International Journal of Theoretical & Applied Sciences, 10(1): 178-184(2018)

ISSN No. (Print): 0975-1718
ISSN No. (Online): 2249-3247

Online Library Management System with RFID

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(Received 15 January 2018, Accepted 15 March, 2018)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: A Library Management System (LMS) is a tool to help any libraries which are still using the old way to manage their library. Libraries are growing very fast every day. Need to manage huge books, journals, magazines along with the database has become a tedious task. Older methods of managing the whole library and database has become outdated and inefficient. System involving various tasks of library such as adding new member, books, updating the information of borrow and return of books, collection of fine need to be automated. the proposed system uses device which operates on radio frequency and is of negligible cost. In this paper we proposed RFID that will help to lessen the burden of work of librarian and the owner since manual work will be reduced and whole task will be automated and Online. The online Library Management system with RFID, making the library online will make the resources available at any place and at any time.

Keywords: Library, RFID Tags, ARDUINO IDE, Asp.Net,

I. INTRODUCTION

With the rising competition in the every field the need of automation is becoming very important. Earlier the automation was used to do precise jobs but now automation is necessary to make every job quicker. is a boom in the industry to use RFID technology[1] in the recent years. The proposed project title "Online Library Management System with RFID" serves the same purpose at library where sorting, searching and insertion of books and users was the necessity. It can be implemented in schools or colleges libraries as per need . This is different from the Library Management Systems built so far in which librarian was required to enter the data manually. In our project preciseness of software has been combined with the feasibility of hardware i.e. RFID-RC522, Mifare tags and ArduinoUno ATmega328P microcontroller has been used.

II. OBJECTIVE OF THE PAPER

The main objectives of this project proposed in the paper are:

i) Issue and return of books with help of RFID reader and tags.
ii) Search the books available in the library.
iii) Track the history of books issued and returned by students and fine levied.
iv) Maintenance of Students and books details with help of SQL Server.
v) User Friendly Interface to manage Student and Books.

III. LITERATURE SURVEY

The existing system in the libraries is performing the tasks manually in library registers. Record of students of every class is written on registers where details of the book they issued along with the return detail is mentioned. Similarly record is maintained for faculty of the school. Books have been arranged in various shelves on the basis of their genre. Hence the whole process of issuing and returning of books seems tedious.

Even the systems developed do not use high-tech software's for library management. 'Online Library Management System' focuses on day to day operations in library such as the user searching for desired book, issue and then return the book [8]. This was developed for 32-bit windows operating systems. The disadvantage is managing the library manually by a librarian.

IV. PROPOSED SYSTEM

The project is a windows-based desktop application developed in.NET using web-form. This system will work on the basis of information stored in RFID tags which will be attached on the back-side of the book. Information will be read by RFID tag reader and will be transfer to the database of SQL server.

On the basis of authentication ad authorization process, users are allowed to access the data and make necessary changes to it. Utmost care has been taken to remove manual book keeping of records, reduce time consumption as line of sight and manual interaction are not needed for RFID-tag reading and improve utilization of resources like manpower, infrastructure etc[4].The project discussed in the paper is a simulation to the projects which can be developed for huge libraries and has not been yet made online.

A. Specific Requirements

The system is expected to perform the following functions:

Functional Requirements

(i) System should be able to enter issue information in database.
(ii) System should be able to search if book is available or not before issuing book.
(iii) An interface to manage the system
(iv) System should be able to enter issue and return date information.
(v) System should be able to for the imposition of fine for late returning of books.

Non-Functional Requirements

(i) User friendly interface to manage the system.
(ii) High performance rate
(iii) System should be reliable.
(iv) System should be able to recover in case of any failure.

