Automation of A.T.E.C Central Library : A Case Study

Bhojaraju G.
Central Library
Fr.C.Rodrigues Institute of Technology
(Fr.Agnel Technical Education Complex)
Sector 9A, Vashi,
Navi Mumbai–400 703.
e-mail: bhojarajug@yahoo.com

Abstract
This paper is a case study of automation undertaken at ATEC central library. The paper describes in detail the development of automation procedures and applied tools.
1 Introduction

The automation of libraries and information centers in India started in middle 1950’s till 1980’s the concept of automation was centered around the use of computers for housekeeping operations and information services by individual libraries. There are certain factors responsible for the automation of the libraries. Information explosion, increased user’s demand, labour intensive nature of work, changing concepts of documents.

Application of modern management techniques, reduced response time and need for resource sharing are important elements. With the tremendous capabilities of computer, libraries started using computers for the in-house operations.

The scope of the study is the A.T.E.C. Central library in all its respects such as in-house operations, its automation, information services etc. Since the computerization started in 1995 the same period is taken for the study. The study will bring out its strength and weakness that will help the library to improve the system to user’s satisfaction.

2 Agnel technical education complex: a profile

Agnel Technical Education Complex comprises of the following institutions:
- Agnel Polytechnic
- Fr.Agnel Industrial Training Institute
- Fr.C. Rodrigues Institute of Management Studies

3 A.T.E.C central library: an overview

The library is the lung of every educational institute which breathes knowledge and information into the minds of the students. The Agnel Technical Education Complex has a well equipped Central Library with an elaborate collection of books, journals, project reports, AV- materials and other resources to serve its users.

COLLECTION DEVELOPMENT

The A.T.E.C Central Library came into existence in the year 1983. The Central Library is equipped with a good no. of national and international books, journals in the field of Engineering, Humanities, Physics, Chemistry, Mathematics, English, Management, Research Methodology and General reading, etc. and also with the modern and latest
technology to cope up with latest development to provide quality and quick services to its users.

The main objectives of the Central Library is to support staff and students of Engineering, Polytechnic, ITI and Management with the view to provide up-to-date knowledge.

**STATISTICS FOR THE YEAR 2000-2001**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>19,422</td>
</tr>
<tr>
<td>Journals</td>
<td>112</td>
</tr>
<tr>
<td>Bound Volumes</td>
<td>941</td>
</tr>
<tr>
<td>ISI Codes</td>
<td>650</td>
</tr>
<tr>
<td>Inplant Training / Project Reports</td>
<td>3167</td>
</tr>
<tr>
<td>AV-Materials</td>
<td>08</td>
</tr>
<tr>
<td>CD-Roms</td>
<td>140</td>
</tr>
<tr>
<td>Floppies</td>
<td>117</td>
</tr>
<tr>
<td>Charts</td>
<td>03</td>
</tr>
<tr>
<td>Transparencies</td>
<td>154</td>
</tr>
</tbody>
</table>

**Library Staff:** A.T.E.C Central Library has good team of qualified Professional, Semi-Professional, Non-Professional Staff.

**Library Services:** A.T.E.C Central Library is providing the following services to its users:
- Circulation
- Reference Service
- Current Awareness Service
- Reprographic Service
- Audio-Visual service
- OPAC
- E-mail and Internet
- CD-Rom Database
- Inter Library Loan
- Intranet

## 4 Automation of A.T.E.C central library

The term “Automation” describes the way in which a machine is programmed to do a job that a person might normally do. Automation is often used to assist with jobs which must be repeated over and over again.
“Library Automation” is a process of using computer-based system to do house-keeping operations. Such as acquisition, circulation, classification, cataloguing, stock-taking, etc.

Library automation which started in the late 1970’s in a few special libraries has now reached most of the university libraries. It is yet to take off in college libraries in India owing to various problems.

Agnel Technical Education Complex is one of the first institutes in Navi-Mumbai to have a computerized Library. Computerization started since 1995 and built a complete database of over 20,000 books, 1000 Current and Back Volumes of journals and reports. Further we have Online Services provided to our users through our **INTER LIBRARY LAN SYSTEM** consisting of 7 terminals connected to the Main Library Server storing our database. The **ONLINE PUBLIC ACCESS CATALOG (OPAC)** is used to carry out online searches of library database by Author, Title, Keywords and Accession Numbers which enables users to provide good reference service to staff and students.

The project was implemented at the A.T.E.C CENTRAL LIBRARY, VASHI. It deals with the automation of the entire library system thereby reducing paperwork and increasing efficiency. The functioning of the existing system was studied and following details were determined.

