COURSE INFORMATION

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Course Title:	**Library Automation**
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Course Status:	Compulsory
Semester:	2nd
Required Study Hour:	1 hour per day
Course Edition:	First

COURSE TEAM

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COURSE GUIDE

INTRODUCTION

Welcome to **LIS 402: Library Automation**. This is a two-credit (2-CR) unit course which is compulsory for all undergraduate students in the Department. The essence of the course is to enable the students to understand the concept of library automation and its relevance to the world of work in today's library environment. Exposure to the course will facilitate an extraordinarily successful academic journey and enhance students' personal development and social status in the community of information professionals. Topics covered in the course include the definition of concepts; objectives, needs, importance, benefits and history of library automation; functions, basic requirements and areas and services of library automation, components of library automation, planning for automation, hardware and software selection procedures, system requirements, library automated system, process, system implementation, training, funding, and practical work based in libraries and information services.

The course guide tells you briefly what to expect from reading the accompanying study material. In addition, it provides you with information on how to make the best use of it to achieve success. So make sure you read it carefully and follow the instructions and suggestions.

COURSE AIMS

Today, libraries play two distinct roles –as a local centre of information and knowledge and as gateways to information sources and resources. Moreover, information and communication technology developments brought drastic changes in how information is collected, stored, retrieved and distributed. As such, several existing specialised databases, online information services, and resource-sharing networks necessitate the application of computers for libraries to harness the possibilities offered by these developments. Therefore, library and information science graduates must be prepared and equipped with the skills needed to assume responsible positions in library and information centres.

This course aims to introduce you to the concepts of and general knowledge in library automation. This will entail a thorough understanding of the application and use of computer systems, related devices and technologies generally as tools for effective and efficient library services delivery and operations. You will be exposed to how to automate the routine procedures in libraries, such as acquisition, cataloguing, circulation, Online Public Access Catalogue (OPAC), serials management and report generation, among other library activities.

In addition, this course offers you the chance to thorough and carefully study the basics of automation in libraries; history, requirements and areas and services of library automation, components of the automation system, steps in library automation, system requirements, hardware and software selection procedures,

library automation process, system implementation, training, funding and practical-based exercises in library automation. The course consists of fourteen (14) study units. Therefore, an in-depth knowledge of the topics in this course will help you understand the functions and operations of an integrated library management system which, if well implemented, will enhance and promote effective service delivery in the library and the productivity of the library personnel.

LEARNING OUTCOMES

By the end of this course, you should be able to discuss any topic in the area of library automation. Specifically, you will be able to:

i. define the concept of automation;
ii. discuss the concept of library automation;
iii. outline the objectives of library automation;
iv. state the basic requirements of library automation;
v. highlight the benefits of library automation;
vi. discuss the history of automation in libraries;
vii. outline the functions of library automation;
viii. describe the steps in planning for library automation;
ix. explain the software concept;
x. identify the categories of software;
xi. outline the characteristics of an integrated library software;
xii. state the hardware requirements for library automation;
xiii. describe the retrospective conversion process;
xiv. outline the steps in library automation;
xv. describe the modules in a library management system;
xvi. outline the library automation process;
xvii. discuss the importance of training in library automation;
xviii. state the importance of funding library automation;
xix. outline the automated system implementation process; and
xx. describe the practical-related scenario in library automation.

WORKING THROUGH THIS COURSE

To successfully complete this course, you are required to participate fully in the theory and practical components of the course. You are equally expected to read the study units, listen to the audio, watch the videos, do all assessments, examine the links, participate in discussion forums, read the recommended books and other materials provided, prepare your portfolios, and participate in the online facilitation exercises. Each study unit has an introduction, learning outcomes, main content, summary, self-assessment exercise, possible answers, and references/further readings/web sources.

The introduction opens the door to each unit and gives you a glimpse of the expectations. Next, you must acquaint yourself with the intended learning outcomes (ILOs), which outline what you should be able to do after each study unit and provides a yardstick to evaluate your learning to ensure you have achieved the

designed objectives (outcomes). To achieve the intended learning outcomes, the content of each section is presented in modules and units with videos and links to other sources to enhance your study. The unit summaries provide a recapitulation of the essential points discussed. It's an indispensable brief that garnishes your journey in each segment and what you should take away from the unit. Click on the links as directed, but where you are reading the text offline, you may have to copy and paste the link address into a browser. You can download the audio and videos to view offline. You can also print or download the texts and save them on your computer or external drive.

STUDY UNITS

There are 14 study units in this course divided into four (4) modules. The modules and units are presented as follows:

Module 1 **Basics of Library Automation**
Unit 1 Concept of Library Automation.
Unit 2 Requirements for Library Automation.
Unit 3 Basic Components of Library Automation System.
Unit 4 Planning for Library Automation.
Module 2 **Software Selection and System Requirements**
Unit 1 The Software Concept.
Unit 2 Library Automation Software Packages.
Unit 3 Library Management System Structure.
Unit 4 Selection of Library Automation Software

Module 3 **Automated System Implementation and Processes**
Unit 1 System Requirements for Library Automation
Unit 2 The Library Automation Process
Unit 3 Library Automated System Implementation
Unit 4 Training in Library Automation
Unit 5 Funding Library Automation
Module 4 **Practicum in Library Automation**
Unit 1 Practicum / Practical work-based on Library Automation.

PRESENTATION SCHEDULE

The presentation schedule gives you the important dates for the completion of your computer-based tests, participation in forum discussions and at facilitation. Remember, you are to submit all your assignments at the appropriate time. Therefore, it would be best if you guided against delays and plagiarism in your work. Plagiarism is a criminal offence in academics and is liable to heavy penalties.

ASSESSMENT

There are two main forms of assessment in this course that will be scored. First is the set of Tutor-Marked Assignments (TMAs). You are advised to be sincere in attending to the exercises. The second is TMAs. This is the continuous assessment component which is graded. It accounts for 30% of the total scores. You are advised to take this with all seriousness because it will assist you in passing the course. The TMAs will

be given in accordance with the University calendar. Therefore, endeavour to strictly adhere to the slated calendar.

FINAL EXAMINATION AND GRADING

At the end of the course, you are required to take an examination which will last for a 2-hour duration. It has a value of 70% of the total course grade. The examination will consist of questions that will reflect the type of self-assessment; practice the exercises carefully. Try to use the time between finishing the last unit and sitting for the examination to revise the entire course. You may find it useful to review your Tutor-Marked Assignment or activities before the examination.

COURSE MARKING SCHEME

The following table lays out how the actual course marking is done

Assessment	30% (Undergraduate) 40% (Postgraduate)
Final Examination	70% (Undergraduate) 60% (Postgraduate)
Total	100% of Course work

COURSE OVERVIEW

How to get the Most from the Course

The study units in Open and Distance Learning (ODL) replace the university lecture. This is one of the advantages of ODL. You can read and work through specially designed study materials at your own pace and at a time and place that is convenient for you. Just as a lecturer may give you classroom exercises, your study units provide exercises for you at a particular time.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the study unit and how a specific study unit is integrated with the other study and the course as a whole. Following the introduction are the intended learning outcomes which help you to know what you should be able to do by the time you have completed the study unit. While studying the unit, you should go back and check if you have achieved the stated learning outcomes. If you consistently do this, you will improve your chances of passing the course. The main content of the study unit guides you through the required reading from recommended sources.

Tutor-Marked Assignments (TMAs) are found at the end of every study unit. Working through these SAEs will help you achieve the study units' objectives and prepare you for the examination.

You should do every SAE as you come to it in the study units. There will also be examples given in the study units. Work through these when you get to them too.
The following is a practical strategy for working through the course. If you encounter any problem, telephone your tutor immediately. Remember that your tutor’s job is to help you. When you need help, do not hesitate to call and ask your tutor to provide it.

1. The main body of the unit guides you through the required reading and directs you to other sources, if any.

2. Your first assignment in this course is to read this course guide thoroughly.

3. Organise a study schedule: Refer to the course overview for more details. You should note that you are expected to devote at least 2 hours per week to study this course. Note important information such as details of your tutorials, dates for submission of TMAs, exams etc. and write it down in your diary.

4. Once you have created your study schedule, do everything to stay faithful. The major reason students fail is that they get behind in their coursework. If you get into difficulties with your schedule, please let your tutor know before it is too late to help.

5. Turn to Unit 1, and read the introduction and the objectives for unit 1.

6. Assemble the study materials. You will need your references and the unit you were studying at any time.

7. As you work through the unit, you will know the sources to consult for further readings.

8. Visit your study centre whenever you need up-to-date information

9. Before the relevant due dates (about four weeks before the due dates), visit your study centre for your next required assignment. Remember that you will learn a lot by doing the assignment carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the examination. Submit all assignments not later than the due date.

10. Review the objectives for each study unit to confirm that you have achieved them. Review the study materials or consult your tutor if you feel unsure about any of the objectives. You can start on the next unit when you are confident that you have achieved a unit's objectives. Proceed unit by unit through the course and try to space your study to keep yourself on schedule.

11. When you have submitted an assignment to your tutor for marking, do not wait for its return before starting the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments on the tutor-marked assignment form and the written comments on the ordinary assignments.

12. After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in the Course Guide).

FACILITATION

You will receive online facilitation. The facilitation is learner-centred. The mode of facilitation shall be asynchronous and synchronous. For asynchronous facilitation, your facilitator will:

- Present the theme for the week;
- Direct and summarise forum discussions;
- Coordinate activities in the platform;
- Score and grade activities when needed;
- Upload scores into the university-recommended platform;
- Support and help you to learn. In this regard, personal emails may be sent;
- Send videos, audio lectures and podcasts to you.

For the synchronous:

- There will be eight hours of online real-time contacts in the course. This will be through video conferencing in the Learning Management System. The eight hours shall be of one-hour contact for eight times.
- At the end of each one-hour video conferencing, the video will be uploaded for viewing at your pace.
- The facilitator will concentrate on the main themes that are must-know in the course.
- The facilitator will present the online real-time video facilitation timetable at the beginning of the course.
- The facilitator will take you through the course guide in the first lecture at the start date of the facilitation

Do not hesitate to contact your facilitator. Contact your facilitator if you:

- do not understand any part of the study units or the assignments.
- have difficulty with the self-assessment exercises.
- have any questions or problems with an assignment or with your tutor's comments on an assignment.

Also, use the contact provided for technical support.

Read all the comments and notes of your facilitator, especially on your assignments; participate in the forums and discussions. This allows you to socialise with others in

the programme. You can discuss any problem encountered during your study. To gain the maximum benefit from course facilitation, prepare a list of questions before the discussion session. You will learn a lot from participating actively in the discussions.

Finally, respond to the questionnaire. This will help the university to know your areas of challenges and how to improve them for reviewing the course materials and lectures.

Contents

MODULE 1 BASICS OF LIBRARY AUTOMATION

In this module, you will be introduced to the basics of library automation vis-à-vis its definition, concepts, factors and requirements of library automation; basic components of a library automation system; and planning for library automation.

Unit 1 Concept of Library Automation.
Unit 2 Requirements for Library Automation.
Unit 3 Components of Automation System.
Unit 4 Planning for Library Automation.

UNIT 1 CONCEPT OF LIBRARY AUTOMATION

UNIT STRUCTURE

1.1 INTRODUCTION

Libraries are an integral part of society and educational institutions. They serve as the hub for learning, research and teaching; and provide unrestricted access to a vast quantum of information resources and sources to students, patrons, researchers, and teachers alike (Muniraja, 2021). Libraries and information professionals are not left out of the digital transformation frenzy in workplaces, as computers are used as powerful tools to improve both the operational efficiency of the library and information personnel and the quality and range of services provided to the user community. Basic knowledge of the automation concept would put the icing on the cake for the smooth running of the library and information centres. This unit therefore, exposes you to the definition of the concepts of automation and library automation, objectives, importance, reasons, disadvantages and landmark development in the history of library automation.

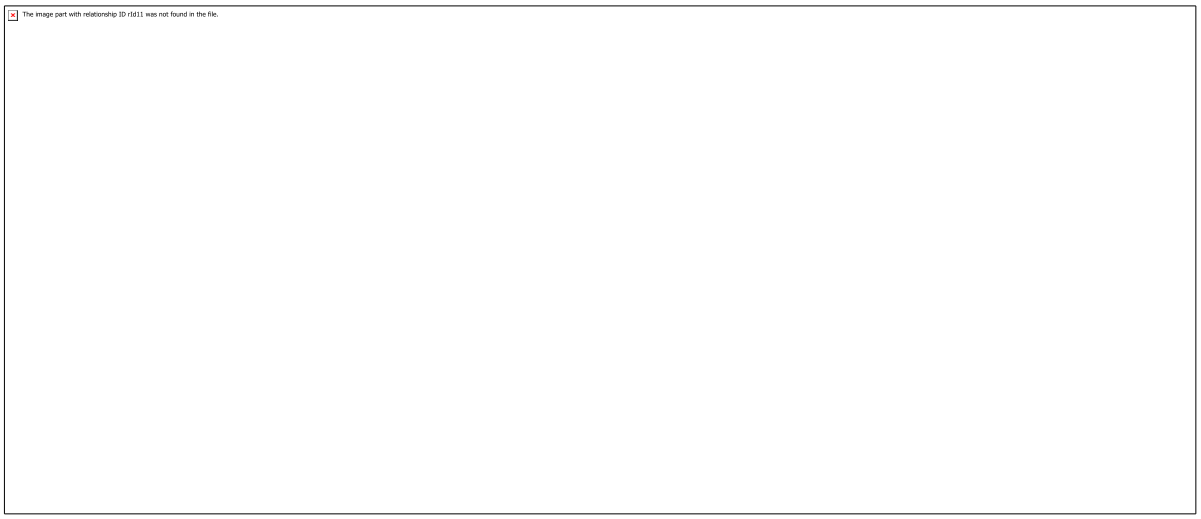


Figure 1: Library Automation
Source: https://www.elibrarysoftware.com/img/blog/3.jpg

1.2 LEARNING OUTCOMES

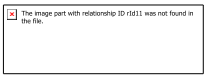
By the end of the unit, you should be able to:

- Define automation;
- Define library automation;
- Outline the objectives of library automation;
- State the importance of library automation;
- Describe the reasons for library automation;
- Mention the disadvantages of library automation; and
- Describe landmark development in the history of library automation.

1.3 CONCEPT OF AUTOMATION

Automation is the application of technology, programmes, robotics or processes to achieve results with minimal human effort (International Business Machine (IBM), 2022). Automation entails using electronics and computer-controlled devices to assume control of procedures (Market Business News (MBN), 2022). Also, it refers to the tasks in which machines have sufficient involvement in human intelligence or effort (Library Academy, 2020). Techopedia (2021) defined automation as using technology to produce and deliver goods and services with minimal human intervention. Therefore, automation is important, given that it reduces operating cost, time and effort; optimises internal resource allocation, increases performance, improves efficiency, productivity, reliability, and speed of many tasks previously performed by humans in organisations.

Automation replaces labour and helps organisations streamline their entire workflow. Gavit (2019) described automation as the automatic operation and control of a process, equipment, or system; or the techniques and equipment used to accomplish this. Automation exists in all functions, involving many key elements, systems, and jobs within the industry, including integration, installation, procurement, maintenance, marketing, sales, healthcare and education. In Library and Information Science, automation is the technology involved with designing and developing processes and systems that reduce the need for human intervention in their functioning (Librarianshipstudies.com, 2020). Moreso, automation revolutionised those areas in which it has been introduced, and there is scarcely an aspect of modern life that has not been affected by it.



https://youtube/W8mKWrT-Cxk?t=1

What is Automation?

1.4 CONCEPT OF LIBRARY AUTOMATION

Figure 2: Web-based Library Service
Source:https://www.libraryworld.com/images/something-for-someone-s-2.jpg

Library automation is a generic term that refers to the application of computers and other related technologies to manage library operations and services. Atanda (2018) defined library automation as the use of automatic and semi-automatic data processing machines to perform traditional library functions such as acquisition, circulation, cataloguing, and serial management. Patel (2014) described library automation as the different activities relating to locating, acquiring, storing, updating, processing, packaging, reproducing, disseminating, communicating and improving the quality of products and services of a library. Accordingly, library automation is an essential tool for effective library management. It conserves the librarian's time for other services, saves them from routine clerical tasks and enhances the workforce's speed, efficiency, and productivity (Bhardwaj & Shukla, 2000).

Library automation involves the application of computer and telecommunications technology to bibliographic control, database access, resource sharing and other electronic communication or transmission to improve and enhance library users' services (Western New York Regional Information Center (WNYRIC), 2019). LISBDNETWORK (2022) described library automation as providing fast and easy access to information resources wherever they might be located, either in the information system or the cloud. Also, Librarianship Studies and Information Technology (2020) defined library automation as the use of the computer to automate the typical procedures of libraries, such as acquisition, cataloguing, circulation and report generation. In essence, the automation of library processes is not just a fad; instead, it is crucial for improved and effective library operations, increased customer satisfaction, and increased efficiency and productivity of library personnel.

1.4.1 Objectives of Library Automation

The objectives of library automation as outlined by Library academy (2020); elibrarysoftware.com (2019), Sadaf (2015), and Tandel (n.d.) are as follows:

a. To have practical and effective control over the entire library collection and operation.

b. To avoid duplicating efforts and improve existing services.

c. To effectively share library information resources among the libraries in the system.

d. To facilitate easy information retrieval beyond bibliographic records.

e. To take advantage of, and add to local and international cataloguing and indexing by offering users access to unique information resources in other libraries.

f. To create a local library information tool by linking to other information networks and sources.

g. To assist people in developing the computer literacy skills they need in a fast-changing learning environment, therefore reducing the digital divide.

h. To better utilise human resources by employing computers to perform routine tasks.

i. To modernise and control library operations by reducing costs.

j. To Improve operations and speed, thus, saving the readers' time according to the fourth law of Library Science.

State any five (5) objectives of library automation

1.4.2 Importance of Library Automation

With automation, the work of librarians and other library staff becomes easy. The importance of library automation are as follows:

a) The automated system provides better and easy access to the library collection. With just a click, patrons can search for books available in the library's database.

b) The automated system makes stock checking and book verification possible within a couple of hours, thus saving a considerable amount of time as opposed to the manual system.

c) The library automation software makes the library smart by organising the books systematically according to the author, title and subject. It allows for a quick and effortless search by the patrons.

d) The automation system provides the facility of easy maintenance.

e) The automated system makes it possible to generate reports promptly.

f) It improves the search process by advancing the search option.

g) Library automation system provides users(s) with a better search interface and information access to library users.

h) Library automation reduces workload and improves the productivity of library personnel.

Why is automation important in libraries?

Figure 3: Importance of Automation
Source: https://www.elibrarysoftware.com/img/blog/9.jpg

1.4.3 Reason for Library Automation

Reasons for the use of computers in automating the library routines are as follows:

a) Automation permits decentralized access to a bibliographic record by multiple users.

b) Automation of library routines helps increase internal operational efficiency by improving workflow within the library and data sharing between libraries.

c) It improves the quality of services rendered by the library due to reduced workload for professional staff.

d) Cataloguing is one of the costliest operations in libraries. Automation encourages the sharing of cataloguing information to gain efficiencies and control over internal costs.

e) To have better and more effective control over the entire library collection and operation.

f) Automation increases the productivity of library staff and avoids work duplication.

g) Library automation provides easy access to the information system that stores information and knowledge in diverse formats, such as books, journals, videos, maps, bulletins, and photographs, among others.

h) It allows library users to have direct online access to library resources.

Outline the reasons for library automation.

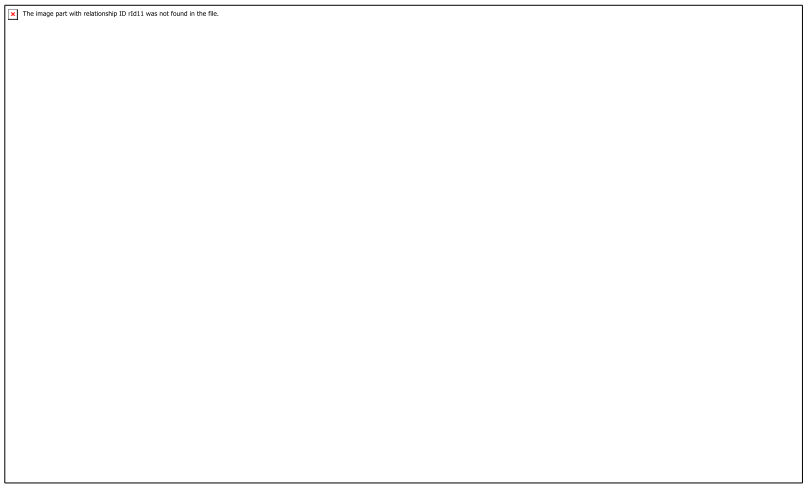


Figure 4: Reasons for automating a library
Source: https://www.elibrarysoftware.com/img/reportSystem.jpg

1.5 DISADVANTAGES OF LIBRARY AUTOMATION

Library automation is a valuable process, but some of the disadvantages include:

a) **Time-consuming:** Automation is a time-consuming process requiring regular system maintenance and frequent end-user training, leaving library staff with little time to develop new services or interact with patrons.

b) **Redundancy:** Automation has replaced many tasks that library staff once performed. For example, patrons can self-check books by swiping their library card and scanning the book's barcode in a scanning machine. Hence, they no longer require assistance locating library materials; computers now provide the information and access.

c) Capital-intensive: Automation is an expensive project. Many libraries may be unable to pay for the start-up, annual maintenance, technical support costs, and the conversion of a library's shelf list into a machine-readable format.

d) Training: Regular training of stakeholders is necessary to keep up with the latest development and upgrading of the system. However, this can put undue pressure on the time of library personnel.

e) **Internet access:** Poor Internet connectivity due to low bandwidth in the library can disrupt everyday work, limit access from patrons, cause delays with email communication, and software updates

f) **Infrastructural facilities:** If the facilities housing the automated system are inadequate, the system may not perform as expected. This can demoralize and decrease the productivity of library personnel.

