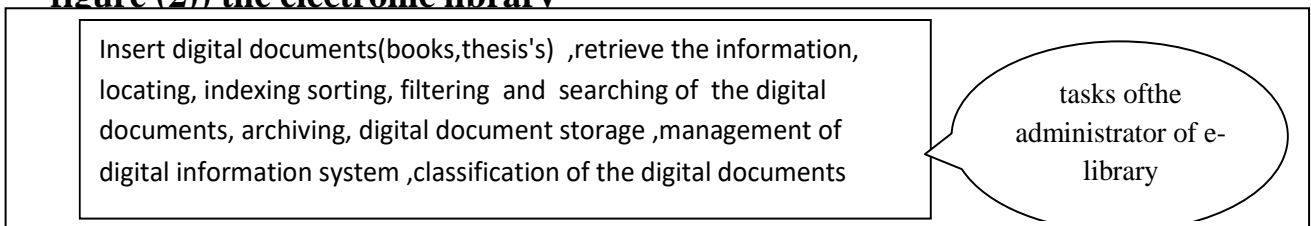
4.2.1 The administrator sends a declaration message to the user about reasons of disapproving the registration request.

Step 5: End.

**1-2 The Administrator Responsibilities**

The administrator have many responsibilities (as shown in the figure (2)) to do for manage the electronic library, These responsibilities are begin after the administrator login to page of the designed E-library website. It contains two fields the username and password.

**figure (2)) the electronic library**



administrator to Admin home page, otherwise the shows a message to user that the username or password error, the administrator responsibilities are:

**a. Add New (Book, thesis )**

The Add books, **thesis's** page of the e-library website allows the administrator of to add information

and digital copy of the book to the system as shown in figure (3), the information are (Book Title, Library Class, Book Class, Book Author, Edition Number, The Publisher, Number Of Copies, Resource Of Textbox, ISBN, Date Of Insertion, The type of file of book, The Chosen Department ).

**Figure (3) Add New Book Page.**

**b. Delete Books page**

The edit books page of the designed e-library website allows the administrator of the website to edit information or make a digital copy of the required books, also It allows the administrator to delete books. To delete any book or thesis, the administrator must enter the book title and author to search the database of e-books and find it, then all the information about the book will appear .The administrator may delete the book and its information, the same process will execute when

the administrator want to delete any thesis.

**c. Reports Page**

The reports page of the administrator phase of E-library website contains the reports about books like resource books report, books specialty report and textbox report as shown in figure (4). It also contains report for thesis like thesis title reports and Supervisor report for example (**Resource books Report page:** It presents report contains book name, author, number of book copies and publish date).