### 4.1 INITIAL STAGE: FOXPRO 2.6

#### 4.1.1 Book search

In the Initial Stage, there exists a computerized as well as manual search for books. The computerized searching can be done title-wise or author-wise. The user has to first logon to a terminal connected to the network. The interface is not a true graphical interface and is not very user friendly. The manual searching is done with the help of cards. Each book in the library is represented by a card, which contains the title, author, subject and its location. All these cards are kept in the library so that the member can go through the list of titles that are available in the library.

#### 4.1.2 Circulation of books

The process of issue and return of books is manual. Each book has a card associated with it. When the book is issued, the member's roll-no is entered on the card along with the date of issue. The date of return is also entered along with the issue date. The library card of the student is then kept along with the book-card at the issue counter. When the member returns the book the date is compared along with the actual date the book was to be returned and the fine if any is calculated. The library card is returned to the member who can issue another book.

#### 4.1.3 Fine calculation
The fine calculation is manual. When a book is returned the date is compared with the return date on the book-card. If the book is returned late then a fine of 50 paise per day is charged. If the late period increases beyond seven days, then a fine of Re.1 per day is charged. The maximum fine that can be charged is Rs.100.

4.1.4 Entry of new books

The process of entry of new books is computerized. It is done using Microsoft FoxPro. The book details are entered in a form and then stored in the database. If many copies of the same book are purchased, each copy has to be entered separately. This process is time consuming and tedious.

4.1.5 Drawbacks of the existing system

The existing system has many drawbacks, which can be listed as:
- The process of issue and return of books is manual and time consuming.
- The fine calculation is manual and hence prone to mistakes.
- The interface for searching of books is not user friendly.
- The book search facility is slow and does not always give correct results.
- The entry of new books is time consuming and tedious.
- There is no provision for the members to recommend any books.
- There is no provision for the members to reserve books.

4.2 SECOND STAGE: MYSQL / PHP

4.2.1 General overview

Before embarking on the project, various technologies, programming languages, candidate platforms and software were studied in order to be able to select which were the most appropriate choices for the proposed system. This was done by reading books on each subject, surfing the internet for information and seeking the expert opinion of experienced people in the IT industry.

4.2.2 Platforms

Three possible candidate platforms for the server were available:
1. Unix or Linux based
   1.1 Linux or Unix Operating System
   1.2 Apache Web Server
   1.3 PHP script, CGI programming with Perl, etc
2. Microsoft – Windows NT based
   2.1 Windows NT server 4 Operating System
   2.2 Internet Information Server
2.3 Active Server Pages

3. Servlet Based
   3.1 Either Windows NT Server or Linux Operating System
   3.2 Java Web Server
   3.3 Java Servlets

The application for the entire library system is to be implemented over a client server setup having one server and five clients. The server and clients are to be implemented on Pentium machines running Linux or Windows NT® Server.

4.2.3 Technologies selected

Unix or Linux based
   • Linux or Unix operating system
   • Apache Web Server
   • PHP script, CGI programming with Perl, etc

4.2.3.1 Reasons why above technologies were selected

• All software packages are free: The principal software packages used are Linux, PHP, MySql, Apache Web Server. Most of these packages are distributed with the GNU public license, which means that they are free. Some of these packages are also open source softwares, which means that their source code is also freely available.
• Compatibility: PHP (scripting language), MySql (database), Apache Web Server are native Linux based softwares. They were originally created for Linux or Unix based systems. The integration between them is totally seamless.
• Documentation and support easily available: All the above mentioned softwares have tremendous resources on the Internet. Documentation is provided at all the respective sites. Since the softwares are free, support is also available freely with no time limits or extra charges for providing support. In addition there are many other sites offering forums for discussion and mailing lists.
• Security: Linux operating system was created for building a system that would have security even in a multi-user environment. Security comes in-built with Linux so no additional softwares are required for providing security. Till today there are almost no viruses for a Linux based system.

Apache provides security through its client server interface. Automatic data encryption can be provided through use of SSL.

PHP can also be used to provide security by verifying a users access, that is stored in a database.
• Stability: Linux is built to ignore breakdowns in parts of its operating system and continue to run without a system shutdown. Also bugs can be fixed while the
operating system is running, this is required in server. Linux’s inherent stability along the seamless integration of all other software on it make the entire system very stable.

4.2.4 Client – server model

The Client Server model is suitable for systems that are smaller in size and less resource hungry on the server side. This system is suitable especially within an organization.