State the disadvantages of library automation.

1.6 HISTORY OF LIBRARY AUTOMATION

The process of automating libraries started gradually, with separate systems for acquisition, cataloguing, database search, reference service, and circulation. Although advances in telecommunication technology accelerated the advancement of computer hardware and software, only a few libraries could afford mainframe computers because they were so expensive and had to be kept in air-conditioned, dust-proof rooms and cared for by people in white lab coats (Syed, 2011). Library automation changed with the introduction of graphical user interfaces (GUI), particularly the Windows operating system, with vendors shifting quickly from character-based mainframe systems to client/server Windows GUIs. Consequently, requests for proposals (RFPs) was created by librarians to upgrade their outdated automated systems. The new systems benefited users because they no longer had to memorise long commands to search, retrieve, and display bibliographic entries**.**

Throughout the 1990s, the pace of development in libraries matched the changes fueled by the introduction of the World Wide Web. As a result, many library automation vendors adopted the Z39.50 standards and developed Web-based catalogues. Though new products included features from previous generations of online catalogues, such as author/title/subject or keyword searching, Boolean operators, and truncation capabilities, they also gave users new ways to search for and display the requested information. In addition, adopting Z39.50 standards ensured that these features were implemented consistently across Web interfaces. For libraries to provide better service to their users, they have their subsystems automated. At the same time, advances in computer and telecommunication technologies, new standards for document storage and retrieval, and the World Wide Web transformed the roles of librarians and automating libraries now refers to the transfer of digital information from the producer to the consumer, regardless of the medium, shape, size, or form. Thus, library automation has evolved into information automation.

1.6.1 Landmark Development in the History of Library Automation

The automation of libraries progressed in line with computer and communication technology advances. The most significant developments in the history of library automation are as follows:

- **In the 1930s, the first steps toward library automation were taken when punch card equipment was used for library circulation and acquisition**.

- **The late 1930s - early 1940s**: World War II slowed down the development of computer systems.

- **From 1946 - 1947:** John Mauchly and J. Presper Eckert of the University of Pennsylvania designed The Electronic Numerical Integrator and Calculator (ENIAC I) computer; the computer contained 18,000 vacuum tubes, weighed

thirty tons, and was housed in a two-story building. Another computer, EDVAC, was designed to store two programs simultaneously and switch between the two sets of instructions.

- **In 1947:** The invention of the transistor by Bell Laboratories, which replaced vacuum tubes, was a huge achievement. As a result, the size of the computer was reduced, but its speed and storage capacity were increased.

- **From 1951 to 1963, the Universal Automatic Computer I (UNIVAC I) was the first** to use transistors. The US Census Bureau used this during the census. Operating systems and programming languages were developed alongside software for newly designed computers.
- **Early 1960s:** Robert Noyce of Intel and Jack Kirby of Texas Instruments invented the integrated circuit by assembling all electronic components onto a single silicon chip.

- **1961:** H.P. Luhn created a brand-new indexing method for articles found in chemical abstracts called 'Keyword in context' (KWIC). However, even though keyword indexing was nothing new, it was discovered to be particularly computer-friendly due to its low cost and multiple access points.

- **Mid-1960s:** The Library of Congress (LoC) started using computers to create machine-readable catalogue (MARC) entries.

- **Between 1965 and 1968:** The Library of Congress (LoC) initiated the MARC I and MARC II projects. MARC was created as a method for 'tagging' bibliographic documents with three-digit numbers to designate fields.

- **1969:** Defence Advanced Research Projects Agency's ARPANET network launched email, telnet, and FTP.

- **1970s:** DIALOG, a commercial database search tool, was used to search reference databases. One of the first was Bibliographical Automation of Large Library Operations (BALLOTS), which eventually became the foundation of the Research Libraries Information Network (RLIN). In addition, the On-line Computer Library Center (OCLC) launched its first collaborative cataloguing project. This project helped member libraries process library materials.

- **1974:** The National Information Standards Organisation (NISO) accepted standard was built on the MARC II format. The standards allowed for the reading and transmission of a bibliographic record by a computer between different library systems, which was a significant advancement.

- **Early 1980s:** MELVYL, the University of California's online public access catalogue, was made available on a national scale by a sub-net of ARPANET. The MELVYL is still used as centralised integrated library software across all University of California campuses.

- **During 1980s:** Technology made computers smaller and faster, with more RAM and storage. As a result, in industrialised nations, households, schools, libraries, and offices increasingly use microcomputers.

- **1985:** The United Nations Educational, Scientific, and Cultural Organization (UNESCO) began distributing Micro CDS/ISIS through its distribution centres in every developed country. The free availability of Micro CDS/ISIS, created specifically for library applications, proved beneficial for librarians in developing countries.

- **Late 1980s:** Several integrated library packages began to appear on the market. LIBSYS was introduced in India near the end of the 1980s. Other software, such as spreadsheets and databases, became available to librarians to aid library administration and information dissemination. Similarly, the introduction of CD-ROMs in the late 1980s altered how libraries functioned. CD-ROMs with databases, software, and information previously only available in print became available, making the information more accessible.

- **Early 1990s:** The massive connection to external databases such as OCLC, DIALOG, and RLIN was maintained. In addition, previously available online databases were made available on CD-ROM. Libraries could then obtain information in a variety of ways.

- **In the 1990s:** The Internet ushered in a new era of library automation. Connections to online commercial systems, e-mail, FTP, telnet, and the Internet were increasingly made via networks.

- **1992 -1993:** The World Wide Web evolved and became the fastest-growing medium for all types of information delivery.

- **2000s:** With advancements in software and hardware capabilities, expert and knowledge systems became available. The ability to quickly process, store, send, and retrieve information is causing the current information delivery services to flourish as more advanced silicon computer chips, expanded storage space, and faster, higher-capacity telecommunication lines are developed.

- **Mid 2000s:** The fourth industrial revolution drove computing advancements. Using the 4th Industrial Revolution, libraries are developing Library 4.0 technology, which includes intelligent systems, maker spaces, context-aware

technology, open source, big data, cloud service, augmented reality, state-of-the-art displays, AI, IoT, block chain, virtual reality, and Librarian 4.0.

Describe the landmark development in the history of library automation?

1.7 SUMMARY

Advances in technologies opened up a new vista for libraries. Computers and other devices are used for general library services, operation, and information management. These significantly increase library automation, freeing librarians and staff from repetitive library routines and allowing them to contribute meaningfully to knowledge and information dissemination. This unit examined the definition of automation and library automation, objectives, importance, reasons, and disadvantages of library automation. The unit also covered the history of library automation and landmark development in the history of automation.

SELF-ASSESSMENT EXERCISE

Filling the gaps as appropriate

a. Automation replaces labour and helps organisations ---------- their entire workflow.
b. Library automation as the use of the computer to automate the ---------- ---------- of libraries.
c. Automation increases ---------- of library staff Library automation saves the time of users and library staff.
d. Automation is a ---------- process that requires regular ---------- ---------- and frequent ---------- training.
e. Library automation provides easy access to ---------- that stores information and knowledge in diverse formats.
f. The first steps toward library automation were taken when ---------- ---------- equipment was used for circulation and acquisition in libraries.
g. The Electronic Numerical Integrator and Calculator computer contained ---------- vacuum tubes.
h. The first computer to use transistors was named ----------.
i. The ---------- ushered in a new era of library automation.
j. The ---------- revolution drove computing advancements.

1.8 GLOSSARY

- **Automation:** This refers to the use of technologies to produce and deliver goods and services with minimal human intervention.

- **Library automation**: This refers to the application of computers, software, networking devices, disks, optical media and related data processing equipment for library processes and operations.

1.9 REFERENCES/FURTHER READINGS

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1.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. Streamline.
b. Typical procedure.
c. Productivity.
d. Time-consuming, System maintenance and End-user.
e. Information System.

f. Punch card.
g. 18,000.
h. UNIVAC-1.
i. Internet.
j. Fourth industrial.

UNIT 2 REQUIREMENTS FOR LIBRARY AUTOMATION

UNIT STRUCTURE

2.1 INTRODUCTION

Library automation is the application of information and communication technologies (ICTs) to library operations and services. Computers and other related technologies gave way to new possibilities in the handling, accessing and disseminating of information. In the previous unit, we discussed the definition and concept of automation and library automation, its objectives, importance, disadvantages, and historical development. In this unit, therefore, our focus will be on functions of library automation, requirements for library automation and barriers to library automation.

2.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Outline the functions of library automation;
- State the requirements of library automation;
- Describe the areas and services of library automation; and
- Discuss the barriers to library automation.

2.3 FUNCTIONS OF LIBRARY AUTOMATION

Library automation is the application of computers to perform traditional library functions and routines. The functions of library automation are:

a. To help manage physical and digital resources and all library routine activities.

b. To satisfy users' needs in the changing information environment by providing a friendly user-interface with enhanced information retrieval skills.

c. To reduce the drudgery of repeated manual efforts in library operations and functions.

d. To facilitate access to the online public access catalogue with the user-friendly search interface.

e. To help in the analysis of document contents and the allocation of controlled subject headings.

f. To promote ease of cataloguing and guarantee data consistency, thus facilitating the printing of Authority files.

g. To expedite searches because the system has a robust search function.

h. To allow flexibility in handling library routines, with several printing layouts available.

i. To facilitate the setting and configuration of software to suit the peculiar needs of a library.

j. To reduce the staff workload and increases the efficiency of the library.

k. To promote stock maintenance, oversee fee collections and ensures the prompt generation of daily statistics of library users.

2.4 BASIC REQUIREMENTS OF LIBRARY AUTOMATION

The library automation requirements are qualifications the library must have to determine its suitability for the automation project. Hence, the decision to select or reject particular hardware and software setup and other related peripherals has to be taken based on considerations for the library's level of preparedness. The basic requirements of Library Automation are as follows:

a. **Library Collection:** Library collection refers to the entire holdings of a library, such as books, periodicals, monographs, and reports. In selecting or

rejecting the type of system (hardware and software), consider the full document backup and its storage capacity based on the library collections and future projections. Several options are available in the market. The library should decide on a system with a high hard disk storage capacity of between 1-3 Terabytes (TB) with a RAM of higher processing speed (see Table1and 2).

b. **Type of services:** The hallmark of any library is to render quality and timely service to users. The nature of operations and the types of services the library plans to provide with the automated system will directly impact the kind of system to select. It is advisable to go for a system (hardware and software) that has been tried and tested for quality, durability, speed and ability to deliver and enhanced with the capacity to provide a wide range of timely, dependable, efficient, and effective services.

c. **Nature of the library's daily transactions:** The nature of the library's daily transactions entails the records of books processed, the number of serials registered and issued, number of notices issued both to the students and vendors. Thus, an anticipated daily transaction in a library will help decide on the system to acquire. Note that the higher the volume of daily transactions, the higher the speed and capability of the Random Access Memory (RAM) and other secondary storage devices for archival storage and backup. It will go a long way to ensure the speed at which the system will execute users' commands and prevent avoidable delay **(see Table 1 and Table 2 for the Basic System Requirements**).

d. **Number of users**: The number of users projected to access the library's automated system daily will determine the total number of computer systems to acquire. Knowledge of the projected number of users will help the library decide whether to invest in a few standalone systems or a networked system with many workstations that can accommodate a large group of library users or decide on a Server with distributed terminals all over the university campus.

e. **Automation and data processing:** Library activities are primarily routine and clerical, with many notices to patrons and orders to vendors daily. In deciding on the type of system to select for the automation project, the library should consider the system's data processing capacity and communication exchange capabilities and its ability to meet modern office trends in the era of digitisation.

f. **Turnkey system**: A turnkey system is a complete hardware and software computer system customized for a particular application, such as library automation. They are fully operational, require no additional components or modifications, and are ready for use. The library should consider selecting a

turnkey system that can easily be configured to the need of any library or go for either a cooperation system, in-house or commercial software.

Describe the basic requirements of library automation.

Table 1: Basic Hardware Requirement/ Specification of Library Automation

Large-sized Library	Medium-sized Library	Small-sized library
Pentium (® Intel Core i7 processor with the following specifications:	Pentium®) Intel Core i7 processor with the following specifications:	Pentium (®) Intel Core i7 processor with the following specifications:
16GB RAM.	8GB RAM.	4GB RAM.
2-3 TB Hard Disk Drive (HDD).	1TB Hard Disk Drive.	500 Gigabyte Hard Disk Drive.
UPS/CVT/Inverter.	UPS/CVT/Inverter.	UPS/CVT/Inverter.
"18.5" Inch FHD LED Monitor.	"18.5" Inch FHD LED Monitor.	"18.5" Inch FHD LED Monitor.
USB Port Extension.	USB Port Extension.	USB Port Extension.
Routers for networking (multiple users) • D-link • Tenda • TP-Link • ASUS	Routers: for networking (multiple users) • D-link • Tenda • TP-Link • ASUS	Routers: for networking (multiple users) • D-link • Tenda • TP-Link • ASUS
No of Terminal: 30 – 35.	No on Terminal: 10 – 15.	No of Terminal: 3 – 5.
LaserJet Pro multifunctional Printer.	LaserJet Pro multifunctional Printer.	LaserJet Pro multifunctional Printer.
Modem for communication • D-Link. • Tenda. • TP-Link.	Modem for communication • D-Link. • Tenda. • TP-Link.	Modem for communication • D-Link. • Tenda. • TP-Link.
• Hard disk drives (HDDs). • Solid-state drives (SSDs). • Cloud storage.	• Hard disk drives (HDDs). • Solid-state drives (SSDs). • Cloud storage.	• Hard disk drives (HDDs). • Solid-state drives (SSDs). • Cloud storage.
• Blu-ray drives. • USB flash drives. • SD cards.	• Blu-ray drives. • USB flash drives. • SD cards.	• Blu-ray drives. • USB flash drives. • SD cards.
TCP/IP.	TCP/IP.	TCP/IP.

Windows 10 Professional (64Bit).	Windows 10 Professional (64Bit).	Windows 10 Professional (64Bit).
Barcode system with software.	Barcode system with software.	Barcode system with software.
Scanner.	Scanner.	Scanner.
Lamination machine.	Lamination machine.	Lamination machine.

Sources: https://www.techopedia.com/definition/13265/secondary-storage-device https://www.educba.com/types-of-primary-memory/) https://www.educba.com/types-of-cpu/?source=leftnav) https://www.lisedunetwork.com/basic-components-of-library- automation/

Table 2: Basic computer system requirements/specification of library automation

Standalone system	Dedicated Client/Server System	On Cloud system
• Pentium® Intel Core i7 Processor • 16GB Ram • 1TB Hard Disk Drive (HDD) • 18.5 Inch FHD LED Monitor • Windows 10 Professional (64Bit)	• PN:25821KA • One Socket Tower • Intel Xeon E3 – 1220v2 CPU (Quad Core) • 3.1. Ghz 8 MB Cache • 1600 MHz, 1 x 4GB Memory • 1x500 GB SATA 7200 RPM, 3.5" Simple Swap • Multi Burner, Integrated Raid 01 SR (C100)	• http://www.amazon web services • http://www.cloudoye.com • http://azure.microsoft.co • http://googlecloud.com **Note:** The price of Cloud Server determined solely by the Service provider based on the following specifications: • Storage capacity, • RAM. • Operating system e.g Windows and the • Library automation supporting Software.

Sources: https://www-konga-com res.cloudinary.com/w_auto,f_auto,fl_lossy,dpr_auto,q_auto/media/catalog/product/C/R/90720_1635432828.jpg

2.5 AREAS AND SERVICES OF LIBRARY AUTOMATION

The areas and services of library automation mainly revolve around library housekeeping operations. Library housekeeping operations refer to a group of library activities performed in the functioning of the library, like acquisition, serials control, and circulation, which allows the performance of the day-to-day functions in a library. These are highly labour-intensive, back-end and routine clerical activities in the library. Patel (2014); and Bhardwaj and Shukla (2010) outlined those areas and services of library automation include:

2.5.1 Acquisition

Acquisition is a major and essential library operation critical to achieving a library's mission and central to information resources development. Acquisition refers to all activities associated with the selection and procurement of books,

monographs, periodicals, audio-visual, electronic materials (e-books, e-journals, databases), digital objects (CDs and DVDs), and maps, among others, as well as the maintenance of records for libraries and information centres.

Acquisition involves a great deal of detailed and exacting paperwork, materials handling in large quantities, reconciliation of orders, invoices, materials received, and fiscal control. Also, it requires constant examination and evaluation of information resources, the study of patrons' needs and changes in the community to serve. Therefore, the acquisition is highly labour-intensive and a prime candidate for automation support. Some of the specific functions of the acquisition process are as follows:

- Suggestions, recommendations, and library collection selection.
- Checking for duplication and Library holdings.
- Vendor selection.
- Order preparation.
- Cancellations of order lists accompanied by supply terms and conditions.
- Checking overdue and record of items on order.
- Record of items received/not received and receipt to the vendor.
- Verification of items with the order file and invoice.
- Receiving/invoice management.
- Extended procurement.
- Gift monitoring.
- Verification of items using the order file and invoice.
- Inspection of items.
- Prepare for payment after Accessioning.
- Accounts preparation and budget planning.
- Final report of activities.

2.5.2 Cataloguing and Classification

Cataloguing is the process of describing, recording, and displaying information about library holdings. It is the prime method of providing access to collections in a library. Other cataloguing tasks include creating, storing, retrieving, and managing bibliographic records. Cataloguing is a traditional and fundamental activity practised among libraries the world over. Whether manual or automated, the cataloguing system encompasses two interrelated activities - descriptive cataloguing and the production of the library catalogue.

Classification, which forms the foundation of librarianship, refers to a mental process of grouping similar objects together and organising library documents according to subject content. Activities involved in cataloguing and classification are as follows:

- Cataloguing and classification of books, serials, and other special collections.
- Production of catalogue cards.
- Cataloguing online.
- Catalogue card duplication detection.

- Making an authority file and a subject heading list.
- Catalogue card sorting, check-in, and filing.
- Automatic creation of new entries (author, title, series).
- Generation of Accession list (monthly).

2.5.3 Circulation Control

Circulation control or library lending comprises the activities associated with lending library books and other materials to library users. It is a fundamental and necessary function of the library. Circulation necessitates extensive record keeping and consumes staff time. It is crucial that library records be correct and that all information be updated immediately following each transaction. The circulation module is responsible for the following activities:

- Member registration/cancellation.
- Charging, discharge, and renewal of books.
- Keeping track and report of circulation statistics.
- Loan periods.
- The use of a barcode system.
- Processing schedules.
- Holds, messages, and blocks.
- Notice generation.
- Devices for recording transactions for offline processing.
- Control of members/inventory.

2.5.4 Serials Control

Serials contain current events and are issued in successive parts but not necessarily, at regularly scheduled intervals. Serials generally have a numerical or chronological designation, such as journals, statistical publications, newspapers, newsletters, and annual reports. Serials control refers to those tasks which support the procurement and management of serials collection in a library. Because of the unpredictable nature of serials publications, serials control is one of the most important housekeeping functions of the library. Activities involved in Serials control are:

- Receipt (check-in).
- Claiming.
- Input the required serials data.
- Order list of new serials.
- Payment mode/preparation
- Bindery control.
- The bound Serials Accession register.
- Making a list of current holdings, additions, missing issue(s), and cancellations.
- Replacements.
- Monographic serials.
- Invoice processing.

- Prepare a budget and keep track of account statistics.

2.5.5 Data Entry

Data entry involves transferring data from one medium to another. Data entry activities revolve around typing hard copy information into a computer program to organise the information in a helpful way for the library. Creating bibliographic databases is an important activity in the library automation project. As a result, a database is required for each of the following library materials/resources:

- Books.
- Serials.
- Monographs.
- Collections of multimedia (Audio-visual, CDs, Floppies, DVDs).
- Items given as gifts.
- Reports and maps.
- Clients / Users / Patrons / Employees.

2.5.6 Reference Services

Reference service, referred to as reference and information service, refers to the personalised assistance offered to library patrons seeking information (Bunge, 1999). Activities consist of:

- Desk services.
- User tools.
- Bibliographic usage.
- Reprography and Bindery.
- Communications between libraries.
- General administration.
- Grants Administration.
- The library's publications.
- Periodical citation searching.
- Online Public Access Catalogue (OPAC).
- Bibliographic Database.