System Requirements

(i) Windows platform
(ii) .NET framework
(iii) SQL Server database
(iv) Minimum 2 GB RAM
(v) Arduino UNO ATmega328P Microcontroller
(vi) MiFare RFID Tag(attached on the back cover of book)

B. Project Functions

For the proper development of the project hardware and software chosen plays an important part. Following are the well explained jobs which the project will serve-
(i) Computerized- The whole work load has been shifted to computers and the need to keep manual records has been eliminated
(ii) User friendly –It handles data easily by providing user friendly software.
(iii) Information - Proper information of the user can be abstracted according to the query.
(iv) Reports- Reports will be generated automatically on a click of one button as per the requirement.
(v) Database–Databases are maintained properly and data can be fetched easily from them using simple queries and joins
(vi) Sort and Modify–Data such as student's profile can be easily modified using modify option.
(vii) Searching–Data for any book or any user can be searched easily thus, making it user-friendly.
(viii) Data security–Passwords are saved in databases using encryption which are hard to crack thus ensuring that data is secured in databases[5].
(ix) Less Time – Since addition and retrieval of data has been made so simple, hence it saves the time of user.

C. User Characteristics

There are two types of users in our system:
i)Admin: Admin can add, remove, update, and search books and students. He is the only user who directly interacts with the system.
ii)Student: Student can issue and return books with the help of admin. He cannot directly interact with the system. Details of each student and book is stored in database.

V. METHODOLOGY

In this paper weuse the following tools and technology for the development of the project-

A. Arduino IDE

Arduino IDE [2] is an open source Arduino Software .Arduino is a family of microcontrollers and code is written on its board. it is compatible on all the platforms such as Windows, Linux etc. IDE is used to write the code on the board which makes it user friendly.

B. Visual Studio

It is an IDE [3] that is used for developing applications for mobile or window based applications. It is a product of Microsoft and variety of languages are supported by it such as VB.NET,C# etc. It is known to use the .NET framework as provided by Microsoft
This project uses Visual Studio to develop a Windows Form desktop application using C#.

C. Radio- Frequency Identification

Commonly known as RFID, it uses the radio wave frequency for detecting and tracking the products on which RFID tags are attached. It is of more benefit than barcodes which are in use since decades. it can detect the tags from certain distance in centimetres whereas it is not so in case of barcodes. Antenna receives and send the signals and its Microchip stores the information and processes it further. each of the tag contains special number which is unique amongst all.

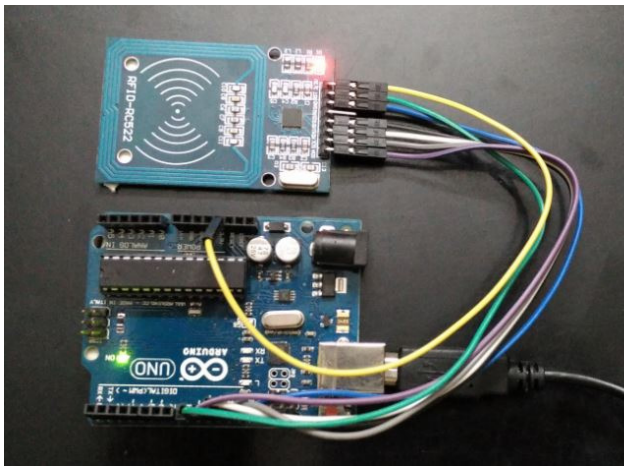

Fig. 1. Hardware (RFID Reader and Arduino UNO).

Different use cases used in the project are:
(i) Issue Book: using this module Admin(Librarian) can issue book to a user (Student)
(ii) Return Book: using this module Admin (Librarian) can return book issued to the user (Student).
(iii) Add Book: using this module Admin (Librarian) can add new books to the catalogue.
(iv) Remove Book: using this module Admin (Librarian) can remove books from the catalogue.
(v) Search Book: using this module Admin (Librarian) can search books available in catalogue.
(vi) Updates Book: using this module Admin (Librarian) can add update the details of books in the catalogue.
(vii) Add Student: using this module Admin (Librarian) can add new student.