Multiple clients can submit requests for service or for some processing to the server. The server executes the requests or performs the processing and then passes the results back to the respective client. Here, the request submission - processing - returning of results takes place transparent to the user sitting at the client terminal.

Since all applications are run on the server, there is a good amount of security and protection to the application programs from any possible attempt to tamper with the system from the client side.

There are several advantages of implementing the system using the Client – Server model

• The system will be fully functional as soon as the server is setup and connected.
• No additional client side installation of software is required except for the basic operating system. By just typing the URL of the site the application will be available to him/her.
• The system will be platform independent on the client side i.e. the system will be accessible to all users, irrespective of the operating systems they are using.
• The system has a good amount of security that is inherent in the client server model, also additional security can easily be provided.
• The system can be easily extended to the Internet to make it available to remote users, and with minimum additional setup.

4.2.5 Server system setup

The server setup will consist of Linux Operating System along with the accompanying Web Server i.e. the Apache server. To handle the data required to be stored on the system MySQL has been chosen as the Database Management System. To perform all the HTML embedded scripting operations PHP has been chosen for scripting operation and the generation of pages. In addition Javascript was also used for some additional features.

4.2.5.1 MySQL

The main factor in favor of MySQL is that it is available at no cost and is freely downloadable from the Internet. If one is looking for a free or inexpensive database management system, several are available from which to choose: MySQL, mSQL, PostgreSQL, etc. But MySQL, one of the most popular databases, has many advantages. MySQL scores over other databases as described below:
4.2.5.2 PHP

Many web sites contain static content, such as academic papers or articles. These sites' pages are documents consisting of simple text, images, and hyperlinks to other documents. For this type of web site, simple client-side technologies generally suffice. HTML and Cascading Style Sheets (CSS) provide the means to structure and present page content, and JavaScript allows one to spice it up a bit if desired.

Increasingly, however, the Internet and intranets are being used for applications, most of which incorporate databases. These sites and applications are dynamic, because their content will vary according to the data involved and the actions of the user. This is where PHP comes in. By running PHP programs on the server you can create very powerful applications that interact with a database and generate content dynamically.

The main difference between PHP pages and HTML pages is how the web server deals with them.

4.2.5.3.1 What happens to HTML Pages?

When a request for a page comes from the browser, the web server performs three steps:
- Read the request from the browser.
- Find the page on the server.
- Send the page back across the Internet (or Intranet) to the browser.

4.2.5.3.2 What happens to PHP Pages?

PHP adds an additional step to the whole process. Instead of throwing a static HTML page to the user, we want the server to make some actions according to our PHP code: the PHP will make some decisions and create a page that is appropriate for the exact situation, Thus, when using PHP the server actions are as follows:
- Read the request from the browser.
- Find the page on the server.
- Perform any instructions provided in PHP to modify the page.
- Send the page back across the Internet (or Intranet) to the browser.
4.2.6 Client system setup

The system will be designed to be platform independent for users of the system. However, within the library Windows NT would be installed on all client machines. Here Windows NT provides some basic security and also a GUI based browser supporting scripting. Internet Explorer would be most suitable. It is a multi-user, multitasking, and multithreading operating system.

5 Library management system: an analysis

5.1 REQUIREMENT SPECIFICATION

The main requirements of the new proposed system are:

- The main requirement is an efficient search facility for the books, journals and project reports. The search facility should be fast, user friendly and accurate.
- Another important requirement is to automate the process of issue-return of books. The current system follows the manual method of issue & return of books. The new system should increase the efficiency & reduce the paperwork involved in the circulation of books.
- The calculation of fine on overdue books should be calculated automatically at the time of returning the books. Manual error in calculating the fine should be eliminated.
- The new system should provide members a facility for recommending the books that they would like the library to keep.
- The system should allow easy updating of the database when new books, journals, or project reports are being entered or existing ones are modified.

5.2 ANALYSIS

On analysis of the system, the entire project can be considered to made of the following modules:

- **Login:** This page offers separate login to each User to have their own Username and Password for their login which ensures the security of the system. After login, the user can access to the Main Page of the Library System.
- **Main Page:** provides a brief information about the Central Library. It shows all the Modules of the Library Software, New Arrivals to the Library, Most Searched for easy retrieval of required information which saves search time.
• **Search Module**: This module implements the searching of books, journals, & project reports. The member enters the search string and can perform the search by author, by title or by accession number. This module accepts the search string & matches the string in the corresponding field of the books, journals, or project report databases. All matching results are displayed as the result of the search operation. Each result in the list of results itself acts as a link to give further details about it.