2.5.7 Documentation and Allied Services

Documentation service is reproducing any material and making it available to readers. Examples of documentation services are:

- Indexing and abstracting of micro and macro documents.
- Thesaurus construction.
- Bibliographic control.
- Translation services in various languages,
- Reprographic service (the reproduction of reading material on-demand in the form of micro-film, micro-card, microfiche and micro prints)
- Union catalogue compilation service.
- Current Awareness Services.

- Literature search.
- Selective Dissemination of Information.
- Newspaper cuttings.

2.5.8 Information Retrieval

Information retrieval is obtaining resources relevant to an information need from a collection of information resources. It is one of the essential functions in the library because it meets the demands of the required information of a user. Searches are based either on full-text or other content-based indexing. Information retrieval activities include:

- Database creation, maintenance, searching, and saving of in-house and external databases.
- Search and printouts of queries against specified requirements such as:
    - Books (issued, reserved, lost, overdue, weed-out).
    - Membership.
    - Inter-library loan.
    - Penalty charges.
    - Periodicals.
    - Newspaper clippings reports: alphabetically, chronologically, subject-wise, members-wise, keywords with each particular such as accession number, title, author, call number, and edition.

2.5.9 Library Cooperation

Library cooperation is a concept of collaborative activities among libraries by sharing bibliographic data and resources cost-effectively. Library cooperation aims to supply better services to patrons, improve the efficiency of library operations, and utilise resources effectively. Library cooperation activities are as follows:

- Sharing of library materials and bibliographic information.
- Cooperative acquisition, cataloguing, and coordinated information services.
- Resource sharing.
- Access to databases
- Information service.
- Back-up service.
- Document delivery.
- CD-ROM services (information searching and text delivery).
- Online search (downloading).
- Training in the library software (self-demonstration program, through help menu and software manual or separate training model for library professionals and users).

2.5.10 Reports

The report generation module can generate customized reports, such as books and circulation statistics, according to the library's needs by sorting and filtering results

from the library database. It handles and facilitates the generation of several reports for decision-making in effective library management.

Describe any five (5) areas and services of library automation.

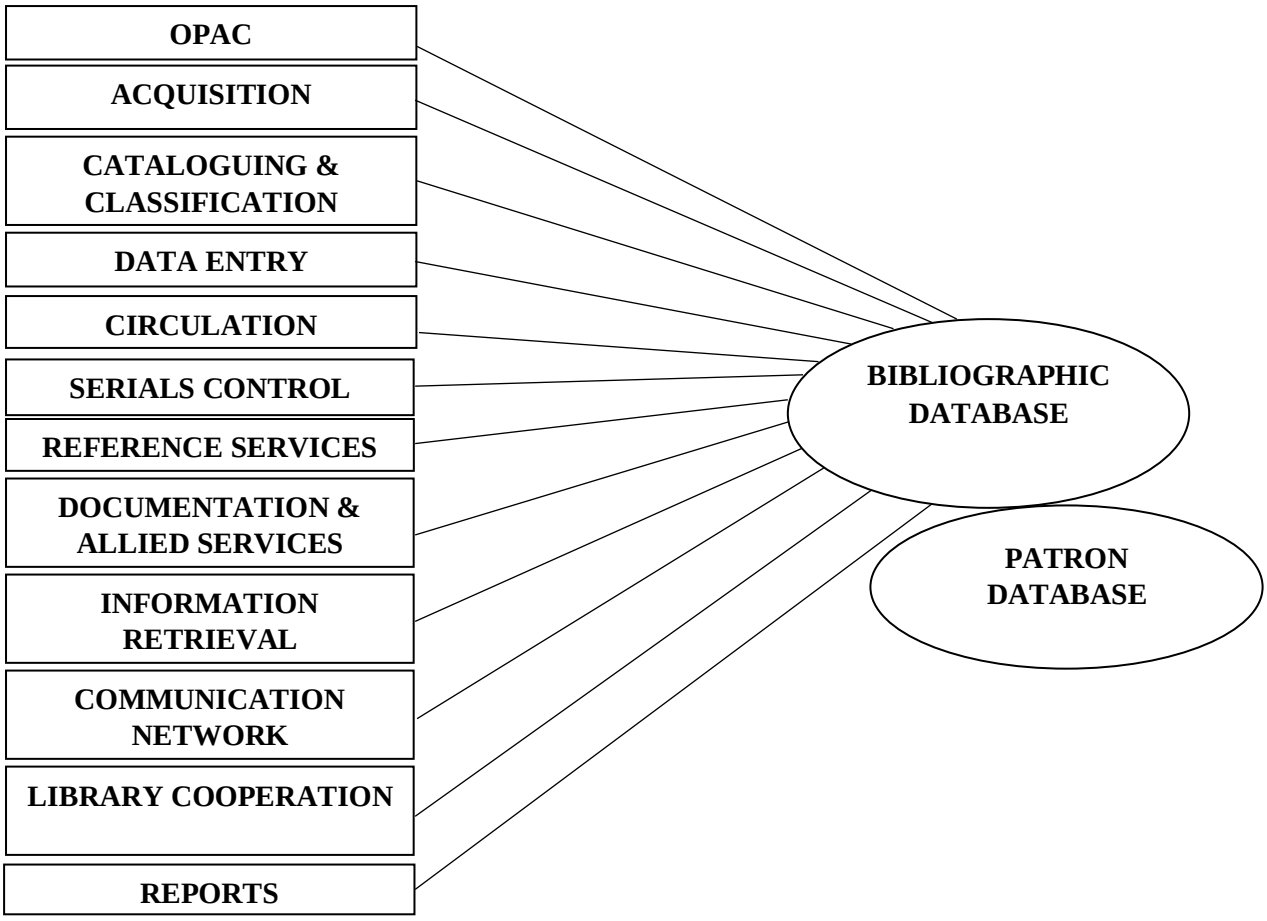

Figure 5: Areas and services of Library Automation
Source: Self-constructed.

2.6 BARRIERS TO LIBRARY AUTOMATION

Computers provide quick and dependable access to information resources in libraries and other locations. Nevertheless, automating a system is typically accompanied by some barriers, including the following:

1. **Time-consuming:** Time is of great essence when embarking on any automation project. From the planning stage to system implementation and use requires much time. Therefore, before the commencement of the project, the library management should consider factors such as funding, library

collections, infrastructure, and support of the different stakeholders to ensure the success and completion of the project.

2. **Training:** Training library staff and patrons to operate and use the automated system could be challenging. There is a need for regular and continuous training of the users whenever the software is updated and upgraded with new features. As a matter of concern, training is expensive, and there is never enough. Library staff must have regular on-site, hands-on training sessions when the automation software is updated.

3. **Technology*:*** refers to methods, systems, and devices resulting from scientific knowledge used for practical purposes in organisations. They become obsolete quickly because of changes in their functionality and the invention of new products. Moreover, updating to the latest can be very expensive and Herculean.

4. **Data migration:** Data migration is moving data from one platform, format, or application to another due to the introduction of a new system. The entire process may require extra time and money to work in the new environment.

5. **Funding:** Library automation is expensive. Most libraries may not have the financial capacity to embark on the project. Also, adequate funds may not be available for the maintenance of the system, training and retraining of library staff, and upgrading or outright procurement of hardware, software, and other computer peripherals.

6. **Power supply**: There is a need for a regular power supply source for the automated system's uninterrupted functioning. Which most times may not be feasible.

7. **Internet:** Poor Internet connection due to poor infrastructural facilities and low bandwidth may hinder the proper functioning and performance of the automated system, which can be frustrating and constitute a major barrier to the entire project.

8. **Attitude:** Attitude refers to the manner, disposition, and position of Library staff towards the automation project. Most times, they may not be welcoming because they fear losing their job and inadequacy in using the system.

9. **Organisational support:** Organisational support is about how the library management can strategically convince, garner the support and commitment of the parent institution towards the entire project in terms of funding, provision of necessary working tools, infrastructural facilities, adequate Internet bandwidth, staff motivation, effective communication, and a conducive working environment. The organisation's absence or lack of sufficient support can hinder the project's success.

Discuss the barriers to library automation.

2.7 SUMMARY

Library automation is the application of computers to perform traditional library functions such as acquisition, circulation, OPAC search, and cataloguing, all of which constitute the areas and services of library automation. Undoubtedly, library automation has helped reduce the burden of librarians and patrons, coupled with overseeing all library operations and services with the provision of a friendly user-interface and enhanced search functions. It has improved efficiency, effectiveness and job satisfaction among the library staff. Therefore, adequate knowledge and understanding of the functions of library automation, basic requirements of library automation and areas and services of library automation will help in the planning for the successful execution of the automation project.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a. ---------- refers to the activities associated with lending library books and other materials to library users
b. ---------- are publications that contain current events and are issued in successive parts but not necessarily, at regularly scheduled intervals
c. ---------- are a group of activities that enable the performance of the day-to-day functions in a library.
d. Acquisition is a major and ----------library operation critical to achieving a library's mission and ---------- developing information resources.
e. ---------- prime method of providing access to collections in a library.
f. Library cooperation is a concept of ---------- among libraries by sharing bibliographic data and library resources cost-effectively.
g. ---------- one of the essential functions.
h. Reference service refers to the ---------- offered to library patrons.
i. Documentation service is ---------- any available material and making it available to readers.
j. ---------- is the mental process of grouping similar objects together and organising library documents according to subject content.

2.8 GLOSSARY

- **Acquisition:** Acquisition refers to all activities associated with the selection and procurement of books, monographs, periodicals, audio-visual, and electronic materials.

- **Cataloguing:** Cataloguing is the process of describing, recording, and displaying information about library holdings.

- **Library cooperation:** Library cooperation is a concept of collaborative activities among libraries by sharing bibliographic data and library resources cost-effectively.

- **Library Housekeeping:** These are a group of activities that enable the performance of the day-to-day functions in a library.

- **Reference service:** refers to the personalised assistance offered to library patrons seeking information.

- **Serials:** Serials are publications that contain current events and are issued in successive parts but not necessarily, at regularly scheduled intervals.

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2.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES WITHIN THE CONTENT

a. Circulation.
b. Serials.
c. Library housekeeping operations.
d. Essential, central to.
e. Cataloguing.
f. Collaborative activities.
g. Information retrieval.
h. Personalised assistance.
i. Reproducing.
j. Classification.

UNIT 3: PLANNING FOR LIBRARY AUTOMATION

UNIT STRUCTURE

3.1 INTRODUCTION

Automation is a process. Planning for an automation project is one of the most important steps in ensuring library automation occurs effectively and efficiently. Planning enables libraries to prepare for the near future, align their programs and services with customer needs and expectations, and monitor progress in reaching what is specified in the plan's objectives. Accordingly, the road to successfully automating a library begins with setting objectives and determining a course of action for achieving the goals. Libraries must create and maintain a technology plan to actualise their mission and vision. The unit introduces you to the concept of planning and the steps involved in planning and preparing for library automation.

3.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Define planning;
- Outline the reasons for planning;

- Describe the planning techniques for library automation; and
- State the steps involved in preparing for a library automation process.

3.3 CONCEPT OF PLANNING

A plan is a detailed proposal for doing or achieving something. Planning is the fundamental management function, a preparatory step, and systematic activity that determines when, how, and who will perform a specific job (Management Study Guide, 2022). In addition, planning is an intellectual process through which an organisation lays down objectives and develops various courses of action by which the organisation can accomplish the set goals (Business Jargons, 2022).

Planning is an intelligent decision-making process that considers the organisation's available and prospective human and physical resources for effective coordination, contribution and perfect adjustment. According to Dugan and Peter (2018), planning focuses on systematically collecting data about an organisation and its activities, such as information about day-to-day operations and functions, staff activities and workflows, and using spaces and equipment.

Planning for Library automation involves setting goals and targets for the process and formulating necessary plans to actualise project implementation. Furthermore, it involves systematically undergoing all the stages of automation because the world of information keeps evolving in this era of the proliferation of electronic products and library software solutions. Therefore, planning is one of the crucial activities a library should undergo to ensure the project's success.

There are two types of plans, and it is advisable and important for a library to have them (Dugan & Peter, 2018). These are:

- A short-term plan, often for a year at a time, serves as the annual operations plan for achieving goals, objectives, and strategic directions of the long-term plan.

- A long-term plan which is an organised and extended view of the library, addresses the strategic directions for the entire library, projecting its course for three to five years.

Define planning.

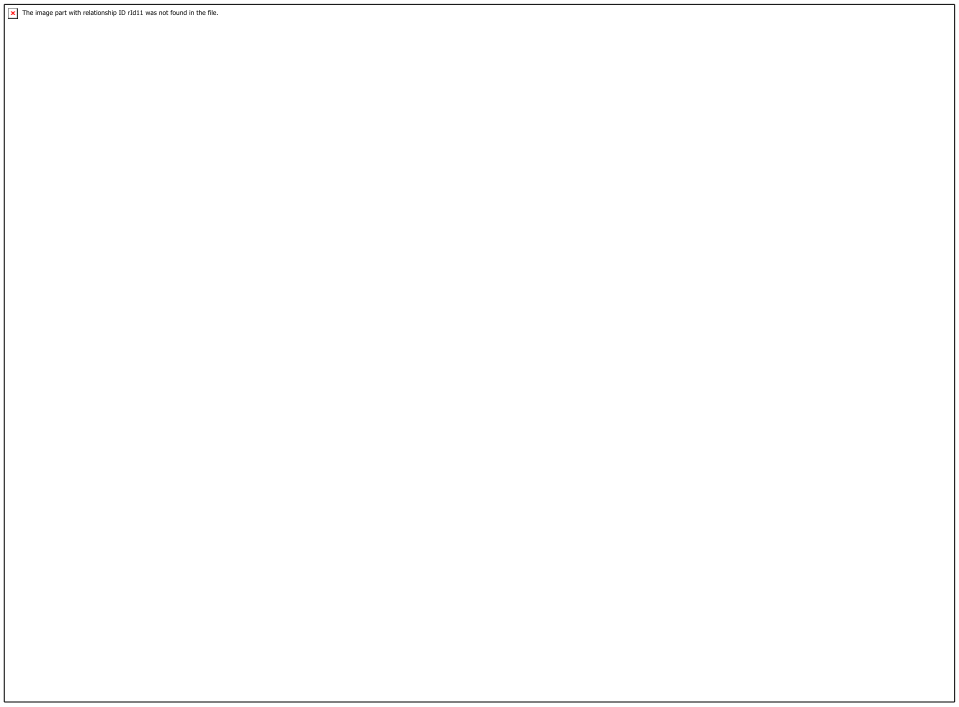

Figure 6: Concept of planning in an organisation
Source: https://www.referenceforbusiness.com/photos/planning-234.jpg

3.3.1 Reasons for planning for Library Automation

Dugan and Peter (2018) outlined reasons for developing and implementing a plan in organisations such as a library to include the following:

a. Planning provides a sense of direction for the library by anticipating uncertainty.

b. It helps management coordinate different library functions and departments consistently and logically.

c. It demonstrates how libraries are accountable for what they promise in plans and how they meet their responsibilities effectively and efficiently.

d. Planning provides a long-term view that advocates for change of services rather than becoming victims of unplanned change.

e. It involves staff members in decision-making as they participate in the planning process, giving them shared ownership of the library's operations.

f. A plan guides the budget and expenditure processes.

g. Planning helps to demonstrate that libraries are dynamic places and not just a warehouse for books, periodicals and electronic resources.

h. It shows that libraries play a critical role in helping institutions achieve their vision as libraries align their mission and vision statements with those of the parent institution.

i. A plan provides a means to demonstrate accountability to the multiplicity of library stakeholders.

State the reasons for planning in libraries.

3.3.2 Factors in Planning for Library Automation

There are many factors involved in planning for library automation. Each of these factors is important to develop a good plan that will bring results. The factors are

a) **Input:** It is of utmost necessity to take regular input from the staff members directly involved in the library's day-to-day operations scattered across individual units and departments into the plan.

b) **Commitment:** Library management should be committed to the plan's full implementation, bearing in mind that much time and resources were expended in the drafting. Hence, necessary measures must be in place to ensure that the plan is adhered to by all, as this will ensure achieving the desired result.

c) **Cost:** Costing must be incorporated during the planning stage to prevent financial loss.

d) **Research:** There is a need for research to identify what the library patrons will like and incorporate the findings into the plan for implementation. Therefore, planning without proper research is bound to fail.

e) **Review:** This is very important. There is a need to review how to improve the plan constantly.

f) **Perception:** The perceptions of workers, users and non-users concerning the quality of the library and its services constitute an important factor because these perspectives will form the library's long-term and short-term planning efforts.

g) **Inclusiveness:** The library management must ensure that information needed to produce the plan are from the bottom to the top of the hierarchy. The outcome will form the plan document for the entire library so that everyone benefits from the plan.

State the factors involved in planning.

3.3.3 Planning Techniques for Library Automation

Many techniques are available to help libraries create long and short-term plans for the automation project. Techniques that can be used to plan for a library automation project include:

A. **Standards and Guidelines**: Standards and guidelines are not plans but serve as a framework for services because they are measurable and directly related to goals. They convey critical information that libraries should review and incorporate as they develop or revise their long-term plans. Standards and guidelines also provide metrics for determining whether a service is suitable or adequate.

B. **Forecasting:** Forecasting is estimating the relevant events of the future based on analysing their past and present behaviour. Forecasting methods include using polls and surveys, graphically plotting future trends based on experience, reporting numerical data, and conducting environmental scanning. Also, benchmark studies can be carried out to look for best practices in other organisations.

C. **Management by Objectives (MBO)**: This is a strategic management model that aims to improve the performance of an organisation by clearly defining objectives that are agreed to by both management and employees over a stated period, usually a year. The objectives must be measurable, have time limits, and require specific and realistic actions. This technique is a form of participatory management that involves everyone, to an extent, in the management process by ensuring that planning is part of the personnel. A typical MBO process includes identifying, setting, and validating the objectives; determining the steps for implementation during the year; and reporting on the progress for meeting each objective. The result is expected to form part of the personnel evaluation.

D. **Total Quality Management (TQM):** is defined as a continuous effort by the management and employees of a particular organisation to get things done right the first time to ensure long-term customer loyalty and satisfaction. TQM emphasises quality and ensures that every single employee works towards improving work culture, processes, services, and systems, among others, to ensure long-term success. In the library, personnel work in teams as they develop and deliver high-quality services. However, a major constraint to TQM's widespread application is that the data collection systems may become overwhelmingly complex.

E. **Strategic planning:** is a process in which the leaders in an organisation define their vision for the future and identify the organisation's goals and objectives based on the mission, which is its fundamental reason for existence. The strategic planning process is the most common planning process that libraries use. Central to the process is a strategic plan, which sets out goals, objectives, actions taken, and progress in meeting those objectives (Dogan & Peter, 2018). Strategic planning has a long time frame, often three to five years or more. It involves analysing competitive opportunities and threats, as well as the strengths and weaknesses of the organisation, and then determining how to position the organisation to compete effectively in its environment (University of Minnesota Libraries, 2022).

Discuss the techniques that can be used in planning for library automation.

3.4 PLANNING FOR LIBRARY AUTOMATION

Planning for library automation constitutes a major component of the library's overall long-range strategic plan. Planning for library automation refers to the process by which an automated system computerises and replaces an array of traditional library functions, using a shared database to replace the card catalogue or other type of non-computerised catalogue to track and inventory a library's collection (Allison, 2017; Saharan, 2014). According to Kumar (2019), planning for library automation is necessary to determine how the library as an organisation intends to implement its automation project. Therefore, the planning process should include input from all the stakeholders (all levels of staff and users) who are likely to be affected by the proposed automation project, bearing in mind that the outcome of the implementation process will form a report of activities (Dugan & Peter, 2018).

3.4.1 Steps in Planning for Library Automation

A strategic plan is a high-level road map to fulfilling the library's vision and mission and providing the necessary framework for the automation process. A library's strategic plan will serve as a document to communicate the library's goals, needed actions to achieve those goals, and all of the other critical elements developed during the planning exercise. The following steps should serve as a roadmap for developing a strategic plan for the library automation project.

a) Need for an intensive planning effort.

b) Identify strengths, weaknesses, opportunities and threats (SWOT) within the library environment.

c) Categorised the identified SWOT into critical areas that might impact the future of the automation project.

d) Brainstorm ideas and perceptions about how the library intends to provide user-friendly, cost-effective automated services long-term.

e) Prioritise all the ideas generated during the brainstorming session.

f) Develop a draft of a strategic vision for the automation development comprising a statement of the library's mission, goals and objectives.

Outline the basic steps in planning for library automation

3.5 PREPARING FOR LIBRARY AUTOMATION

Automation involves a range of activities much broader than an automation system's selection and implementation. Therefore, to prepare for the automation, librarians should:

- identify the mission and goals of the parent institution as they relate to the library;
- acquire adequate knowledge of the automation process;
- develops an understanding of various library functions;
- access staff needs, user information needs, and
- examine the sources of funding for the project.