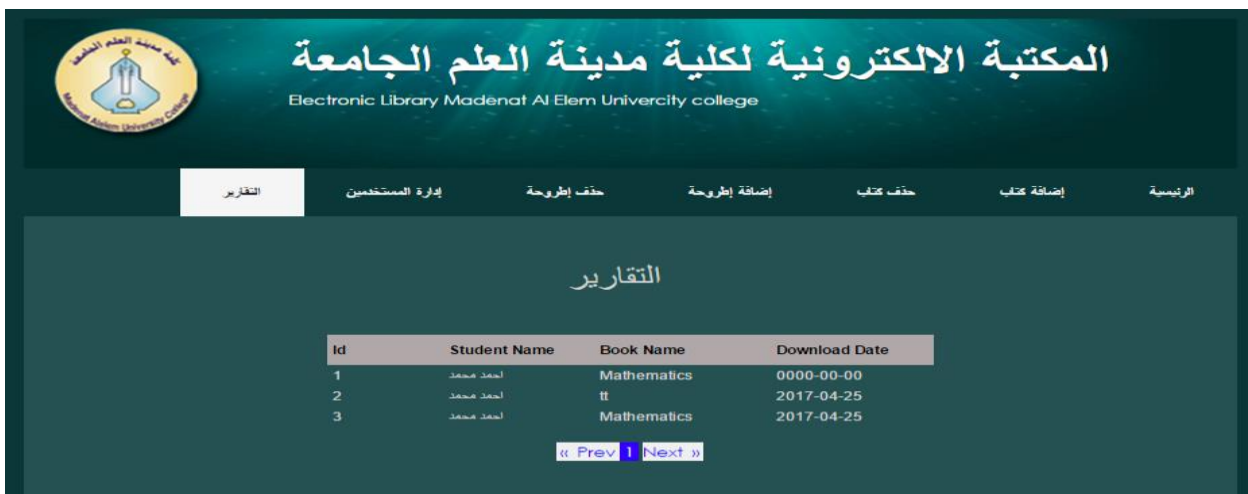
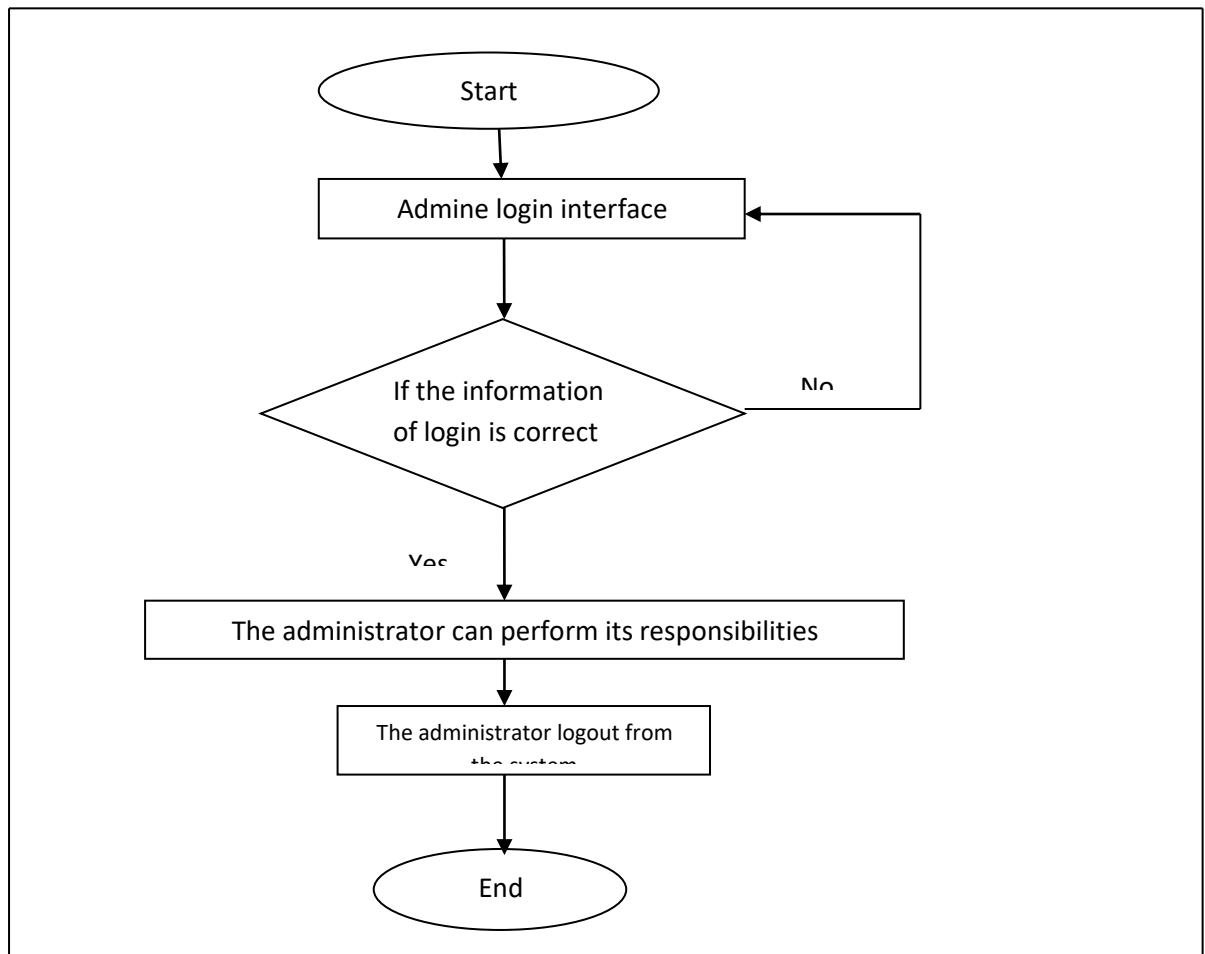