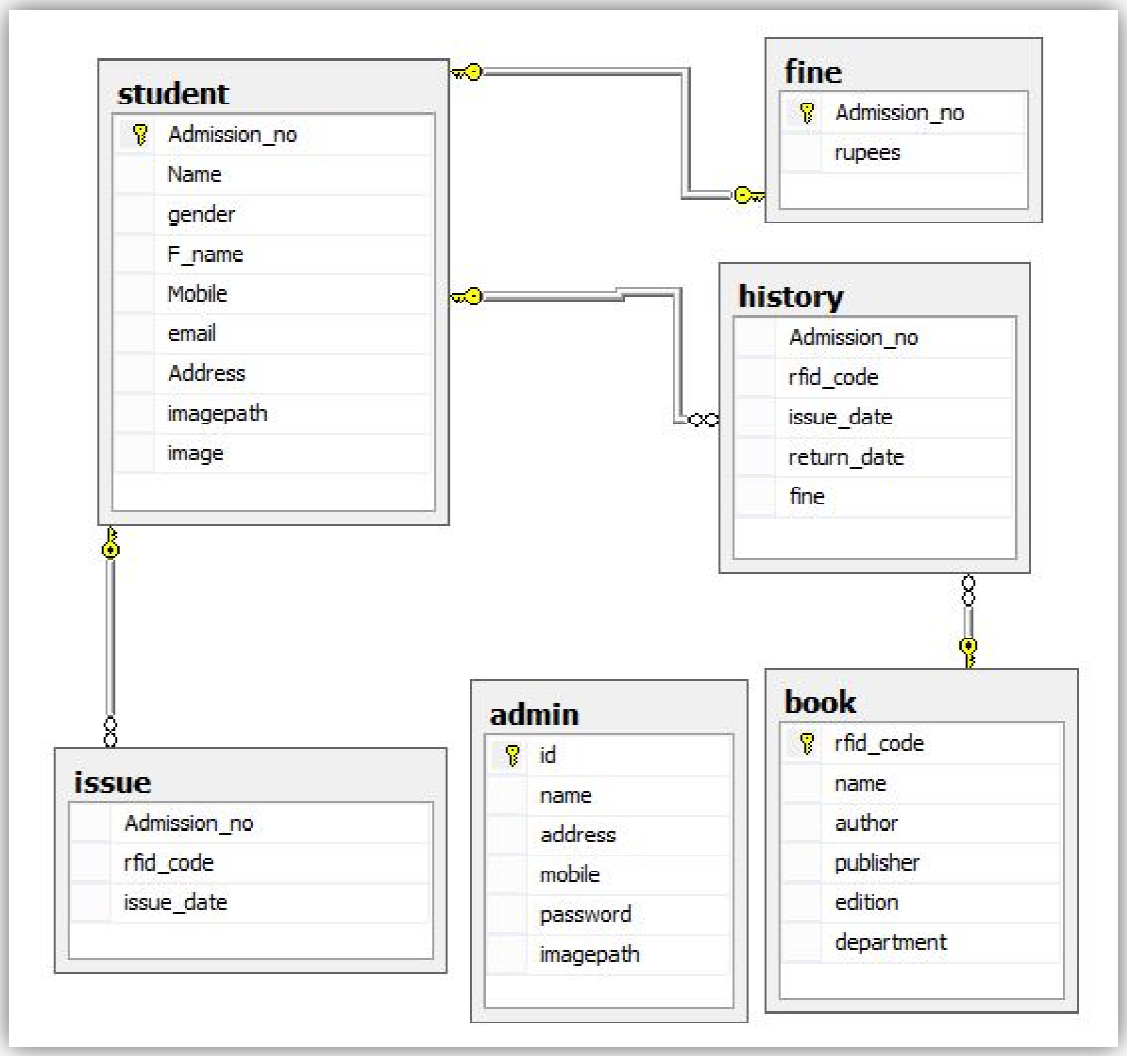

Fig. 2. Database Diagram.

Certain tables have been used in the model and their connections with each other have been shown in the diagram below- student table, admin table, book table, history table, issue table, fine table. each one of them have specific columns and data is recorded accordingly. Entry into system is done when admin authenticated with the password along with his username. after login, he can visit any of the tabs such as student, book, issue, return. In student corner, he can add new student, remove old student or update information about any student. In book corner he can add or remove books. Issuing of book is automated through RFID tags scanner as information goes automatically in the database without any manual work. Admin can also check fine details of any student if number of days for the issue exceed 7. Finally he has to logout to protect the privacy and authenticity of the system.