Furthermore, library staff involved in an automation project must have adequate knowledge about a wide range of topics, like:

- Evaluating, selecting and implementing an automation system;
- Hardware and software terminologies;
- Functional specifications of the automated system;
- User information-seeking behaviour and information needs; and
- Diverse operations of the library.

Important features of Automation

When the preparation for the automation of the library is in progress, the library staff should learn the essential features of automation. Some of the features are:

- The benefits and disadvantages of library automation.

- The impact of automation on the parent body’s organisational structure in general and the library in particular. Such implications may include access to the OPAC from offices and other remote locations, change in staff responsibilities, the kind of services that may be removed, modified or created, the need to create new positions and abolish or redefine existing ones.

- Issues and challenges associated with using the online public access catalogue (OPAC). Awareness of the common problems users experiences using OPACs guides in selecting an automated system that meets users’ information needs and supports their information-seeking. It will also offer a framework for the library to design robust user training after implementing an OPAC.

- The different system software available and suitable for library automation, including the modules available, the ones recently added, and the strengths and weaknesses of each module.

- Investigate the financial stability and support of the software companies; and the antecedents of vendors' efforts in upgrading and implementing new technologies.

3.5.1 Steps in preparing for library automation

The steps involved in preparing for library automation are:

A. Knowledge acquisition

Knowledge acquisition is the process of extracting, structuring, and organising knowledge from one or more sources. For example, acquiring knowledge about the automation process is vital for the project's success. This can be achieved by:

- Researching the literature and other relevant write-ups on the basics of automation, hardware and software components, applications, search features, price and their compatibility with bibliographic standards;

- Learning from professional colleagues to ask for advice or share their automation experience will provide helpful insight into the capabilities of selected automation systems.

- Attendance at conferences and workshops and learning from software vendors will help understand the benefits and advantages of automation, the capability of software packages and their company's antecedents in support service, products' reliability and experience and financial stability.

B Needs Assessment

A needs assessment is a part of the planning process. It is a systematic process that examines what criteria must be met by an organisation (library) to reach the desired outcome (automation). Needs assessment is carried out to examine and evaluate the current procedures and functions to improve the library's productivity, effectiveness, and efficiency, understand the library staff and user needs and ascertain how people will be affected by the change. Activities in needs assessment are:

i. **Staff needs**

Evaluating staff needs is very pertinent to the library's automation project success. It will help ease the fear of staff members of the imminent change in their work relationships and practices, fear of the unknown, and economic insecurity. Also, assessing staff needs will disclose their concerns, current roles and responsibilities, level of job satisfaction, and readiness for the automation project. All these will provide a framework for defining existing and identifying future problems, re-assess job descriptions and reassigning responsibilities.

Well-trained staff members can assist with needs assessment, data collection, shelflist preparation and collection inventory. Also, they should be involved in the decision-making process because they are directly affected by the automation project. Their involvement will help reduce job insecurity, confidence in performing new activities and support. Therefore, the library management needs to strengthen their leadership skills, develop an understanding of change and assume the role of change agents saddled with the task of providing support and creating an environment that will cushion the effect of the change.

ii. User needs

Users' responses to technological change differ. A needs assessment of users (clients, faculty, administrators and others) will reveal their information needs, challenges and fears. Therefore, library users should be involved in the automation process to ally their fear and create a positive environment in the workplace. The outcome of the needs assessment will form the basis of their education about automation. The library should know that the project's success will depend on the performance and compatibility of the software and hardware, staff, and user level of preparedness and responses.

iii. Automation Advisory Committee

An advisory committee is a group that regularly gives suggestions and help to people or organisations. The committee needs to be composed of a committee responsible for planning and coordinating the automation project. Members of the committee must include all the interest groups in the organisation. The responsibility of the committee will consist of the following:

- Information gathering,
- Needs assessment,
- Literature search,
- Attending conferences, workshops and seminars on automation,
- Preparing the library for automation,
- Developing and evaluating a request for proposal (RFP), and
- Final selection and implementation of the automated system.

iv. Needs Assessment Questions

An integral component of needs assessment is understanding the mission and goals of the library about the parent institution. Some questions to address during the needs assessment process are:

- The parent institution’s present and future technology priorities.
- The library’s present and future priorities
- Services and procedures that can be improved through automation
- How automation will increase staff productivity, accuracy and efficiency.
- Other alternatives that may help improve services, procedures and productivity.

Automation is time-consuming and costly. It requires long-term staff commitment and financial resources. Therefore, clarification of the goals and objectives of the library at the onset is crucial to avoid unnecessary expenditures.

v. Needs Assessment Process

The needs assessment process is as follows:

a) Functional Analysis

Functional analysis is the first step in a needs assessment. It is a technique used to identify and understand the needs of a project. In the library, the functional analysis will examine the existing functions and tasks in terms of the procedures used to accomplish them. To understand the procedures involved in each function, compare the workflow pattern (workflow provides a clear understanding of the task involved in each function) in a non-automated and automated environment. For example:

- **The circulation function**: Activities in circulation include material check-out and check-in, overdue, fines, inventory, reserve, renewal and report management.
- **The cataloguing function**: Activities involve cataloguing various items in-house or accessing copy cataloguing.
- **The information service function:** This provides services to patrons to meet their information needs using a card catalogue or other bibliographic tools available in the library.

In a non-automated system, the circulation function of filling check-out cards, collecting inventory, and retrieving a card catalogue from the box is time-consuming, with attendant errors. However, automating the functions would save staff-time filing because the cards are eliminated, and barcodes are scanned to check out materials with high precision and accuracy.

b). Data gathering

Data gathering is the second step in needs assessment to prepare for automation. It entails the collection of quantitative and qualitative information on each library function. The information gathered will be used to justify the automation of each function and set priorities on how to automate the various functions. Data gathering provides a framework for establishing specifications that meet the library's needs and requirements. It can be done weekly, monthly, or annually as the library deems fit.

c). Data Analysis and Interpretation

Data analysis is the final stage of the needs assessment. It involves analysing the data collected about the workflow pattern. The outcome will help decide the functions to automate first and the sequence order. Prioritising the functions to be automated permits the effective allocation of financial resources. Data collection and analysis are helpful, even when funds are available to automate all operations. The data analysis outcomes can be used to improve the capabilities of the automated system.

Some typical questions to ask to prioritise functions include:

- Which tasks are the least productive?
- Which tasks are the most repetitive, labour-intensive, and time-consuming?
- Which tasks result in inaccuracy, inefficiency and ineffective?

C Funding

Automation does not save money. However, it is cost-effective, improves library services, enhances access to the collection, and increases productivity, accuracy, and efficiency in performing tasks. When sourcing money to fund an automation project, the library may need to prioritise functions to guide the phasing in automation, thus allowing for budget constraints.

i). Sources of Funding

Automation may be funded by the parent organisation, supported by funds generated internally or provided by external sources such as local businesses, friends of the library, private organisations, foundations, individuals, and granting agencies. Funding for the project should be assessed during the preparation process to determine what funds will be available for present and future support. For instance, if funds are unavailable to acquire all modules in an automated system, consider phasing in the project by developing one module at a time based on your priorities for automation (Kumar, 2019). If funds are available, a decision may be made whether to hire an automation consultant to assist with the project. However, an automated system should be selected with the automation advisory committee, not the consultant.

ii). Cost Estimation

Budgeting for the automation project requires a cost estimate for the overall project, including ongoing expenses. The cost estimate should include software, hardware, personnel, utilities, consumables, supplies and ongoing expenses.

- Cost estimates include the cost of automation software and other software that supports the system's operation, such as barcode/ label production, in-house retrospective conversion or Web browser to provide access to the OPAC on the Web.
- Hardware costs may include computer stations, servers, scanners, Printers, inventory devices, an uninterruptible power supply (UPS) for the server, modems, and network devices.
- Utility cost - retrospective conversion, Internet access, remodelling of facilities, and a future update of the existing wiring system.
- Personnel cost – hiring of new staff, consultant, training, workshop, conferences
- Supplies cost - barcode labels and ongoing expenses such as software updates, technical support, software and hardware maintenance, and consumables.

Preparing for automation is an important activity in the automation process and implementation criteria. Therefore, considering the benefits of automation, it is advisable at the initial stage of the planning process to focus more on how to proceed with the project and what the library intends to achieve with the exercise than how much it will cost.

Library Automation involves a range of activities that is much broader than system selection and implementation of a system.

Discuss?

3.6 SUMMARY

Planning is making or carrying out plans to establish goals, policies and procedures for a social or economic unit. A plan at any organisational level identifies the goals that will be pursued, the courses of action to adopt to attain those goals through measurable objectives, and the allocation of organisational resources from the budget for achieving those goals. Proper planning is crucial to meeting the technological demands of all stakeholders in the library. Automation projects are successful in libraries when they provide a solution for a need, not just because the library staff wants to experiment with new technology. Establishing, developing, and maintaining a library automation program is demanding and costly. Hence, the project should be executed with utmost care through adequate planning. This unit examined the concepts of planning and planning for library automation and the steps involved in preparing for library automation.

SELF-ASSESSMENT EXERCISE

Please fill in as appropriate

a. A strategic plan is a high-level ----------to fulfilling the library's vision and mission.
b. ---------- a systematic process that examines what criteria must be met by an organisation (library) to reach the desired outcome (automation).
c. Functional analysis is the ---------- in a needs assessment
d. Forecasting is estimating the ---------- of the future based on analysing their past and present behaviour.
e. A plan is a ---------- for doing or achieving something.
f. Planning is the ---------- management function.
g. Funding for the project should be assessed during the ---------- to determine what funds will be available for present and future support.
h. Budgeting for the automation project requires a ----------for the overall project.

3.7 GLOSSARY

- **Plan:** Plan refers to is a detailed course of action designed today to do something tomorrow.
- **Planning:** Planning is the fundamental management function, which involves deciding beforehand what is to be done, when it is to be done, how it is to be done and who will do it.

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3.9 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a). Road map.
b). Needs assessment.
c). First step.
d). Relevant events.
e). Fundamental.
f). Leaders in an organisation and future and identify.
g). Preparation process.
h). Cost estimate.

UNIT 4 LIBRARY AUTOMATED SYSTEM

UNIT STRUCTURE

4.1 INTRODUCTION

The unit focuses on the concept of automated systems, namely the elements, types, benefits, and components of integrated systems. An automated system is a combination of software and computer hardware designed and programmed to work automatically without requiring a human operator to provide inputs and instructions for each operation (Techopedia.com, 2022). The automated system is built to handle a wide range of tasks with precision, increased productivity, efficient use of resources, reduced manual errors and increased performance.

4.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Define automated system;
- Outline the basic elements of the automated system;
- Mention the types of automated systems;
- Differentiate between a standalone and an integrated automated system;
- Enumerate the benefits of an automated system;
- State the advantages of an integrated system; and
- Outline the components of an integrated automated system.

4.3 CONCEPT OF AUTOMATED SYSTEM

The automated system refers to the application of computer and telecommunications technology in the library functions such as circulation control, acquisitions, cataloguing, serials control, public access catalogue, and other similar activities, and the integration of these functions into one system (WNYRIC, 2019). An automated system comprises hardware, software, a database, a network and people. All the components integrate to perform input, process, output, feedback and control
An automated system can be grouped based on the following attributes:

- **Function:** This refers to the automated system's ability to carry out tasks. This can be on a standalone or integrated computer system.

- **Interface:** The interface is the point of communication between one system to another. This can be a character-based, graphical or Windows-based or Web-based automated system.

- **Platform**: A platform is a group of technologies used as a base upon which other applications, processes or technologies are developed. It is the basic hardware (computer) and software (operating system) on which software applications can be run. This environment constitutes the foundation for any application or software to be supported and developed. The automated system can support either a personal computer or a desktop computer

4.3.1 Basic Elements of an Automated System

An automated system consists of three basic elements (Brainkart, 2016). These are:

- Power to accomplish the automation process and operate the system;
- A program of instructions to direct the process (software), and
- A control system to actuate the instructions.

The software and hardware must work concurrently for an automated system to function properly.

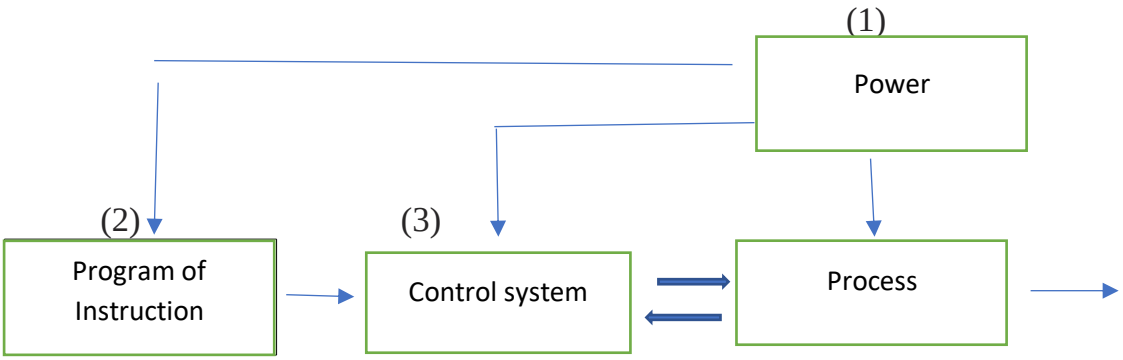

Figure 7: Elements of an automated system:
Source: https://img.brainkart.com/imagebk7/jL1ddfQ.jpg

4.3.2 Types of Automated Systems

The automated system can either be:

4.3.2.1 Standalone automated system

A standalone automated system is a system that can operate independently of other hardware or software. It does not share a common bibliographic database with another system. An example of a standalone system is the library automated system. Each module represents a library function and works independently of other modules available in the automated system. Examples are the circulation module and the acquisition module.

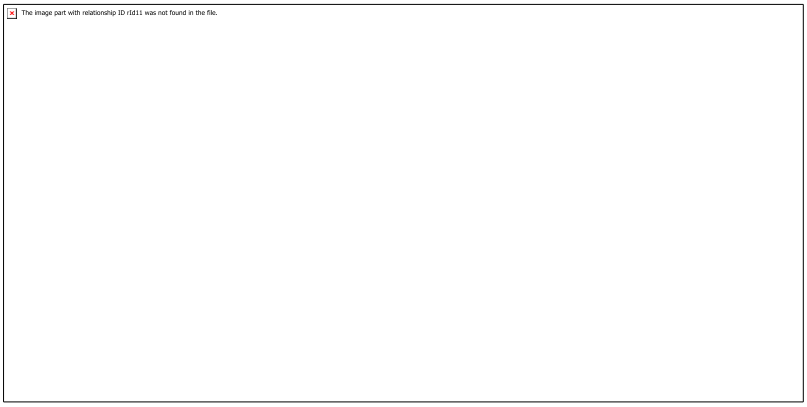

Figure 8: A Standalone Automated System
Source:https://www.automationworld.com/products/control/blog/13314007/automation-panel-or-standalone-plc

4.3.2.2 Integrated automated system

An integrated automated system is a computer-based information system consisting of interrelated components and sub-components designed to perform specific tasks and functions. An integrated system shares a common database, interface, and operations to achieve a purpose (Bilal, 2014). An integrated automated system ensures that all the components work together harmoniously to increase productivity and data consistency. It also aims to resolve the complexity associated with improved communication between systems since they reduce the impacts of changes that these systems may have. An example is a Library Management System.

i). Advantages of Library Management System

The integrated system is quite complex and combines various records for a single transaction. Using an integrated automated system in a library for its daily operation will greatly benefit such a library. Therefore, some of the advantages of an integrated system are as follows:

- An integrated system is an electronic program that helps librarians to circulate and catalogue items.
- An integrated automated system helps manage processes and user activities.
- The Integrated system tracks item movement and interacts with the database from other units or locations.
- Using an integrated system to automate, for example, library processes, improved patrons' access to resources.
- Using an integrated system in the library makes circulating items easy by scanning barcodes rather than laborious manual writing on library cards and date stamps.
- An integrated system saves time with the ability of patrons to do simple and advanced searching using OPAC.

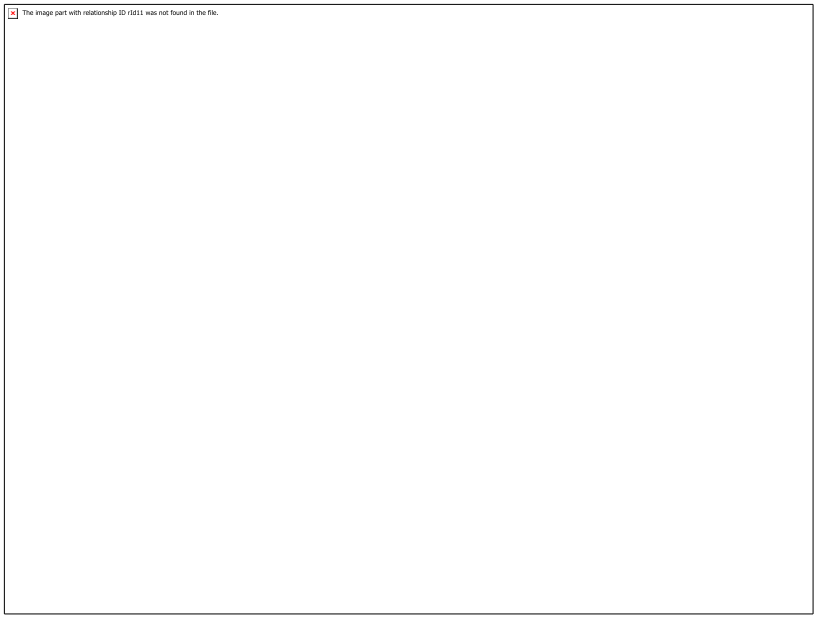

Figure 9: Library Management System
Source:https://www.iitms.co.in/library-management-system/img/Library-Management-System-Infographic.png

4.3.3 Benefits of Library Automated System

Library automation uses computer and networking technologies to automate library procedures such as acquisition, circulation, and cataloguing. The automation process enhances workflows, improves accuracy and consistency in operations, and increases efficiency. The benefits of automated systems in libraries are:

1. The system facilitates novel information retrieval by connecting users to various online information sources and resources from any location.
2. It involves replacing traditional, paper-based systems with computers and software.
3. It offers real-time process monitoring and problem identification, allowing for speedy modifications.
4. The automated systems can save space by not having to keep as many physical books as before.
5. It provides fast and easy access to quality library materials for users.
6. The Online Public Access Catalogue (OPAC) system allows for more advanced searching using broader search strategies with Boolean operators such as AND, OR, and NOT.
7. Library automation reduces staff workload and exponentially increases personnel's efficiency, productivity and output.
8. Automated system makes it easier for patrons to use electronic resources by providing barcode scanning or RFID tags which can be used to identify books.

9. An automated system makes circulating items easy by scanning barcodes rather than laborious manual writing on library cards and date stamps.
10. The automated system enables patrons to gain information retrieval skills and opportunities for lifelong learning.
11. The automation system keeps track of all book transactions. Thus, relieving library staff of some of the workload in acquisitions, cataloguing, and circulation, allowing them to serve their patrons better.
12. It reduces cataloguing time by allowing the import of bibliographic records for library resources from external databases, thereby allowing for faster cataloguing of library items and facilitating the sharing of materials from location to location.
13. The automated system speeds up material acquisition, serials management, budget administration, and record-keeping.
14. An automated system makes it possible for a group of automated libraries to form a consortium that can create a union catalogue to aid collection development, interlibrary cooperation, and resource sharing.

State the benefits of the library automated system.

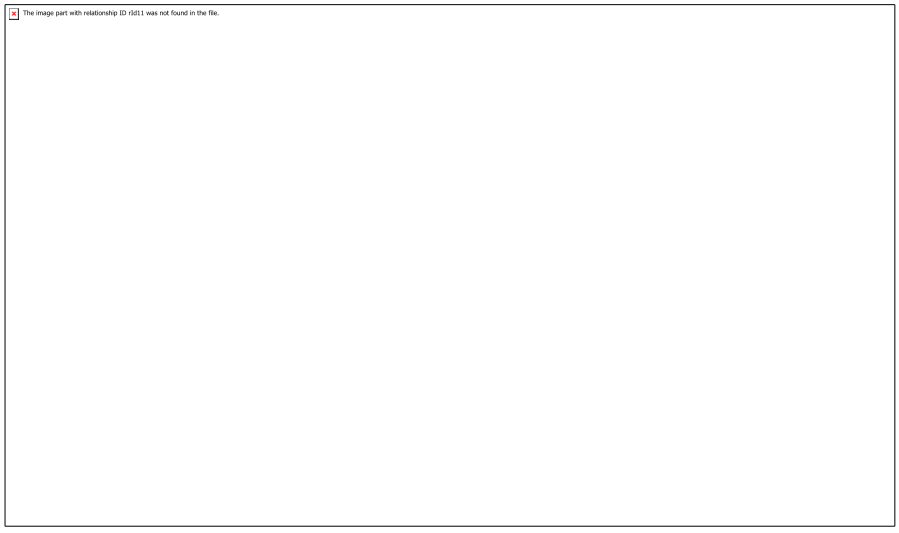

Figure 10: Integrated Automated System
Source: https://www.elibrarysoftware.com/img/library-automation.jpg

4.4 COMPONENTS OF INTEGRATED AUTOMATED SYSTEM

An integrated automated system is a complex information system that combines various records for use in a single transaction. The components include the following:

4.4.1 Computer Hardware

A computer system is a set of integrated devices that input, process, output, store data, and communicate information. The computer system has the following hardware components:

A. Input devices: Input devices are physical hardware used to enter data or instructions into the central processing unit. They are generally peripheral devices connected to the primary device (Techopedia, 2020). Examples of input devices are as follows:

- **Keyboard:** Keyboard is the primary input device of a computer. It contains three types of keys: alphanumeric, special, and function keys. The keyboard's layout is like that of a traditional typewriter, although some additional keys are provided for performing additional functions.