Figure (4) Resource books report page.

**2. The Second Main Phase (The User(Student) Side )**

The Users of the E-library can be accessed at anytime and anywhere through the designed GUI interfaces

using the internet browser . The E-library website can be accessed using various types of client devices such desktop, laptop or mobile devices as shown in the Figure (5).



**Figure (5)** The administrator login and logout

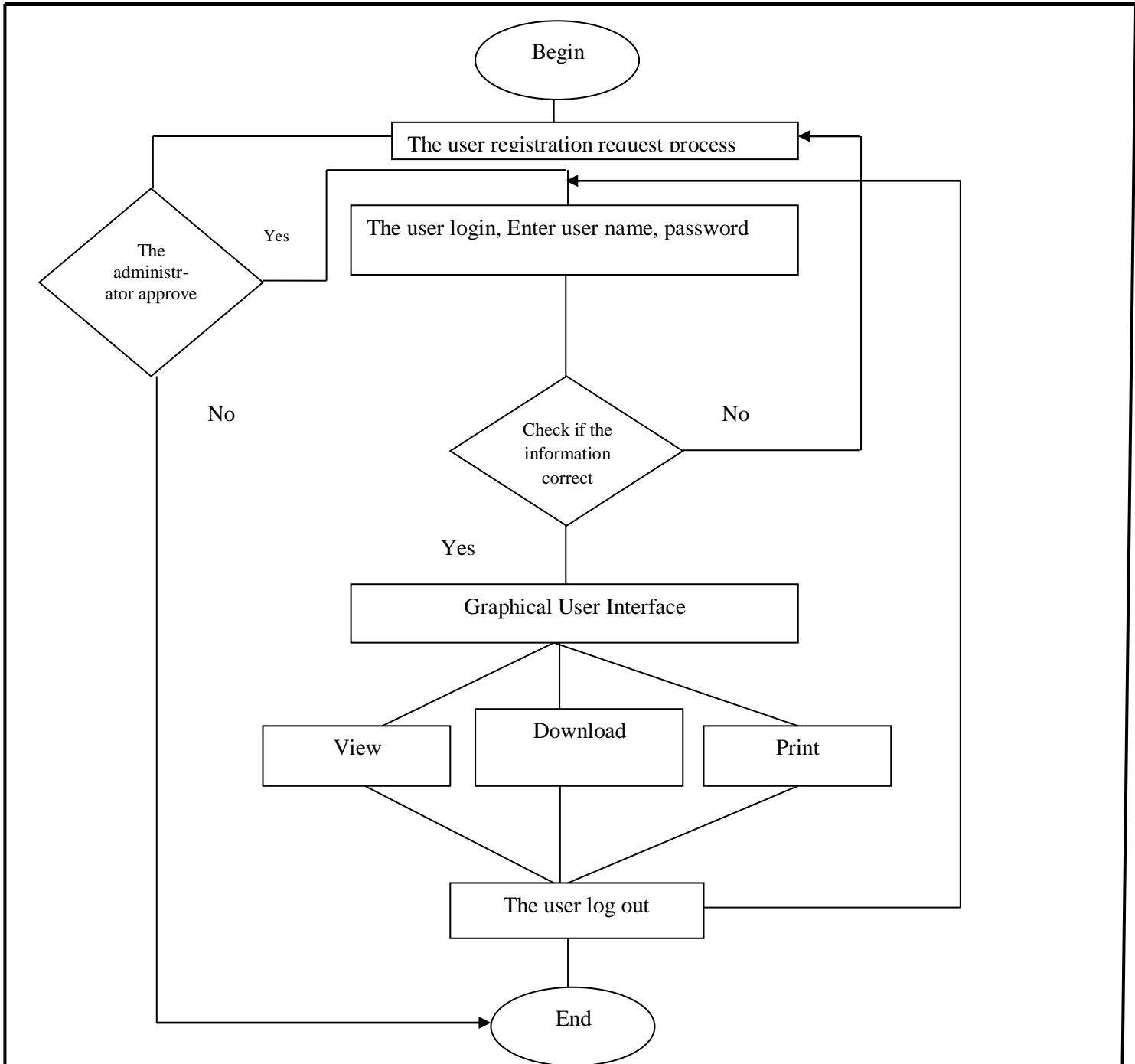
Then if the user it the first time he visit the website he must be registrations otherwise he must be login to the system, The main function that the user can perform can be divided into three parts: user registration, user login and user logout of website .