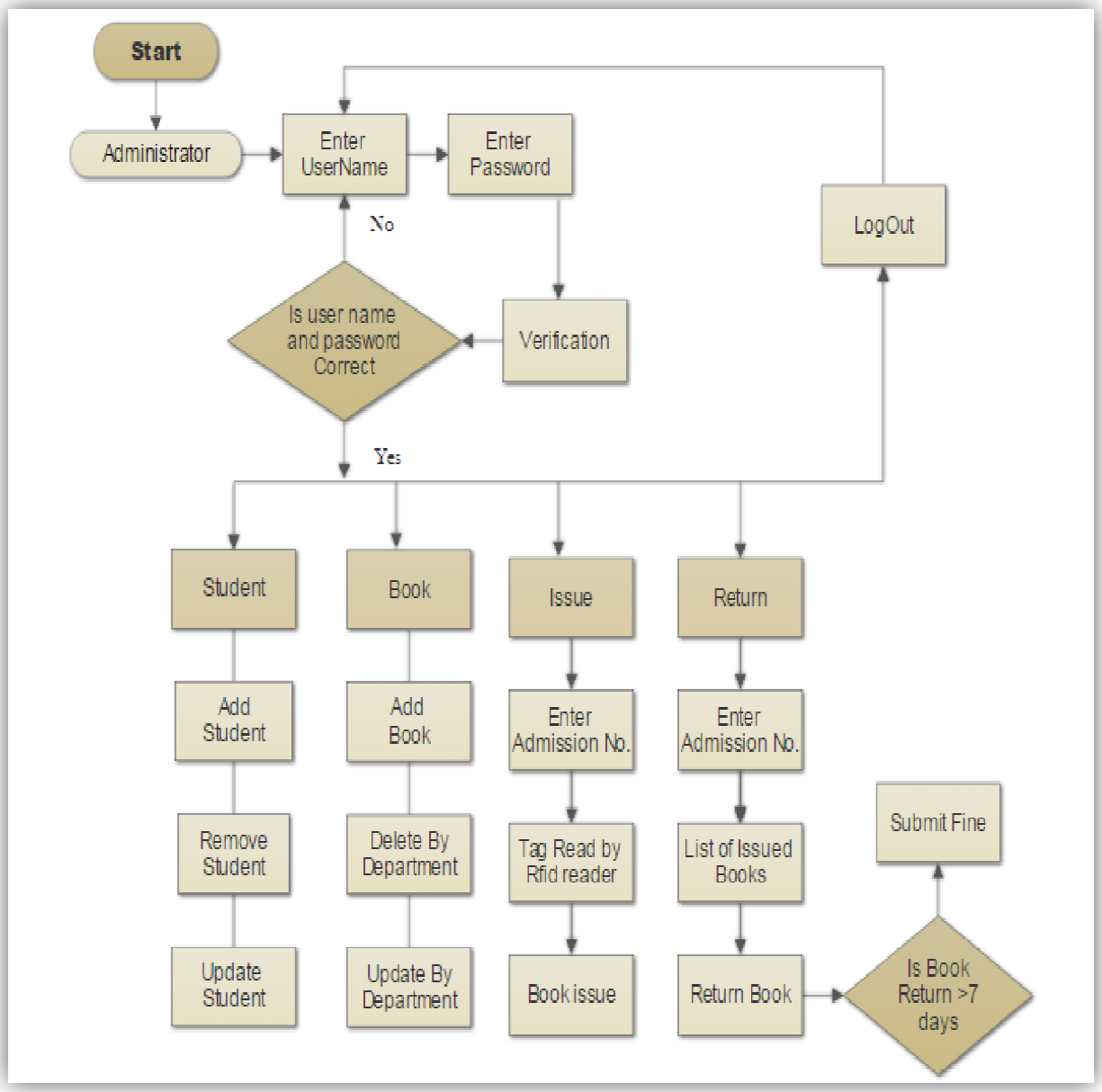

Fig. 3. Flowchart for the Proposed Model.

VI. IMPLEMENTATION OUTPUT

A. Login Page

Admin is required to fill his username and password to enter the system.

Fig. 4. Login Form.