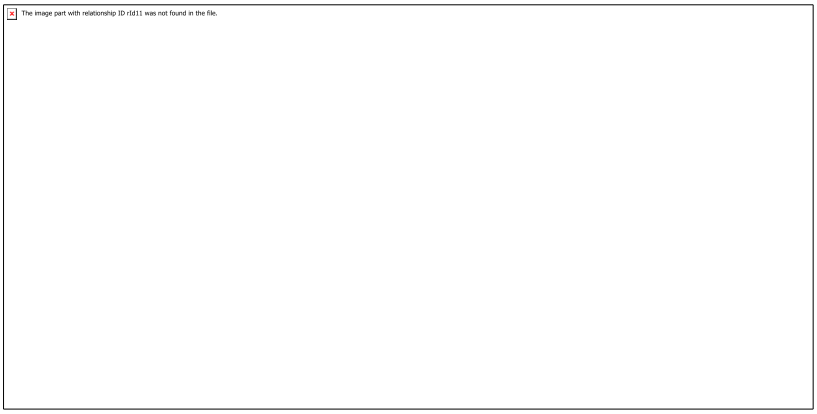

Figure 11: A Keyboard
Source: **https://images.unsplash.com/photo-1587829741301-dc798b83add3?ixlib=rb1.2.1&ixid=MnwxMjA3fDB8MHxzZWFyY2h8MXx8a2V5Ym9hcmR8ZW58MHx8MHx8&w=1000&q=80**

- **Mouse**: A mouse is a handheld hardware input device that controls a cursor in a graphical user interface for pointing, moving and selecting text, icons, files and folders on the computer. It is a famous cursor-control

device with a small palm size box and a round ball at its base, enabling interaction with objects on the screen. It may be wireless or wired.

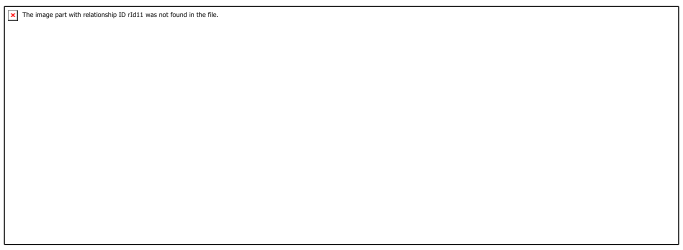

Figure 12: A mouse
Source: https://www.computerhope.com/jargon/m/mouse.htm

- **Scanner:** A scanner is a computer input device that uses a light beam to scan codes, text, or graphic images directly into a computer or computer system for further manipulation. A basic model scanner is required to scan the book cover, images and photographs that will be uploaded into the library's automated system hardware. They are helpful in build-up an automated library collection.

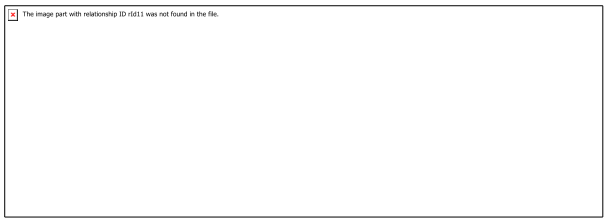

Figure 13: Epson Perfection V19 Color Photo *and* Document Scanner *w*ith Scan-to-cloud
Source: https://www-konga-com res.cloudinary.com/w_auto,f_auto,fl_lossy,dpr_auto,q_auto/media/catalog/product/C/F/163031_1631096166.jpg

- **Barcode scanner:** A barcode scanner or reader is an electronic scanning machine that reads barcode information and converts them into digital data. This is required for circulation and stock verification. It helps in preventing

wrong check-out and check-in of library materials, saves time and manpower; and gets the exact figures in stock verification.

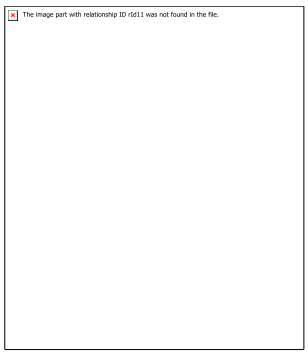

Figure 14: Barcode Scanner
Source: https://www.computerhope.com/jargon/b/barcode.htm

Describe the input devices for a computer system.

B. Output device

An output device is any hardware device that sends data from a computer to another device or user. It converts machine-readable information into people's readable form. Examples of output devices are:

- **Monitor:** The monitor is a display device. Its output signal is information, documents, or images generated by the computing device. It is a beneficial device for an automated library system.

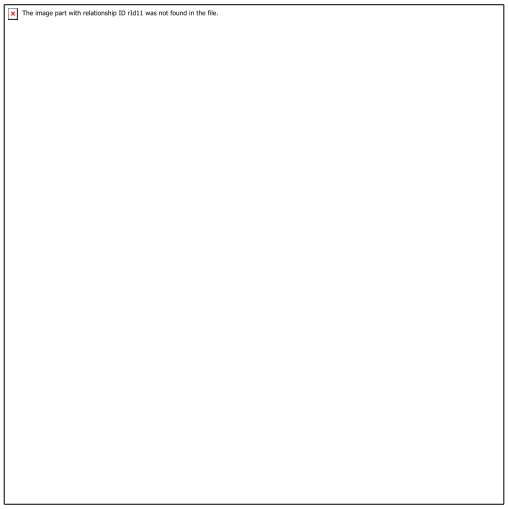

Figure 15: LCD Computer Monitor
Source:https://encryptedtbn0.gstatic.com/images?q=tbn:ANd9GcQdHU0nz2RVak_VdhRbhtZ0tdgd7rjR-PSO0_AnRTPG77z-ZvKPrpH1AYg3m8YW1lylivw&usqp=CAU

- **Printer:** A printer is an output device that produces a hard copy of data or a paper sheet. Printers render electronic data from a computer into printed

material. A printer is an external hardware output device that takes the electronic data stored on a computer or other device and generates a hard copy. For the proposed automated system, any laser printer to print circulation slips and other library documents can be considered.

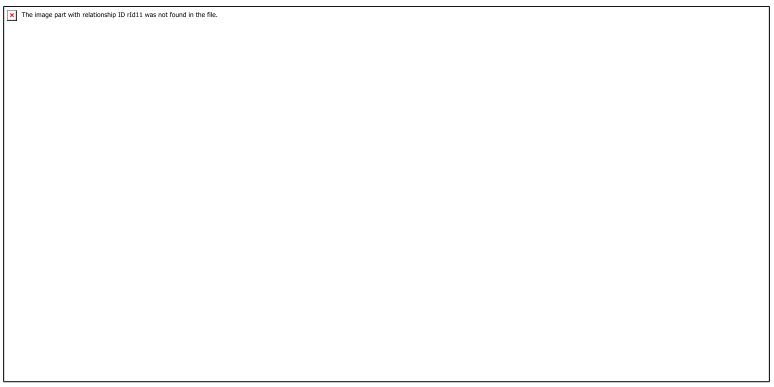

Figure 16: HP LaserJet Pro Multifunctional Printer - M428dw
Source:https://www-konga-com-res.cloudinary.com/w_auto,f_auto,fl_lossy,dpr_auto,q_auto/media/catalog/product/Q/P/161794_1658412841.jpg

- **Barcode Printer:** Barcode printer is a computer peripheral specially designed to produce barcode labels or tags which can be attached to other objects (books and users' cards).

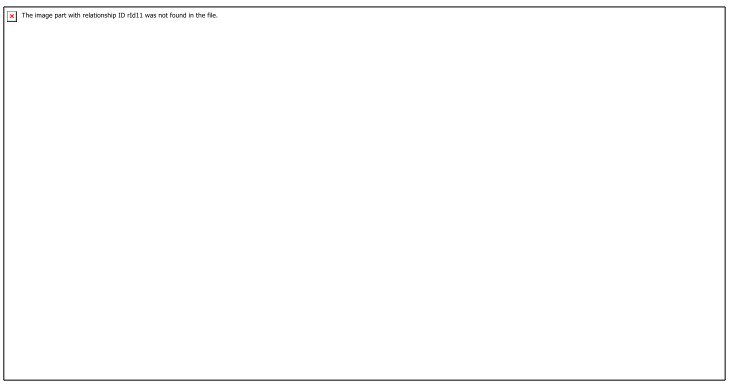

Figure 17: Barcode Printer
Source: https://image.shutterstock.com/image-photo/barcode-label-printer-isolated-on-260nw-19517119.jpg

Describe the output devices for a computer system.

C. **Central Processing Unit (CPU):** The central processing unit, often called the processor, is the central part of a computer in which operations are controlled and executed. It is the brain of the computer and contains, most importantly

hardware of a computer. The CPU consists of an arithmetic and logic unit (ALU), a control unit, and various registers.

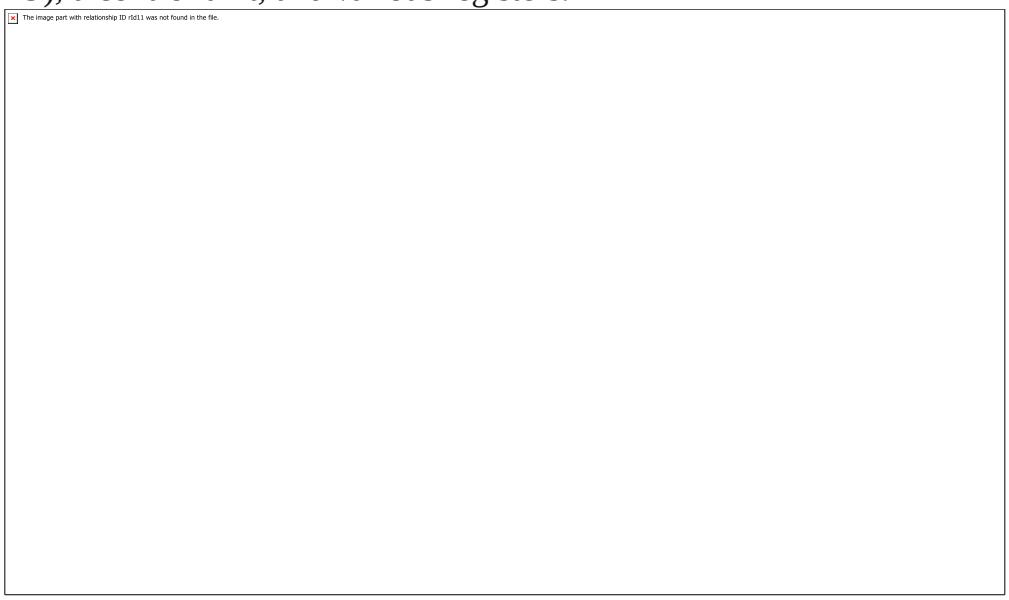

Figure 18: **Dell XPS 8940Central Processing unit (CPU)**
Source: **https://www-konga-comres.cloudinary.com/w_auto,f_auto,fl_lossy,dpr_auto,q_auto/media/catalog/product/O/U/52059_1633964102.jpg**

D. Storage Device

A computer system contains a variety of storage devices to store instructions and data for its operation. They are:

- Primary memory refers to a set of internal memory units within the computer. It stores and retrieves data, instructions, and information. The central processing unit (CPU) has direct access to and stores instruction and data needed for processing by the CPU. Examples are:

- **Hard Disk Drive (HDD):** A Hard disk drive is a non-volatile computer storage device containing magnetic disks or platters rotating at high speeds. It is a secondary storage device used to store data permanently.

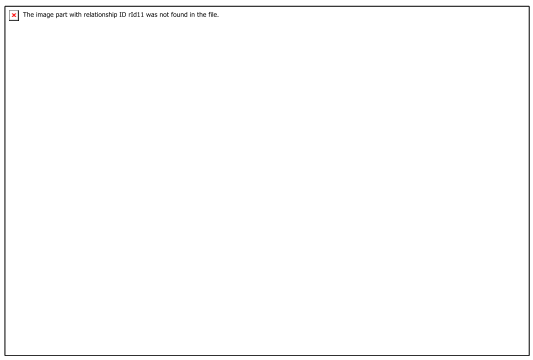

Figure 19: Hard drive
Source:https://images.unsplash.com/photo-1601737487795-dab272f52420?ixlib=rb-4.0.3&ixid=MnwxMjA3fDB8MHxzZWFyY2h8M3x8aGFyZCUyMGRpc2t8ZW58MHx8MHx8&w=1000&q=80

- **Random access memory (RAM):** RAM is the hardware in a computing device where the operating system application programs and data in current use are kept so the device's processor can quickly reach them. RAM is the main memory in a computer. It is much faster to read from and write than other storage, such as a hard disk drive, solid-state drive, or optical drive (Peterson, 2022)

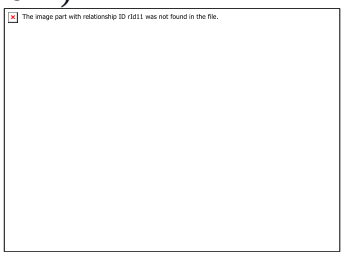

Figure 20: Random Access Memory
Source:https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQunVZ_O0Gj-NwFMwGJjN_PnvTwCnduzSr8I6ZY_CHd&s

- **Read-only memory (ROM):** Read-only memory (ROM) is a type of storage medium that permanently stores data on personal computers (PCs) and other electronic devices. It contains the programming needed to start a PC, which

is essential for boot-up; it performs major input/output tasks and holds programs or software instructions.

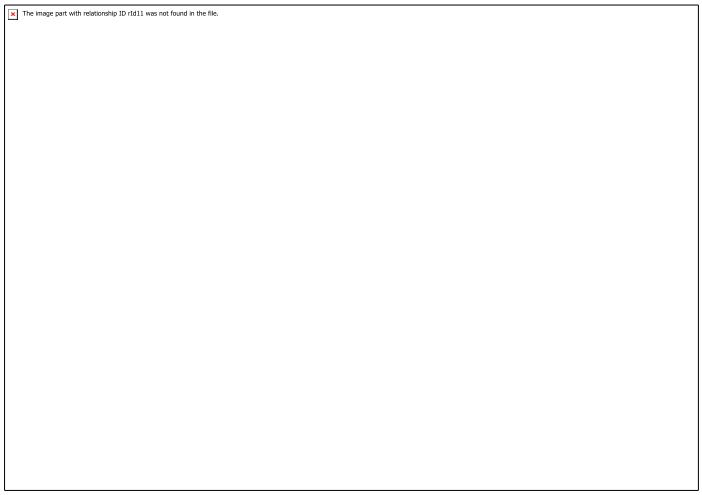

Figure 21: Read Only Memory
Source:https://www.previews.123rf.com/images/yuriy2design/yuriy2design1311/yuriy2design131100037/23989236-rom-read-only-memory-chip.jpg

E. Secondary memory: Secondary memory refers to computer memory that is non-volatile, persistent and not immediately accessible by a computer or processor. It allows users to store data and information that can be retrieved, transmitted, and used by apps and services quickly and easily. They are essential for an automated library system because books, journals and documents can be stored in digital format on the storage device. Examples of secondary storage memory are

- **Solid-State Drive (SSD)**: Solid State Drive is a new generation of computer storage device. SSD uses flash-based memory much faster than a traditional mechanical hard disk.

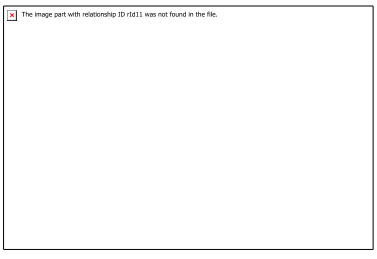

Figure 22: Solid-State Drive
Source: https://www.shutterstock.com/search/solid-state-drive

- **Flash drive:** A flash drive, also known as a USB drive, data stick, or pen drive, is a portable storage device often the size of a human thumb. It connects to a computer via a USB port. It is a jump drive type of disk drive

that stores data on flash memory chips and is less prone to erratic behaviour. As a result, it is faster and more reliable even during sudden power outages.

Figure 23: **A USD/Flash Drive**
Source: https://image.shutterstock.com/image-illustration/modern-usb- flash-drive-on-260nw-158798891.jpg

- **Blu-ray discs**: Blu-ray is an optical disc format like CD and DVD designed to display high-definition video and store large amounts of data. Blu-ray discs can hold more information than other optical media because of the disc drives' blue lasers. A single Blu-ray disc can hold up to 25GB of data.

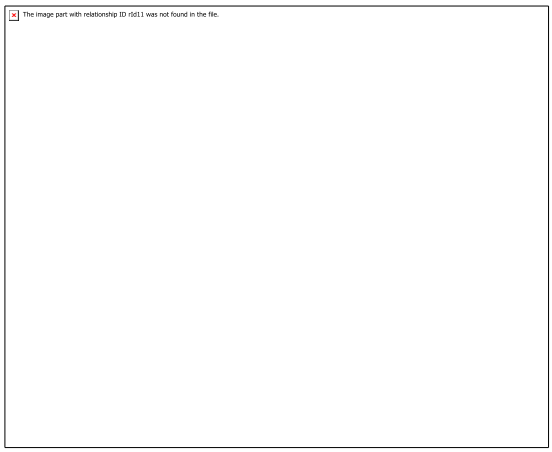

Figure 24: A Blu-ray Disc
Source: https://informationq.com/wp-content/uploads/2016/12/Blu-ray-Disc.jpg

4.4.2 Software

Software is a generic term that describes computer programs that run on computers, mobile phones, tablets, or other intelligent devices. Software is often used to describe a computer's functional aspects that does not refer to its physical components (hardware). Scripts, applications, programs, and a set of instructions are often used to describe software (Techopedia, 2020).

A. System Software

System software refers to a set of one or more programs designed to control the operations and extend the processing capability of a computer system. It acts as an interface between the hardware and user applications and controls the computer's internal functioning through an operating system and peripherals such as monitors, printers, and storage devices. Example is:

- **Operating system**: An operating system (OS**)** is software installed on a computer's hard drive that enables the computer hardware to communicate and operate with the computer software. A computer and software programs would be useless without a computer operating system. Examples are MS-DOS (command-like interface – challenging to use) and Windows (Graphical user Interface – user-friendly and accessible).

B. Application Software

Application software is commonly defined as any program or number of programs designed for end-users to solve a specific task. They are specialised in their function and approach to solving a problem. Application software is non-essential software installed and operated on a computer based on the user's requirements. Examples include Microsoft Word, Microsoft Excel, or any of the web browsers used to navigate the Internet and Koha

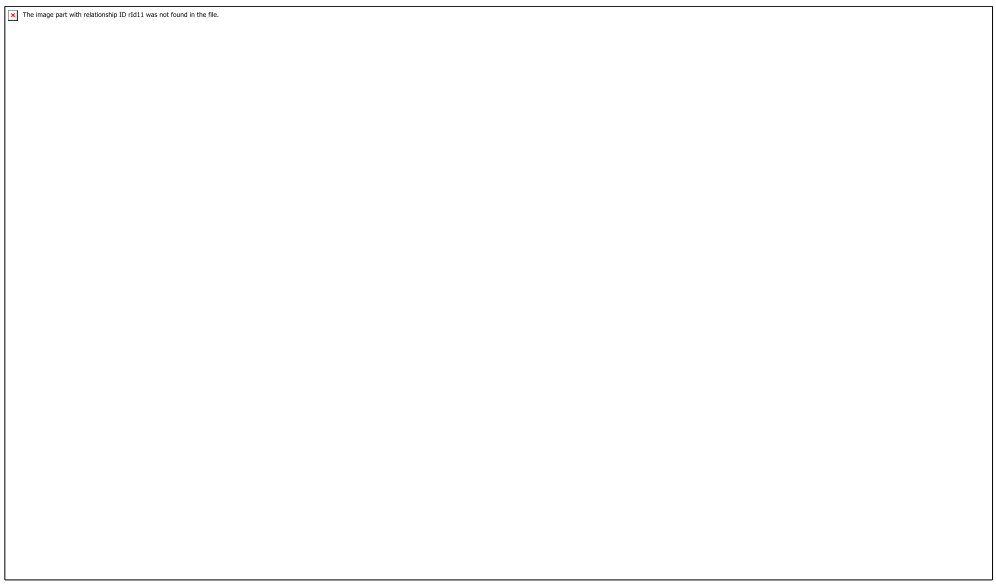

Figure 25: System and Application Software
Source: **https://getuplearn.com/wp-content/uploads/2021/06/Types-of Computer-Software.jpg**

What are the functions of system software?