• **Circulation of Books**: This module implements the issue-return of books. At the time of issue, this module stores the member number of the member issuing the book, the accession number of the book being issued, and the date of issue.
The return date is calculated accordingly and all these details are stored in a separate database. At the time of return of books, the database is referenced to retrieve the details of the books issued by the member. The current date is matched with the actual return date of the book being returned and the fine, if any, is calculated. Once the book is returned, the corresponding entry is deleted from the issue database. Thus the process of issue and return of books is automated.

- **Entry/Modification of Books, Journals, Reports and Members:** This module deals with the entry of new books, journals, reports, and members and accordingly updates all the concerned databases. During the entry of books, this module first checks the existing book database to see if a copy of the book is already exists. If yes, then the book is assigned the same bookid and the other details are then entered accordingly and the database is updated. If no other copy of the book exists, then the book is first assigned a unique bookid and then the other details of the book are entered and the database is updated. A similar procedure is followed while entering details of members, journals, and project reports. During modification of existing books, the module first searches for the books in the database and retrieves its details. It then allows the librarian to make the required modifications and finally updates the database. Similar procedure is used to update details of journals, project reports and members.

- **Recommendation:** This module allows members to recommend the books they would like the library to keep. This module mainly consists of a form to be filled up by the members. The member enters the name, author and other details (optional) of the book, along with his member number. All these details are then stored in a recommendations database. The list of books that are recommended are made periodically by referencing this database, and are sent for approval by the concerned authorities. The approved books are then purchased and kept in the library.

- **Reservation:** This module allows members to reserve books the need in advance. This module works in association with the issue-return module. If all copies of a particular book are issued and a member requires that book, he can reserve the book. The member number, the bookid, and the time of reservation are entered in a database called the reservation database. When any book is returned, the reservation database is checked to see if the book has been reserved. If yes, then the book is marked and is not available for issue to any other member, except to the member who reserved it. When the member who had reserved the book, issues it, the corresponding entry is deleted from the reservation database. Each reservation is valid only for a certain time period from the time the book is returned, after which, the reservation stands cancelled and the book can be issued by any members.

### 6 Observations and conclusions

The A.T.E.C Central Library is having an in-house Library Management Software developed by the students of the Computer Engineering with the help of Librarian, through which computerized information services are provided to its users. Here are some observations and findings:
6.1 MAINTENANCE OF HARDWARE AND SOFTWARE

**Hardware Maintenance:** The common problems like PC’s hanging, printer out of order, electricity failure occurring frequently are observed.

**Software Maintenance:** Library has installed in-house created Library Management Software for management of library database. Right from the installation library is facing maintenance problem. Data entry errors, indexing, missing records, editing of data, etc. Are major problems.

Database administration is maintained by the software programmer and by the librarian. There should be co-ordination among these two persons.

6.2 TRAINING THE STAFF

Trained IT staff become the necessity of present IT revolutionized scenario. Staff should be computer literate. All the professional staff must be trained and provide learning environment. Unfortunately such free and healthy environment not found in the library. Deputing staff for training programs, seminar and conferences enhance the knowledge, but these activities are becoming very rare due to the lack of interest from the staff and financial hurdles.

6.3 LIBRARY AND INFORMATION SERVICES

The Central Library is providing various services to its users. Also hoping to provide a better and qualitative services when the Intranet is implemented within the Campus in a short period.

6.4 AUTOMATION OF HOUSE–KEEPING OPERATIONS

Earlier the project was planned to make Circulation and Search modules with the expandability options. Now the Software programmer with the help of the Librarian has created other modules like Serials Control, Stock Verification, Accounting, etc. Bar-coding has been done for all the books. For journals, bound volumes, projects, etc. bar-coding will be done in the near future.

6.5 ENHANCEMENTS POSSIBLE

Like all other systems, the Library Automation system has some aspects that can be improved upon. These are as follows:

- Students can be emailed when their reserved books are available.
- Reminders can also be mailed to students when the books issued to them are overdue.
- Pages from Internet sites, articles from the latest journals that can be scanned can be stored in database, where the students can reference them easily.
• Books can be stored online in order to provide students access to them, even without issuing them.

7 Conclusion

The library is the lung of every educational institute which breathes knowledge and information into the minds of the students. The Agnel Technical Education Complex has a well equipped Central Library with an elaborate collection of books, journals, project reports, AV materials and other resources to serve its users.

Agnel Technical Education Complex is one of the first institutes in Navi- Mumbai to have a computerized Library. Online Services provided to our users through our Inter Library LAN System in which users can access the library database from the Online Public Access Catalog (OPAC) and also helps to library staff to provide good reference service to staff and students.

8 REFERENCES