**2-1 Algorithms Of User Side**

To assure the authentication of the user of the online e-library, the user must perform some actions such as the registration in the website, login and after he visits the website, he

must logout of e-library. Figure (6) illustrate the user side.





**Figure (6)** The user side

**2-1-1 Login Algorithm**

**Input:** The username and password

**Output:** Redirect the user to user's home page.

**Step 1: Begin**

**Step 2:** If the user enter correct information, the system will redirect the user to user's home page (this mean the user was registered in the website previously) and he can perform the operation that specified to him (**user operations algorithm**)

**Step 3:** otherwise the shows a message to user that the username or password error.( **this mean the user wasn't registered in the website previously**) ) the user must first complete the Registration process (**Registration Algorithm**) before login to the system

**Step 4: End.**

**2-1-2 Registration Algorithm**  
**(Figure (7))**

**Input:** The user information

**Output:** Complete the user registration process

**Step 1: Begin.**

**Step 2:** The user fills the registration field: name, e-mail, password, date of birthday, department.

**Step 3:**the user click register button

**Step4:** After that the registration request is displayed for the administrator.

- **If** the administrators approve student registration (Administration Algorithm), then the student can access to e-library via username and password.

- **Else** message is displayed to the student that this username and password is not registered

**Step5: End.**



**Figure (7)** Student registration page.

**2-1-3 User Operations Algorithm**

**Input:** The user login to the website.

**Output:** The user view or download the books or thesis .

**Step 1: Begin**

**Step 2:** The user login to website by enter the correct user name and password in user management Interface

**Step 3:** If the user selects the books page of the e-library website. It views the books archived in e-library with basic information like book name, author, ISBN and publish year this page allows the students to **view** and **download** books and also search for books using book title and author.

Else if the user selects thesis page, it views the thesis archived in e-library with basic information like thesis title, researcher name and supervisor. This page allows the students to **view** and **download** thesis and also search for thesis using thesis title, researcher of supervisor.

**Step 4:** The user must logout from the website after he finish his work

**Step 5: End.**

## Conclusion

With the development of science and technology, The E-library plays an important role in education sector these days. Its success depends upon the sharing of useful information and documentation of it. The Electronic libraries can provide a vehicle for extending collaboration, which is at the heart of the academy, with the aim of more effective education. The Digital Libraries basically store materials in electronic format and the administrator can use an E-library management system to add,

modify or delete the objects from the database by using online control that is protected with a username and password and e-mail for more authentication also The e-library system facilitates of different departments in the same universities to access, search and download the required books and thesis's.

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