4.4.3 Database

A database is an integrated collection of logically related records essential for an automated system. For example, a database is where all the information belonging to a library, such as MARC records and patron information, among others, is stored.

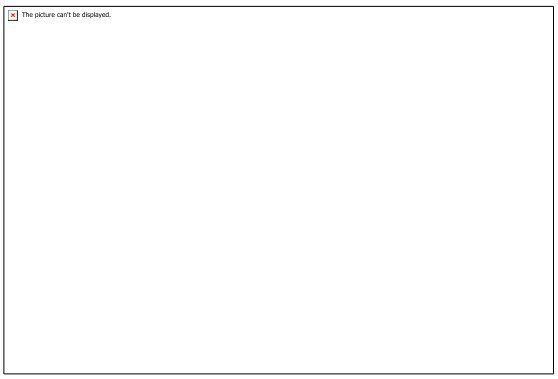

Figure 26: A Scholarly Database
Source:https://www.google.com/url?sa=i&uri=https%3A%2F%2Fapuedge.com%2Fthe-scholarly-database-differential%2F&psig=AOvVaw2ZiR

4.4.4 Networking devices

Network devices are hardware devices that are used to connect computers, printers, fax machines and other electronic devices to a network. These are required to interconnect the computers, peripherals and switches for information sharing. Examples are:

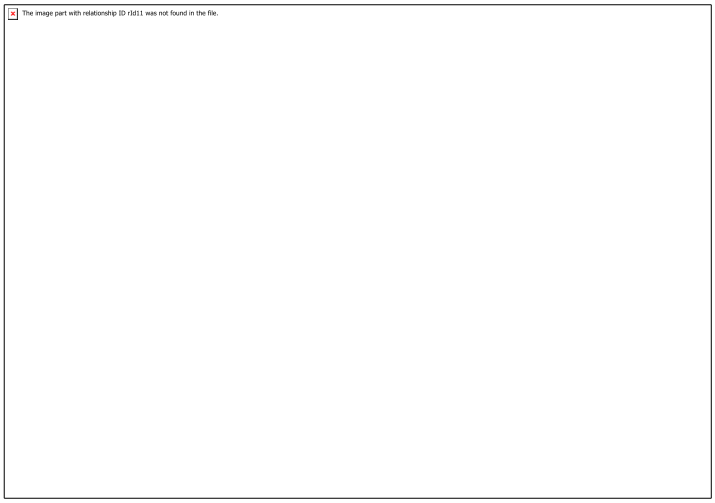

Figure 27: Types of Network Devices
Source:https://www.itrelease.com/wp-content/uploads/2021/06/Types-of-network-devices.jpg

- **Modem:** The modem is an electronic communication system that allows two or more interconnected computers and terminals to share information and resources.

- **Gateway:** A gateway is a data communication device that provides a remote network with connectivity to a host network. A gateway device provides communication to a remote network or an autonomous system

that is out of bounds for the host network nodes. Gateways serve as a network's entry and exit points; all data routed inward or outward must first pass through and communicate with the gateway to use routing paths.

- **Local Area Network (LAN):** A local area network is a data communication network used to interconnect data terminal equipment distributed over a limited area. LAN is valid for accessing the library database within the organisation

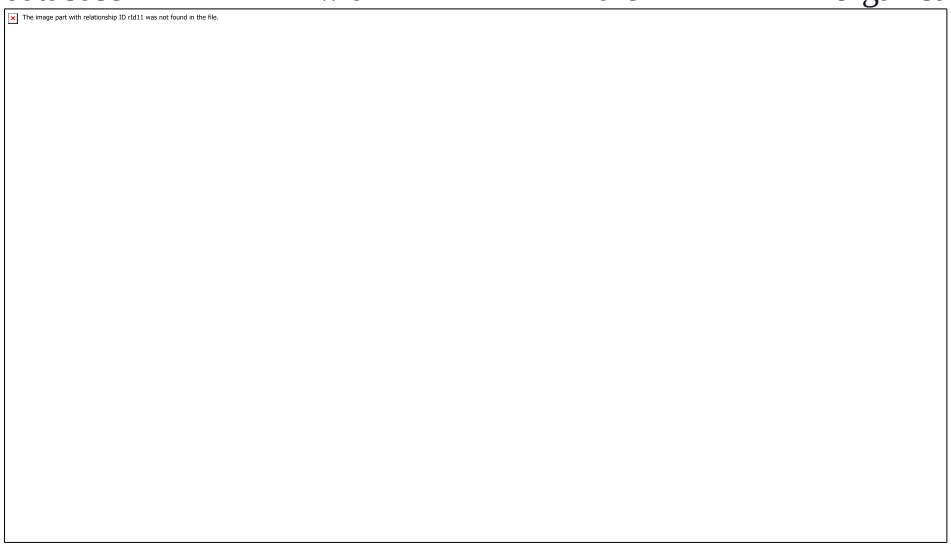

Figure 28: Local Area Network
Source:https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.javatpoint.com%2Ftypes-of-computer-network&psig=

- **Metropolitan Area Network (MAN):** This computer network spans a city or a large campus. MAN interconnects several LANs.

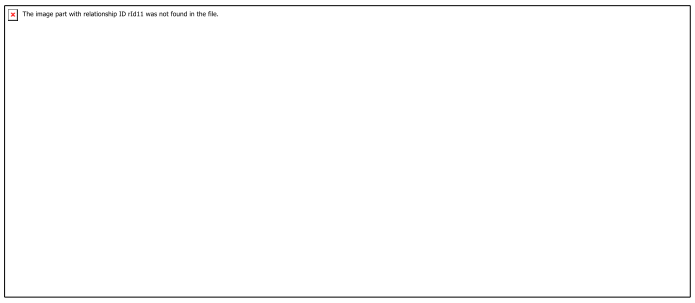

Figure 29: Metropolitan Area Network
Source: https://www.media.geeksforgeeks.org/wp-content/uploads/20210817121003/man-300x192.png

- **Wide Area Network (WAN):** A wide area network is a computer network that connects computers across a wide geographical area. WAN is required to provide access to facilities outside the library. An example is the Internet.

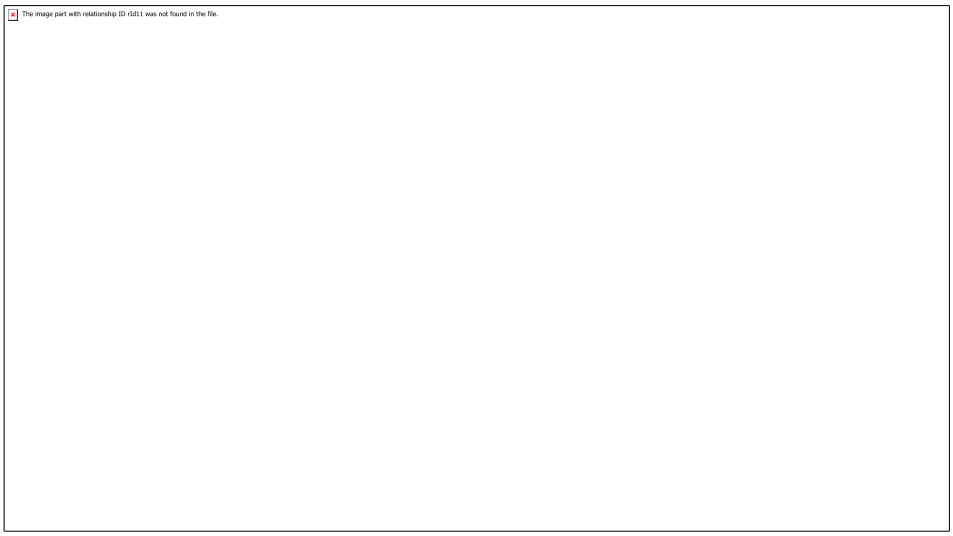

Figure 30: Wide Area Network
Source: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQY2X8uWYXWoueXxd3WjWE-QtLaVYkvfA4P-g&usqp=CAU

- **Cable:** The networking cable connects one device to another or connects two or more computers to share a printer or scanner.

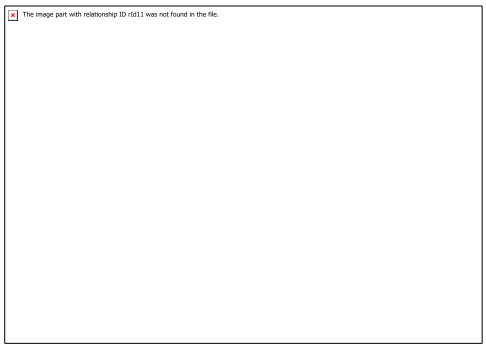

Figure 31: **A Cable**
Source:https://www.media.istockphoto.com/photos/cables-picture-id144349803?k=20&m=144349803&s=612x612&w=0&h=AO3skIk2QP2_hLYwTITpXQX7cYUwJN3DKDhusNbJLLY

Describe the networking devices for a computer system.

4.4.5 Server

A Server is a computer or program that manages or controls access to centralised resources or services in a network. Using the server, libraries can share library e-resources with other libraries connected with the server.

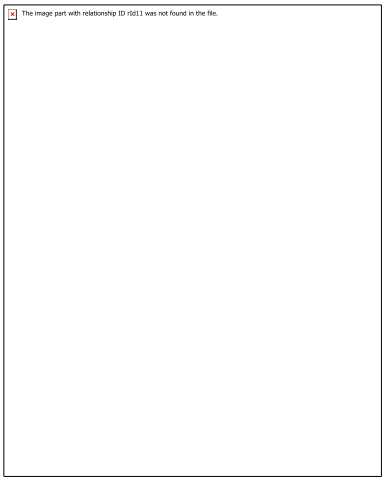

Figure: 31: Computer Server
Source: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcR5X6WQyq55FdloVzznAjl2oj65

4.5 SUMMARY

The automated system revolutionized every aspect of life, increasing productivity, making work more accessible, and saving human power and time. As computers and other technologies continue to be used to improve service provision in various industries, information providers such as libraries are also leveraging the benefits of automation to improve the efficiency of the entire library system. This unit discussed the concept, types and benefits of an automated system. Equally examined were the components and advantages of an integrated system.

SELF-ASSESSMENT EXERCISE

Fill-in as appropriate

a. Software is made up of ---------- and ---------- software.
b. ---------- is an integrated collection of logically related records.
c. A computer system contains a variety of memory devices to store ---------- and ---------- for its operation.
d. ---------- is a portable external storage media to store media or data files.
e. ---------- refers to a set of one or more programs designed to control the operations.
f. ----------is an optical disc format like CD and DVD.
g ---------- interconnect the computers, computer peripherals and switches for the sole purpose of information sharing.
h---------- a set of internal memory units within the computer.

i. A mouse ---------- input device.
j. ---------- external hardware output device.
k. A computer that provides the network resources and services to other computers is referred to as a ----------.

4.6 GLOSSARY

- **Automated system:** This refers to a combination of software (a computer program designed to perform various functions) and hardware (computer system, input and output devices and other related peripherals).

- **Central Processing Unit**: This refers to the central part of a computer in which operations are controlled and executed.

- **Computer hardware:** The tangible components or delivery systems of a computer.

- **Computer peripheral:** This refers to any external device that provides input and output for the computer.

- **Computer system**: This refers to a set of integrated devices that input, output, process, and store data and information.

- **Database**: A database is an integrated collection of logically related records essential for an automated system.

- **Integrated system**: This refers to a system that combines different functions to work as one entity.

- **Networking device:** This refers to hardware devices that are used to connect computers, printers, fax machines and other electronic devices to a network.

- **Server**: This refers to a computer that provides network resources and services to other computers.

- **Software:** This refers to a generic term used to describe computer programs that run on computers, mobile phones, tablets, or other smart devices.

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4.8 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. System and Application software.
b. Database.
c. Instruction and Data.
d. Memory card.
e. System software
f. Blu-ray discs.
g. Networking device.
h. Primary memory.
i. Pointing.
j. Printer.
k. Server.

MODULE 2 SOFTWARE SELECTION AND SYSTEM

Unit 1 The Software Concept.
Unit 2 Library Automation Software Packages.
Unit 3 Library Management System Structure.
Unit 4 Selection of Library Automation Software.

UNIT STRUCTURE

UNIT 1 THE SOFTWARE CONCEPT

1.1 INTRODUCTION

This unit introduces you to the software concept, categories and qualities of software. This is another vital component that determines the success or failure of the automation project. Every day, we come across different computer software that helps us with our tasks and increases efficiency. Software is a collection of data, programs, procedures, instructions, and documentation that perform various predefined tasks on a computer system. The software enables users to interact with the computer; it controls, integrates and manages the hardware components to execute a specific or multiple task(s) with a user-friendly interface.

1.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

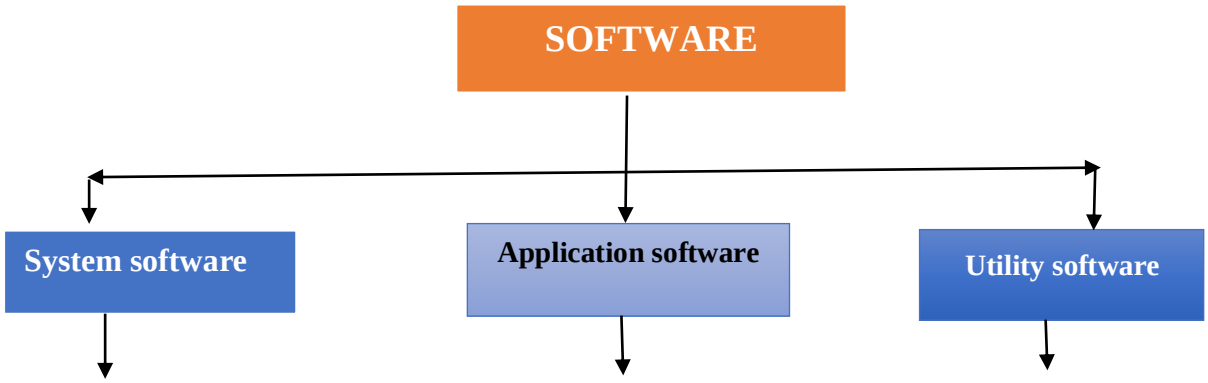
- Define software;
- Identify the categories of software;
- Mention the types of software;
- Discuss the classification of software; and
- Describe the qualities of software.

1.3 DEFINITION OF SOFTWARE

Software is a generic term that refers to applications, scripts and programs that run on a device's instructions (Rosencrance, 2021). Software refers to instructions/programs that direct a computer's hardware to perform a task. It comprises the entire set of programs, procedures and routines associated with operating a computer system (Britannica Eds., 2022). Software is an application made in a machine-understandable language to accomplish various individual or administrative tasks. It is responsible for directing the functions of all peripheral devices on the computer.

1.4 CATEGORIES OF SOFTWARE

Based on functions, purposes and features, there are many types and classes of Software. However, there are three major categories of Software. These are:



Operating System Software **Microsoft Office Suite** **Anti-Virus**

Figure 32: Categories of Software
Source: Self-constructed

1.4.1 System Software

System software is a computer program designed to run the hardware parts of the computer and application programs and coordinate the activities of a computer system. System software runs in the background, maintaining the computer's basic functions so users can run higher-level application software to perform specific tasks. System software manages computer hardware behaviour to provide the user's basic functionalities and provides a platform for application software to be run. System software is used to manage the computer itself. Types and examples include

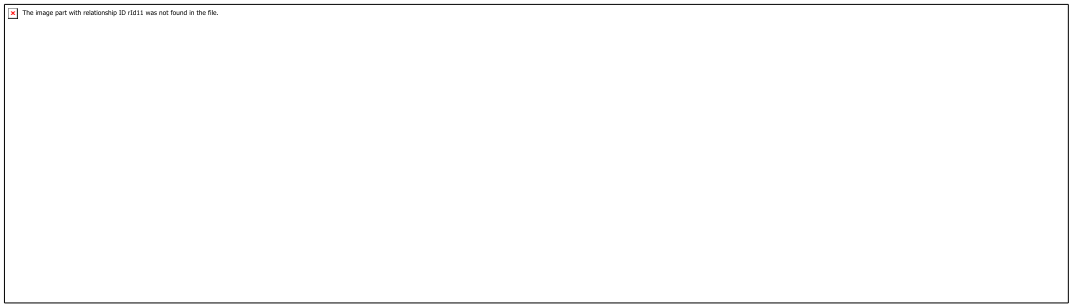


Figure 33: System Software
Source: **https://classnotes.ng/wp-content/uploads/2020/04/system-software-1.jpg**

A. Operating System

The operating system is a collection of software that handles resources and provides general services for the other applications that run over them. Operating systems are the lifeline of the computer and are responsible for the successful functioning of all hardware parts and their interoperability. It is the first to be loaded into computer memory when switched on; it collects system performance information, stores data in memory, and retrieves and controls improper computer use. There are various operating systems, such as real-time, embedded, distributed, multiuser, single-user, internet, mobile, and many more. Examples of the most popular operating system are Unix, Android, MS Windows, Ubuntu, Linux and Mac OS.

There are two types of operating system software. They are:

- **Line command operating system:** A-line command operating system is a non-graphical command line, the text-based user interface to the computer. It allows the user(s) to open, navigate, operate and manipulate files on the computer (Davis, 2022). Examples are MS-DOS, command shell in Windows, Unix, and Linux.

- **Graphical User Interface (GUI) Operating System:** The Graphical User Interface operating system is a computer program that enables a user to communicate with a computer using icons, menus, other visual indicators, and a pointing device. The interface is easy to navigate and use, and there is no need to remember commands. An example is Microsoft Windows NT.

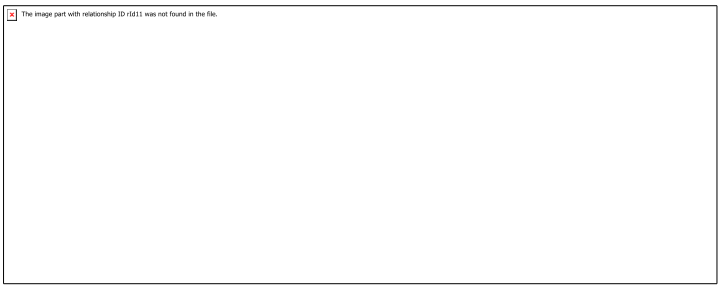


Figure 34: Popular Operating Systems
Source: https://openxcell.com/wp-content/uploads/2021/06/img_60cb23a68785e.jpg

Describe the types of operating systems?

B. Language processor

A language processor is a system software program designed to convert program code to machine code. For example, a language processor converts all user instructions into machine-understandable language. There are three (3) types of human-machine interaction language processors. These are:

- **Machine-level language:** Machine-level language is understood only by a computer and consists of a set of instructions in the binary form of 0 and 1.

- **Assembly-level language:** Assembly-level language is a low-level programming language that communicates directly with computer hardware. It is machine-dependent and designed to be readable by humans.

- **High-level language:** A high-level language is a computer programming language that resembles a natural language or mathematical notation. It enables the development of a program in a much more user-friendly programming context and is generally independent of the computer's hardware architecture. It uses English-like statements and is easy to create, read and understand.

State the importance of machine-level language to a computer.

C. Language Interpreter

A language interpreter is a system software program used to directly execute a program or instruction written using one of the many high-level programming languages.

Types of language interpreters include:

- **Assembler:** This refers to a program that takes basic computer instructions and converts them into a pattern of bits (0 and 1) that the computer's processor can use to perform its basic operations. It interprets software programs written in assembly-level programs into machine language, code and instruction that a computer can execute. It can optimise computer memory and hardware utilisation.

- **Interpreter:** This refers to a program that can analyse and execute a program line by line. The interpreter directly executes instructions using one of the many high-level programming languages. It is easy to write and does not require ample memory space.

- **Compiler:** A compiler is a software that converts the source code to the object code.

Mention the three types of language interpreters.

D. Device Driver

A Device driver is a software that controls particular hardware attached to the system. Hardware devices that need a driver to connect to a system include displays, sound cards, printers, keyboards, headphones, mice and hard disks. All hardware parts require a driver from your internal computer components,

State the function of a driver.

1.4.2 Application Software

Application software, also known as end-user programs or productivity programs, helps users complete tasks such as doing online research, playing games, setting alarms, designing graphics, and doing calculations. They lie above the system software. It directs the computer to execute commands given by the user(s).

Application software has become our everyday companion, and different types are available to suit every need and purpose. They are as follows:

- **Microsoft Office Suite:** Microsoft Office Suite is a set of programs with related functionality for everyday tasks. The primary programs are word processing, spreadsheet and presentation graphics.