B. Student Form

Admin can add, delete, update or search any student from the database manually.

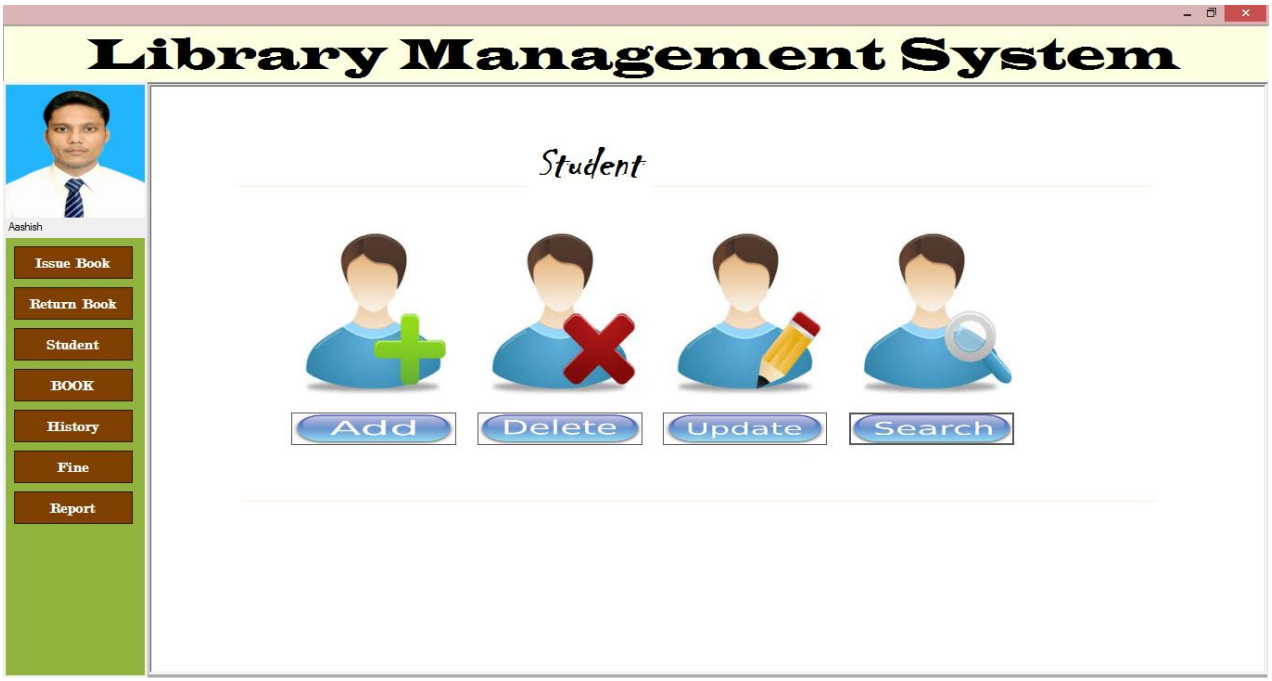

Fig. 5. Manage Student Form.

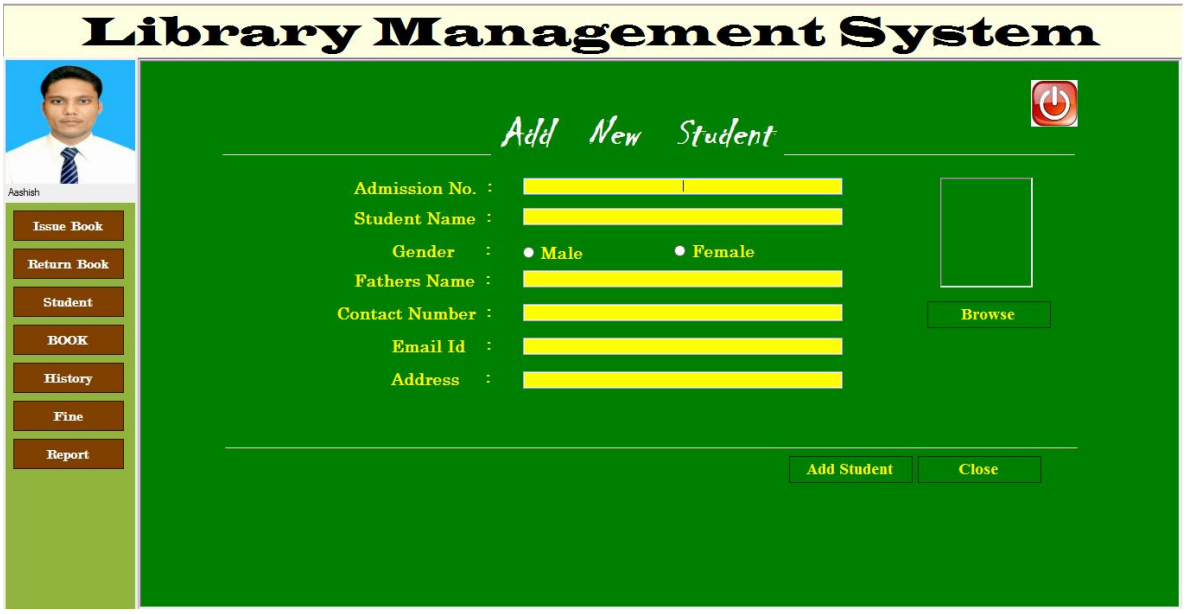

Fig. 6. Add Student Form.

C. Book Form

Books can be added, deleted, updated or searched from the database.

Fig. 7. Manage Book Form.

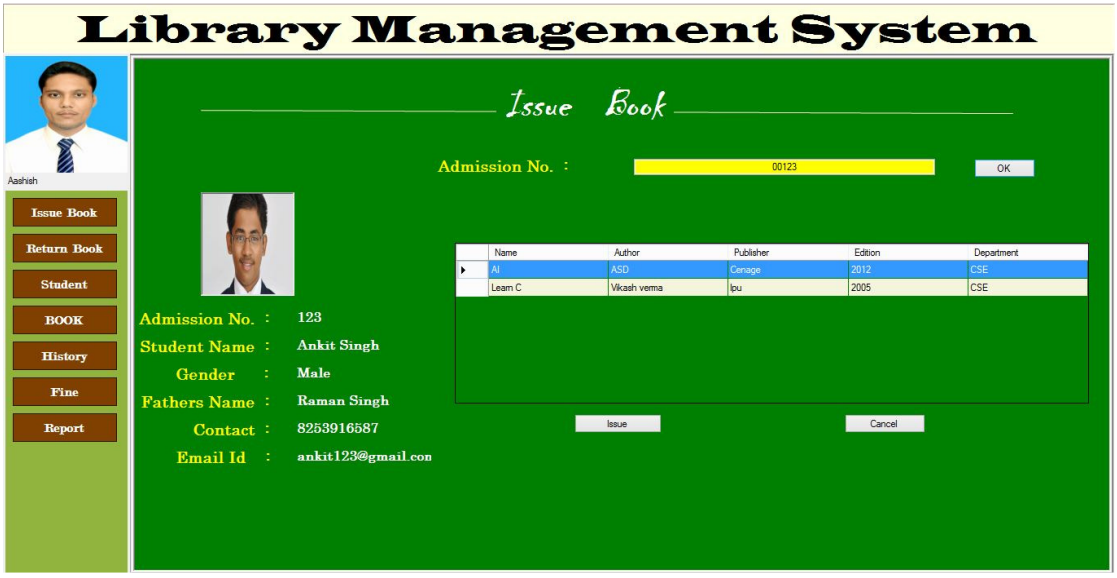

Fig. 8. Issue Book Form.

VII. CONCLUSION & FUTUTRE WORK

RFID System will prove to be helpful in many situations such as theft, self checkout, sorting of books etc [6]. Thus, manpower and infrastructure costs are reduced significantly. RFID tags are of low cost which makes it pocket friendly too. Password are stored in encrypted form which makes the system more secure and sound. Android application [7] can be build and can be interconnected with the application. Information reading and storing algorithms can be improved for security reasons. GUI system can be made more interactive. More options such as sorting of books according to genre, free online journals can be added to the application.

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