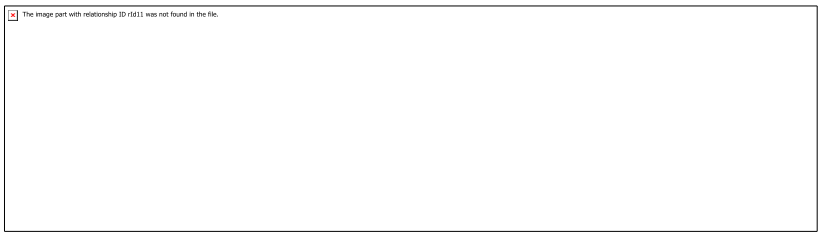


Figure 35: Microsoft Office Suite
Source:https://www.i.pinimg.com/originals/5b/3d/10/5b3d1078f5551280e310af7db411e2ba.png

- **Database Software:** Database software, also known as database management software (DBMS), is a program or utility used to create, edit and maintain database files and records. It allows users to store data in structured fields, tables and columns, which can then be retrieved directly and through programmatic access. Examples are MYSQL, FoxPro, dBase and MS Access.

- **Presentation Software:** Presentation Software is a category of application software specifically designed to allow users to create a presentation of ideas by stringing together text, images and audio/video. Examples are MS PowerPoint and Google Slides.

- **Spreadsheet Software:** Spreadsheet software is an application capable of organising, storing, and analysing data in tabular form. The application can provide a digital simulation of a paper accounting worksheet. They can also have multiple interacting sheets with data represented in text, numeric or graphic form. An example is Microsoft Excel.

- **Enterprise Resource Planning Software:** Enterprise Resource Planning Software manages a company's finance, supply chain, operations, commerce, reporting, manufacturing and human resource activities. Examples are CodeAchi, Librarian, and Koha Library Management Software.

- **Browser:** Browser refers to software that allows a computer user to find and view information on the Internet (Gregersen, 2017). Web browsers interpret the HTML tags in downloaded documents and format the displayed data according to standard style rules. Web Browsers help the user to locate, retrieve and display content found on the Internet. Examples are Mozilla Firefox, Google Chrome, and MS Edge.

- **Multimedia Software:** It is the software that can play, create or record images, audio or video files. They are used for video editing, animation, graphics, and image editing. Some examples of Multimedia Software are: Adobe Photoshop, Picasa, VLC Media Player, Windows Media Player, Windows Movie Maker

- **Communication Software:** Communication software is an application or program that passes information from one system to another. It provides remote access to systems and transmits files in various formats between computers. An example is Zoom.

- **Music Software:** Music Software is software used for this application for music production, e.g., Spotify and Apple Music.

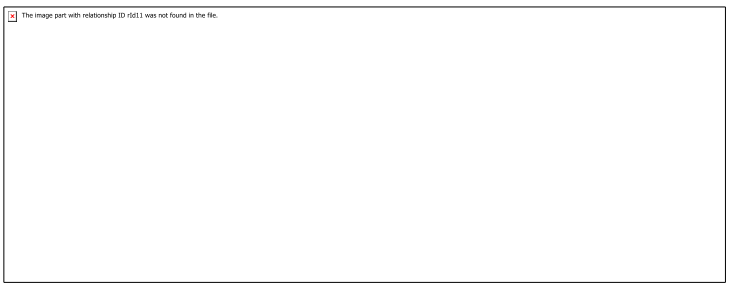


Figure 36: Types of Application Software
Source: https://lms.su.edu.pk/storage/uploads/1606586211-what-is-application-software.jpg

Describe the different types of application software with examples?

1.4.3 Utility Software

Utility software supports computer infrastructure. It is designed to aid in analyzing, optimizing, configuring and maintaining a computer system. This software focuses on how an OS functions and then accordingly decides its trajectory to smoothen the system's functioning. Types of utility software are as follows:

- **Anti-virus software:** Anti-virus software is a program to prevent, detect, scan, and eliminate malware and viruses from a computer system. Examples are Norton utility Avast and McAfee
- **Disk management tools:** Disk management tools are utility software programs used to manage data on disk by performing various functions like partitioning devices, managing drives, checking, and formatting.
- **File management tools:** File management tools are utility software that manages computer system files. They help to browse, search, arrange, find information and quickly preview the files of the system.
- **Backup Software**: Backup Software is a computer program used to perform a backup. It creates exact supplementary copies of files, folders, documents, software data, most data types or the entire computer/server, used for restoring the original files in case of file corruption, accidental/intentional deletion or a disaster.

Figure 37: Utility software
Source: https://ventsmagazine.com/wp-content/uploads/2019/11/Utility-Software.jpgIg&usqp=CAU

State the importance of utility software.

1.5 CLASSIFICATION OF SOFTWARE

There are tons of readymade software packages in the market for various applications. However, the capabilities differ, prices vary, and versions keep changing. Based on features such as the source code's nature, access level, and usage cost, the software can be classified as follows:

- **Commercial Software:** Commercial Software is a software program designed and developed for licensing or outright sale to an end-user. Commercial Software is reliable, easy to use and well-documented. Examples are LIBSYS and Alice for Window.

- **Open-source Software:** Open-source software is computer software with the source code freely available under a license that permits the user to study, change, improve and redistribute in modified or unmodified form. The license is released free of cost and prohibits commercial redistribution (Syed, 2011). Examples are Evergreen and Koha.

- **Closed-source Software:** Closed-source, also known as Proprietary Software**,** is a non-free computer program. The source code is the publisher's intellectual property, which reserves the licensing rights to use, modify, share modification, or share the Software, restricting user freedom with the Software on lease. Examples include Android, Java, Microsoft Office, and Adobe Photoshop.

- **Shareware:** Shareware **is** a freeware public domain software solution. The license prohibits modifications and commercial redistribution. It is distributed free on a trial basis with the understanding that the user wants to pay for it later. The source code is not available for modification. Examples are Adobe acrobat, PHP Debugger and Grammarly.

- **Middleware:** Middleware is software that mediates between application and system software or between two different kinds of application software. For example, middleware enables Microsoft Windows to relate to Excel and Word.

- **Freeware:** Freeware is proprietary software available for use at no monetary cost but may not be modified, re-distributed or re-engineered without the author's permission. Examples include Google Chrome, Adobe Acrobat, Adobe Illustrator, McAfee Antivirus, PDF Reader, and Skype, among others.

- **Productivity Software:** Productivity software is application software that assists users in regular office jobs such as creating, updating and maintaining documents, handling large amounts of data, and creating presentations. Typical examples are word processors, and spreadsheet software.

- **Application suite:** An application suite is a group of different but interrelated software programs combined and packaged. It contains software from a single software publisher and encapsulates it into a layer of executable programs known as the installer. The installer enables the bundled applications to be installed individually or the entire software stack at once. They have related

functions, features, and user interfaces and may be able to interact with each other. One of the best-known software suites is Microsoft Office, which includes Word, Excel, PowerPoint and other programs depending on the version.

- **Web-based software:** Web-based software is any program accessed over a network using hypertext transfer protocol (HTTP) rather than existing within a device's memory. It runs inside a web browser without needing installation, download or upgrading. Examples are Online Banking and web-based email programme – Gmail, Yahoo, and Hotmail.

- **Cloud-based software:** Cloud-based software (software as a service SaaS) allows users access to **software** applications that run on shared computing resources (for processing power, memory and disk storage) via the Internet. It is cost-effective, flexible, innovative, and open-access to access data anywhere, anytime, as per user need. In addition, libraries can use the software without having to license or install it. A typical example is Dropbox, where the user interacts with the application in a web browser to upload and interact with their files. Still, all of the data processing and storage happens remotely on the cloud.

- **Programming software:** Programming software is used by computer programmers to write code. Enable developers to develop, write, test and debug other software programs. Examples include Assemblers, Compilers, Debuggers and interpreters.

- **Licensed software:** Licensing software is proprietary **software** distributed under a licensing agreement to authorized users only. The source code is not to be shared publicly. An example is Norton Utility anti-virus software.

- **Subscription-based Software:** Subscription software is a monthly or annual licensing model in which users pay a per-user fee. The subscription fee covers software licenses, access to support services, and new software versions as they become available.

Discuss the classification of software packages based on source code, access level, and cost.

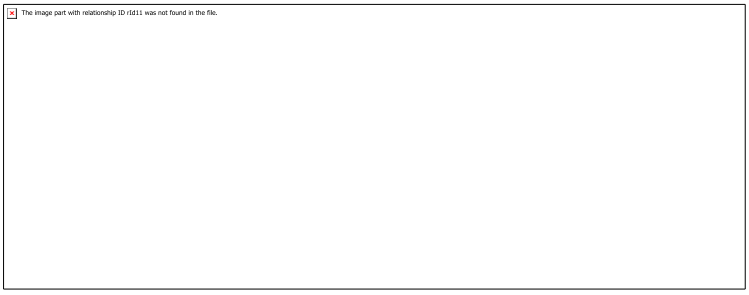


Figure 38: Classification of software
Source:https://1.bp.blogspot.com/-Q37a0bo1-Bc/YUuPHJQGwFI/AAAAAAAACIQ/lipUQS30aCQMge4EB1q3Yxo7_bE5xIoDwCLcBGAsYHQ/s16000/Classification%2Bof%2BSoftware.png

1.6 QUALITIES OF SOFTWARE

The ability of software to meet its functional (operational) and non-functional requirements defines its qualities. According to Rosencrance (2021), the functional requirements includes technical details, data manipulation and processing capabilities, and other functions that define performance. The non-functional requirements are the attributes that determine how the system should work. These include:

a) **Integrity:** Integrity is preventing unauthorised access to software or data. It is not usual for software to have side effects, such as affecting the operation of another application, but quality software should not have side effects.

b) **Accessibility:** Accessibility is the degree to which a diverse group of people can use the software comfortably, including those who require adaptive technologies such as voice recognition and screen magnifiers.

c) **Functionality:** Functionality is the software's ability to do the work for which it was intended.

d) **Testability:** refers to the fundamental attribute associated with every software artifact (such as modules, requirements and specifications, design documents and UML model) that enables computation and effort required to perform testing. The lesser the testability, the larger the efforts will be, whereas greater testability ensures minimal effort.

e) **Reliability:** Software reliability is the probability of failure-free operation of a computer program for a specified period in a specified environment. Reliability is a customer-oriented view of software quality. It relates to operation rather than program design; hence, it is dynamic rather than static.

f) **Efficiency**: This refers to the software's ability to use system resources most effectively and efficiently by making good use of storage space and executing

commands by the desired timing requirements, and it should perform well without wasting resources, effort, or money.

g) **Re-usability:** This refers to the ability to reuse software code with some modifications for different purposes**.**

h) **Compatibility:** Compatibility is the software's suitability for use in various environments, such as with different operating systems, devices, and browsers.

i) **Interoperability:** Interoperability is the ability of the software to exchange and use information with other applications transparently (interface with other software).

j) **Correctness:** Correctness is the software's ability to do what it is supposed to do to meet all of the specifications specified by the customer.

k) **Installability**: Installability is the software's ability to be installed in a specific environment.

l) **Robustnes**s refers to the degree to which the software can continue functioning even when given incorrect data.

m) **Portability:** This is the ability of software to be adaptable, installable, replaceable, and transferable from one platform to another without modification.

n) **Localisation:** Localisation refers to a software's ability to adapt to different languages, time zones, and other features.

o) **Scalability:** The ability of software to increase or decrease performance in response to changes in processing demands, expanding for more work or a more significant number of users with affordable costs should be straightforward.

p) **Performance:** Performance relates to how quickly the software performs a specific activity.

q) **Usability:** Usability is the degree to which specified consumers can use software to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of the use. This refers to how simple it is for a non-IT expert to use the software.

r) **Maintainability:** is the ability to modify the software to improve performance or correct errors, features and debug. Also, it must be testable, stable, changeable, and operable.

s) **Security:** This refers to the software's ability to protect against unauthorised access, invasion of privacy, theft, data loss, malicious software, and other external threats.

t) **Safety:** This refers to the system's ability to operate, normally or abnormally, without danger of causing human injury or death and without damage to the system's environment.

Discuss the non-functional requirements of the software for it to be adjudged to be of good quality?

1.7 SUMMARY

This unit examined the software concept. It discussed the types, categories and qualities of software. Without software, computer hardware is virtually useless. Software is the programs and other operating information used by a computer. There are three categories of software. The system software controls the computer's internal functioning and the peripherals such as monitors, printers and storage devices; the application software directs the computer to execute commands given by the user(s) and the utility software is designed to help analyse, configure and optimise hardware performance. The qualities of software depend on its functionality, attributes, the developer's ability to constantly adapt to meet new customer requirements, and the prompt handling of identified problems of the software.

SELF-ASSESSMENT EXERCISE

Fill in the gap as appropriate

a). ---------- software assists the systems software in their work.
b). ---------- controls and monitors the functioning of a specific device on the computer.
c). Types of operating systems are ---------- and ----------
d). ---------- is the lifeline of the computer.
e). Language processor converts all user instructions into ---------- language.
f). ---------- software is computer software for which the software publisher or individual owner retains intellectual property rights.
g). Application suite is an ---------- management software package.
h). Open-source software is any ---------- that prohibits license modification and commercial redistribution.
i). ---------- is distributed free on a trial basis?
j). Norton utility anti-virus is an example of ---------- software.

1.8 GLOSSARY

- **Application software:** A computer program that performs a specific function directly for an end-user, or in some cases, for another application.

- **Graphical User Interface**: This refers to a computer program that enables a user to communicate with a computer using icons.

- **Hardware:** This refers to the physical component of a computer.

- **Interoperability:** This refers to the ability of a computer system or software to exchange and use information.

- **Non-functional requirements**: These are the attributes that determine how the system should work

- **Proprietary software:** This refers to commercial software that can be bought, leased or licensed from its vendor/developer.

- **Software:** This refers to instructions/programs that direct a computer's hardware to perform a task.

- **Software quality**: This is defined as a field of study and practice describing software products' desirable attributes.

- **System software:** This is a program designed to run a computer's hardware, and application programs and coordinate the activities of a computer system.

- **Utility software**: This refers to a software designed to help analyse, configure, optimise or maintain a computer.

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1.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a). Utility.
b). Driver.
c). Line command and Graphical User Interface.
d). Operating system.
e). Machine-understandable.
f). Closed-source
g). Integrate.
h). Computer software.
i). Shareware.
j). Licensed.

UNIT 2 LIBRARY AUTOMATION SOFTWARE PACKAGES

UNIT STRUCTURE

2.1 INTRODUCTION

Managing a library is laborious, process-oriented, and demanding for individuals without making mistakes. Library automation is essential as deploying a robust library automation software would eliminate daily repetitive activities. The current trend in libraries is the digitisation of contents and the provision of open-source integrated platforms to enable a broader search and usage spectrum 24/7 from remote

locations for member access. The best library automation software helps transform the library and make it accessible. Therefore, libraries must endeavour to procure software with a user-friendly interface for today's computer-savvy users. This unit therefore, focuses on library automation software vis-a-vis the definition, types and qualities. Also, it brings to you some of the library automation software available in the market and their unique features.

2.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Define library automation software;
- Identify the types of library automation software;
- State the qualities of library automation software; and
- Mention the different library automation software.

2.3 LIBRARY AUTOMATION SOFTWARE

Library automation software is a multi-component information system whose objective is to facilitate the management of library information resources and enhance staff performance (Ferguson & Hebels, 2003). The software system may be a simple program designed to perform the job of acquisition or cataloguing; or an integrated software that can handle several functions such as acquisition, cataloguing, circulation, serials management, report generation and others. Therefore, be it academic, public, school or special library**,** automation software is designed to help attain efficiency. This is done by optimising data and information on new books, borrowing, and returning records with date and time, daily statistics of library transactions, and administrative operations by automating records and catalogues.

There are different library management software in the market with different capabilities and functionality. However, the similarity of features makes it difficult to categorise them. Based on where the software can be hosted/situated/ownership, it can be categorised into the following types:

a. **On-the-Cloud:** Cloud-based solutions refer to the applications, storage, on-demand services, computer networks, and other resources accessed with an Internet connection through another provider's shared cloud computing framework. It is the digital data stored, managed, and processed on a network of remote servers hosted on the Internet rather than on local servers or personal computers. With cloud-based solutions, access is guaranteed from any remote location with Internet facilities. As a result, they are more flexible, easier to maintain, and. Examples are WorldShare Management Service and Evergreen ILS.

b. **On-Premise Library Software:** On-premises software is a software delivery model installed and operated from a library's in-house server and computing infrastructure. It utilises the library's native computing resources and requires

only a licensed or purchased copy of the software from an independent software vendor.

c. **Subscription Software:** Subscription-based software relates to a monthly or annual licencing model, allowing users to pay a per-user fee. Customers typically pay an initial subscription upfront and are entitled to use the software only during the subscription term.

d. **Perpetual Software Licence:** A perpetual software license is a software license that authorises an individual to use a program indefinitely. Libraries purchase the software and are responsible for its maintenance. Generally, aside from the termination of the contract, a perpetual software license allows the holder to use a specific version of a given software program continually with payment of a single fee. However, a perpetual license agreement often means that the licensee has to pay additional fees to install any software updates the manufacturer provides.

Describe types of library automation software based on?

2.3.1 Qualities of Library Automation Software

A library management system is software that is designed to manage all the functional activities of a library. It helps the librarian maintain the database of new books, the books that members borrow, and their due dates. According to Sadaf (2015), the qualities of good library management software are as follows:

a) The automation software must have an integrated design and support all library functions, database building, and information retrieval.

b) The software must be user-friendly and operate on a platform with multiple users.

c) The automation software must be international-standard compliant (MARC 21 enabled) with export and import capabilities.

d) The software must support the proper management of books and other library collections and accurately give details about the library stock and members.

e) The software must support the easy issuing and returning process.

State the qualities of library automation software.

2.4 LIBRARY AUTOMATION SOFTWARE PACKAGES

Library automation software solutions have evolved over the years. Different packages are available on the market, each with peculiar functionalities and

capabilities. Each type of library has unique requirements to cater to its patrons. The library management system software selection will depend on the type of library that needs to be automated. Finding the right software solution for the library is vital for managing the library's assets and the service of patrons. Therefore, for automation software to offer complete satisfaction to the users, and perform library activities and functions effectively, it is essential to have options from which a choice can be made based on the library's requirements. Types and examples of leading library automation software solutions in the market include but are not limited to the following:

2.4.1 KnowAll Matrix Library Management System

KnowAll Matrix Library Management System is an entirely browser-based integrated library management system that offers quality for single to multi-site libraries and information centres. It is a fully maintained modular library management system that allows librarians and information professionals to carry out administration, cataloguing, serials management, loans, acquisitions and financial reporting in their own modular integrated library software system in the cloud.

KnowAll Matrix Library Management System, a product of Bailey Solutions, was developed and designed by a library consultant in consultation with clients. The product features a standard Google-type search feature with simple and advanced search, filters, and ranking. In addition, the platform has an AutoCat feature that adds catalogues quickly by automatically downloading bibliographic data, including images from resources such as Google Books, COPAC libraries, and other specialist resources. Other key features include Catalogue, OPAC, user management, set-up, hosting, support, upgrades, admin staff licenses, unlimited web OPAC for library users, and a 24/7 help centre. Optional: services like data conversion and training. Add other modules as required, including Circulation, Acquisitions, Serials and Interlibrary Loans.

Features of KnowAll Matrix Library Management System

The unique features of the KnowAll Matrix Library Management System are:

- KnowAll Matrix Library system solution supports different formats, from print and digital resources to government publications and law reports.
- A highly customisable discovery interface with a Google-type search experience and nightly data backups.
- Personalises user experiences in their accounts through saved searches and alerts for reviews.
- Free upgrading and updating of the software whenever they are available.
- Flexible enough to be deployed for NHS, healthcare, and law libraries.
- Downloads bibliographic metadata, images and description for published books.
- Create metadata for print and digital resources.
- Manage all information and knowledge resources in one place.
- It has multiple workflows, which means all offices or branches can use the library system, but work separately.

- Buy only the modules required by a library.

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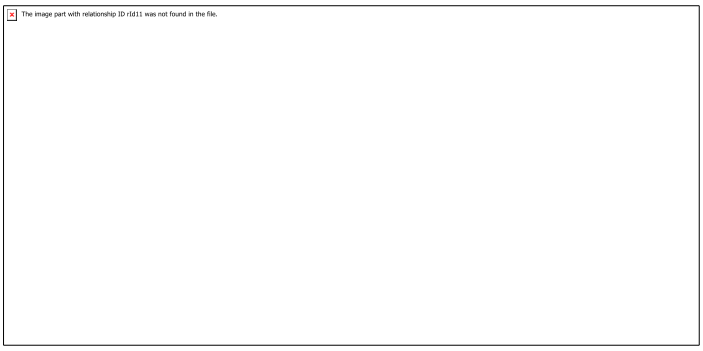


Figure 39: KnowAll Matrix Dashboard
Source: https://s2.research.com/wp-content/uploads/2022/06/28225227/KnowAll-Matrix-dashboard-1024x626.png

2.4.2 CodeAchi Library Management System

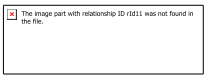
CodeAchi Library Management System is one of the most sought-after platforms on the market today. It is a globally trusted software for Library Automation. The software is easy to install on Windows computers and can be accessed by multiple computers using LAN. It is a complete solution for managing and administering a library of any size. CodeAchi LMS features training through documentation, live online, webinars and YouTube videos, which is very easy to use.

CodeAchi Library Management System is a fully featured solution with many sophisticated options and functions. It can add books, CDs, DVDs, students, and staff with the required filed names. It can check the history of most used books, a student and many more in a few seconds. This software is ready to perform every vital digital task in managing a library. The available modules are designed with the International Standard Organization for Library and Library Science guidelines. CodeAchi Library Management System is the best choice for schools, colleges, universities, and public libraries. The product can satisfy every query related to your library information.

Features of CodeAchi Library Management System
CodeAchi library management system is easy and best for the organizational library with the following features:

- It provides easy-to-use cataloguing features with relevant fields and tags, customised categories, tags, and other data saved for library materials.
- CodeAchi LMS offers a powerful search engine for librarians and users using categories and tags.

- The platform helps streamline issue and return processes for books and other materials.
- It has a shelf management and barcode scanner feature for easy issues and returns.
- Allows quick data import using comma-separated values (CSV) or excel sheets.
- Provides an automatic fines calculator and automated borrower SMS and notifications.
- It includes acquisition, check-in, and issue book features for procurement management.
- The platform offers a 360-degree view of circulations and their inventory status.
- It has an automatic fine calculation module with SMS borrower notifications through emails and SMS from the software.
- CodeAchi provides multisystem support, allowing users to connect with other library management tools and databases.
- It provides after-sale support and data security.



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Outline the unique features of CodeAchi Library Management System.

2.4.3. LibraryWorld

LibraryWorld is a cloud-based library automation solution with a full range of library application modules, including catalogue, circulation, inventory, serials control, and OPAC. LibraryWorld allows users to create a branded library site and access customisable library automation options, catalogue their collection, manage circulation, patrons, inventory, and more. In addition, the product offers an online public access catalogue (OPAC) that allows patrons to search the collection and is accessible via native mobile applications for Apple devices.

Features of LibraryWorld

The unique features of LibraryWorld are as follows:

- The software streamlines library transactions with its intuitive circulation management module.
- It is a Web-based library automation service. No costly software, hardware, or networking nightmares.
- Quick email receipts for checkouts.

- Serials tracking modules enable tracking of expected repeating items and allow users to send letters and missing reports to vendors.
- The inventory module allows for collection status verification quick real-time views.
- Range of library reports such as cataloguing reports, statistical reports, overdue patron lists, library spine and pocket labels.
- The cataloguing module allows users to create and update library catalogues and records.
- Users can add one or multiple copies to catalogue records and attach PDF or JPEG files to build a digital library.
- The circulation module's barcode scanning supports self-service kiosks and streamlines check-out, check-in, renewal, holding, and reservation of items for patrons.
- The cataloguing module allows users to manually enter records, import records in MARC format, and pull records directly from online resources, including the Library of Congress, through the Z39.50 connection to the Library of Congress.
- The Z39.50 protocol can also be used by client applications to search your library in a vendor-independent manner.
- A mobile web application, native iPad and iPhone apps, and an online patron access catalogue (OPAC) allow patrons to search the library catalogue anywhere.
- The patron module allows you to import or hand-enter patron records. In addition, patron records can include an optional patron image for quick user verification.
- It provides basic and advanced searching with multiple display modes, items status and book jacket display.

Figure 40: LibraryWorld Dashboard

Source: **https://s2.research.com/wp-content/uploads/2022/06/28230039/LibraryWorld-dashboard-1024x626.png**

2.4.4. Alexandria Library Management Software

Alexandria Library Management Software is a robust cloud-based integrated library automation software that empowers patrons and librarians with its customisable interface creation tool and powerful features that allow users to add custom fields, buttons, icons, and images. As a result, users can configure their library experience to engage patrons of all ages and reading levels. In addition, the software seamlessly helps manage catalogues and allows patrons to quickly search collections anytime and anywhere.

Alexandria is available for Cloud, Mac, Windows, Android, iPhone and iPad, and configured to meet every library's unique needs. It includes catalogue management, hosting options, 24/7 customer support, and many more. The platform also connects users with eBook providers and offers free resources like monthly themed posters.

Features of Alexandria Library Management Software

Key features of Alexandria are as follows:

- The platform is device agnostic. Librarians and patrons can access it via any device.
- It provides users with customisation tools to build library experiences for patrons of all ages and reading levels.
- It offers a robust search function with customisable filters and categories.
- Allows for distributed catalogues to be managed from one interface.
- It has a map feature that pinpoints the location of any material searched for in the system.
- Alexandria has a community Bulletin Board feature for promoting events.
- End-users can create virtual spaces for storing resources, creating events, and reading lists.
- It has a slideshow feature for promoting resources such as seasonal reading, new releases, and school materials.
- It has a user-friendly circulation interface for handling all transactions.

- Provides a custom reporting module that users can generate whenever it is necessary.

- It has options for additional hardware like scanners, printers, and labels to integrate with the software.

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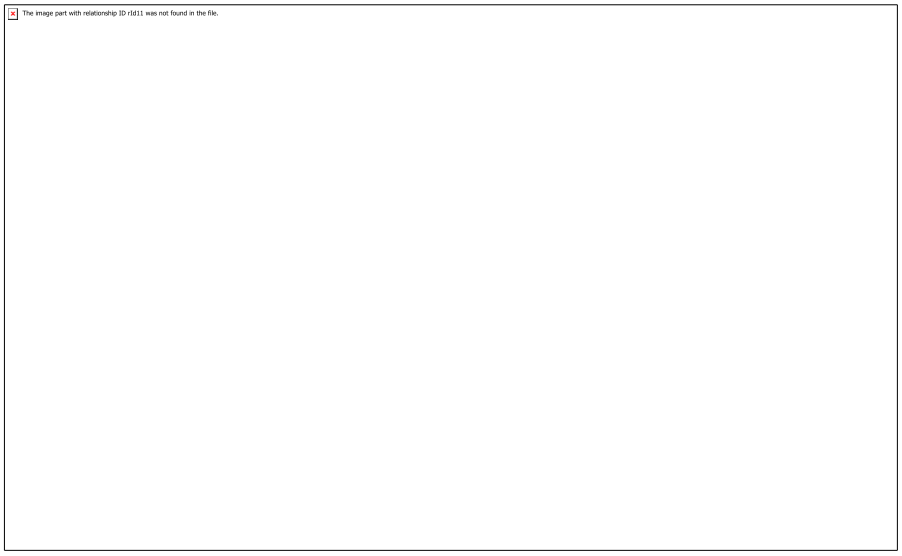


Figure 41: Alexandria Dashboard
Source:https://s2.research.com/wpcontent/uploads/2022/06/28224357/Alexandria-dashboard-1024x626.png

2.4.5 Mandarin 5 Library Automation Software

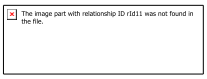
Mandarin M5 is a modern web-library management system accessible through any device that is purpose-built for librarians. It is user-friendly and customisable. Mandarin M5, a flagship product of Mandarin Library Automation, enables users to access resources from any workstation, remotely or at the library. The solution helps single libraries and libraries with multiple sites and school districts cut costs while saving time with its one-point installation, maintenance, and updates.

Mandarin M5 provides cataloguing, circulation, inventory, and report generation modules. In addition, it provides users with features to configure according to their needs and preferences. Also, the platform supports Unicode. Hence, it allows patrons and librarians to search for any material using any language, including Chinese, Arabic, and Hebrew, among many others.

Mandarin 5 Library Automation Software Features

Features of Mandarin 5 Library automation software are:

- Simple and advanced cataloguing editors.
- Allows for listing and printing of records.
- Enables transactions, including loans, returns, renewals, reservations, and bookings.
- View patron and item status.
- Displays patron and item images.
- Automates fine processing and refunds.
- Automatically sends email notifications for overdue materials and fines.
- Conducts partial and complete inventory.
- Generates custom reports with PDF and automatically sends them to relevant email addresses.
- Its Report Tool includes over 900 reports and free custom reports.



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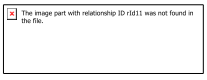

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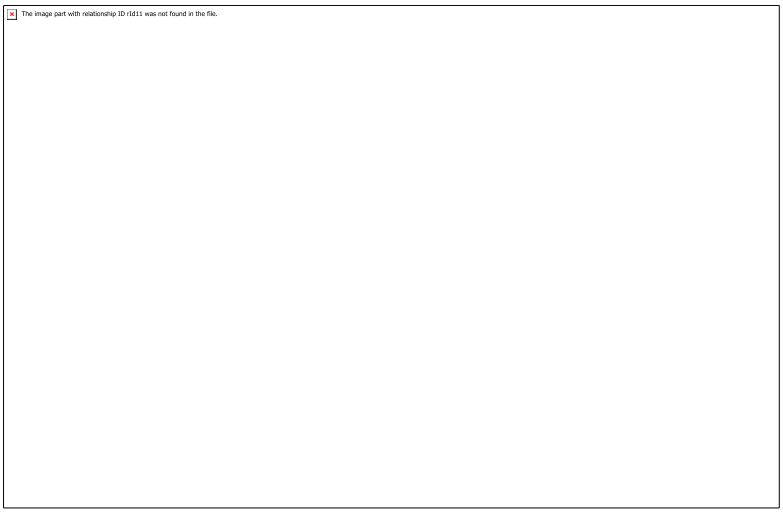

Figure 42: Mandarin M5 Dashboard
Source: **https://s2.research.com/wpcontent/uploads/2022/06/28224935/Mandarin-M5-dashboard-1024x626.png**

2.4.6 Library System Software 10 (LIBSYS 10)

LIBSYS 10 is a Library Management System produced by LIBSYS Corporation, New Delhi, India, with a three-tier architecture and independent front-user interface that enhances the library experience by automating, maintaining, organising and handling the books systematically. LIBSYS 10 is an integrated multi-user library automation software designed in COBOL language but converted to C and C++ for academic libraries with vast collections.

LIBSYS 10 is an intelligent library management system that meets the needs of advanced librarians. It covers all the essential functions of a library, like acquisition, cataloguing, circulation, serials management, barcode scanning, fee collection, article indexing, e-books, dean and vendor portals, and an upgraded OPAC. In addition, it has a mini version called Micro LIBSYS for DOS/XENIX machines that may be adapted to work with Oracle, Ingres, and Unify.

Features of Library System Software (LIBSYS)

Some of the features of LIBSYS 10 are as follows:

- LIBSYS can be accessed through a web browser, thus, allowing the networking of libraries via a local and vast area network.
- The software is multi-lingual and CD-ROM compatible.
- LIBSYS 10 is open technologies complaint such as JAVA and International Standards such as Z39.50.
- It is available in client-server and web-enabled configurations.
- It provides a tree-structure system, with each system consisting of several sub-systems with unrivalled functionality depth.
- The software is a fully integrated multi-user system designed to run on any computer with the Unix operating system via a local area network.
- Integrated with the software is the Vendor Management System, a cloud-based software platform in charge of common and many global enterprise platforms and environments operations.
- The LIBSYS transactions processor includes a powerful bibliographic search database manager/engine with the option of using Oracle or SQL Server as the back-end relational database management system.
- It supports all library-related activities, the installation of software and its smooth operation on a site.

- It has a streamlined workflow that allows library staff to manage library operations efficiently.

- It aids in approving new purchases, collection development, material handling, SDI services, and bindery management.

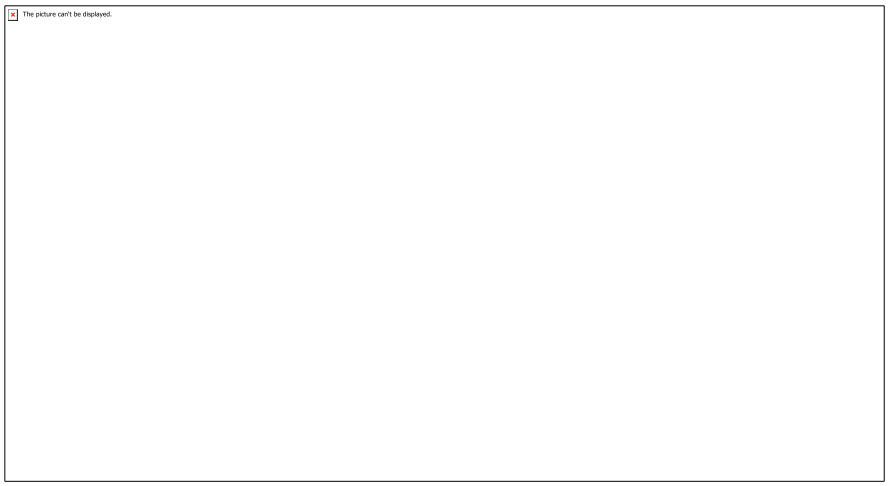

Figure 43: LIBSYS 10 Dashboard
Source:https://d2t60rd7vcv5ly.cloudfront.net/latest_screenshots/1583728715_LIBSYS_10.PNG.png

2.4.7 Evergreen Integrated Library System

Evergreen ILS is a unique, highly scalable open-source library management solution with an active development community. It is maintained by passionate volunteers and is used by more than 2,000 libraries across the globe. The platform has an on-premise client that allows web connection to a vast network of users, allowing for sharing of resources among the group. It helps library patrons find library materials and helps libraries manage, catalogue, and circulate those materials, no matter how large or complex the libraries are. It is available for Windows, Mac and Linux.
The software, also called Evergreen, is used by libraries to provide their public catalogue interface and manage back-of-house operations such as circulation (checkouts and check-ins), acquisition of library materials, and sharing resources among groups of libraries. Evergreen depends on the following technologies Perl, C, JavaScript, XML, XPath, XSLT, XMPP, OpenSRF, Apache, mod_perl, and PostgreSQL. In addition, the latest stable release of a supported Linux distribution is recommended for an Evergreen installation.

Evergreen Integrated Library System Features

Key features of Evergreen ILS are as follows:

- Provides an intuitive public catalogue interface.
- Offers back-end support for circulation.
- The platform offers features for acquisition and resource sharing.

- It is open-source and is managed by a passionate community of developers and end-users.
- Evergreen ILS provides a metadata search engine.
- It is a transaction processing engine for library workflows.

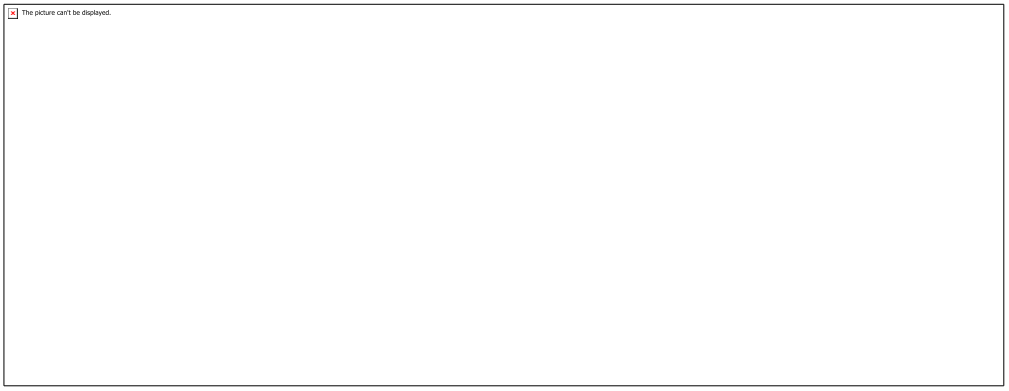

Figure 44: Evergreen Home page
Source:https://a.fsdn.com/con/app/proj/evergreenils.s/screenshots/1.PNG/1000/auto/1

2.4.8 Apollo Integrated Library System

Apollo ILS is a hosted integrated library system for public libraries. It was created by Bibiolix, a Texas-based family-owned company dedicated to providing solutions for public libraries. Apollo ILS enables customers to significantly increase their efficiency by accomplishing more tasks for patrons. The platform automatically connects clients with state catalogues and ILL systems and maintains these connections at no extra charge. It has comprehensive features, from collection management to online payments. As a cloud-based solution, Apollo ILS delivers many features, including circulation management, collection management, acquisition management, cataloguing management, barcode scanning, barcoding/RFID, OPAC, Fee collection and integration with third-party products or services.

Features of Apollo ILS
Key features of Apollo ILS include the following:

- Streamlines circulation management.
- Supports Email, text, and phone notifications.
- Communal catalogues and virtual consortium capabilities.
- Auto-notifications for reservations and overdue materials.
- Self-checkout capability.
- Acquisitions support.

- Delete items without losing information on items; also has batch weed/delete capabilities.
- Includes the Gabbie two-way texting tool and gives patrons access to their librarians using a "Ask a Librarian" link.
- The Gabbie two-way texting tool has auto-commands like "renew-due.".
- The Gabbie two-way texting tool provides librarians with an SMS phone number that patrons can add as a contact.
- It integrates most e-items automatically into client catalogues.

Figure 45: Apollo Integrated Library System dashboard
Source: https://s2.research.com/wp-content/uploads/2022/06/28225335/Apollo-ILS-dashboard-1024x626.png

2.4.9 WorldShare Management Services (WMS)

WorldShare Management Services (WMS) is a unique and integrated suite of cloud-based library management applications that leverage cooperation between clients and the software provider to create a system that fits their needs perfectly. WMS lets subscribers define their success, such as design and KPIs, and then provides them with tailor-made solutions. The company is also known for allowing clients to train in their custom system in a sandbox environment before going live. With WorldCat® as the foundation, WMS connects users to unparalleled global resources through OCLC's robust network of libraries. WMS delivers a robust user experience with a single intuitive interface to search the entire collection and all databases, find items in other libraries, view item availability, place holds, review accounts, and renew items. WMS group functionality is so much more than shared resources. WMS is a fully integrated library platform designed to meet the changing needs of modern libraries.

Circulation tasks are streamlined with a reduction in training period. Users can find and request items in the library without changing interfaces.

Features of WorldShare Management Services (WMS)

Key features include

- WMS creates a system designed to meet a client's specific needs.
- The company continually cooperates with libraries to optimize and adapt their platform as they go.
- It provides a robust search function with custom tags.
- It provides access to a vast global interlibrary network.
- WMS has built-in custom reports to help generate data-driven actionable insights.
- It provides a sandbox carbon copy environment for training before live deployment.
- The platform is accessible via the mobile application Digby for library management and inventory control
- WMS integrates with other third-party applications.
- Known for providing excellent support and training

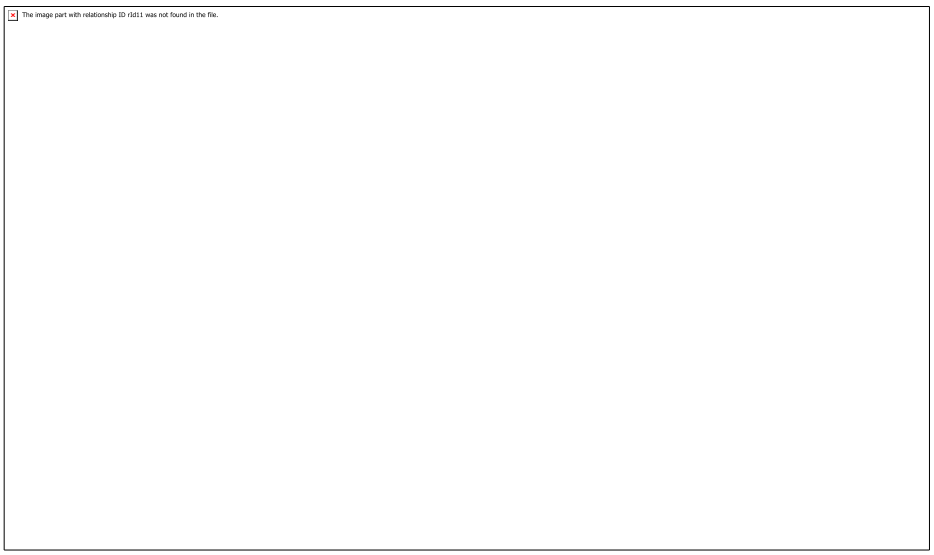

Figure 46: WorldShare Management System Dashboard
Source: https://s2.research.com/wp-content/uploads/2022/06/28224455/OCLC-Worldshare-Management-System-dashboard-1024x626.png

2.4.10 Libib Library management service

Libib Library management service is an intuitive cloud cataloguing platform with a highly-visual interface that caters to home and small organizational libraries. Libib is the best system for cataloguing media available online. It allows users to create multiple libraries and tags, leave notes, import/export, and catalogue books, movies, music, and video games. The platform is customizable enough to be used by different library types. It is also popular among corporate users, such as Disney and EA games.

Features of Libib Library Management Service

Some of the critical features of Libib Library management services are as follows**:**

- Libib has mixed media collections with up to 100 categories.
- It has automatic metadata, which allows for easy search.
- Libib enables tagging, grouping, and basic editing.
- It provides a kiosk application with a built-in camera scanner for self-checkout.
- Libib provides native mobile applications for Android and iOS.
- It has a facility for auto-generated custom barcodes and custom branding.
- Libib scanning scanned, searched, entered an ISBN/UPC, or imported items in bulk from a CSV file and automatically retrieved that item's cover art and all pertinent information.
- It offers two different subscription options to best-fit users' needs.
- Exportable comma-separated values (CSV) reports.
- It allows for online reviews.

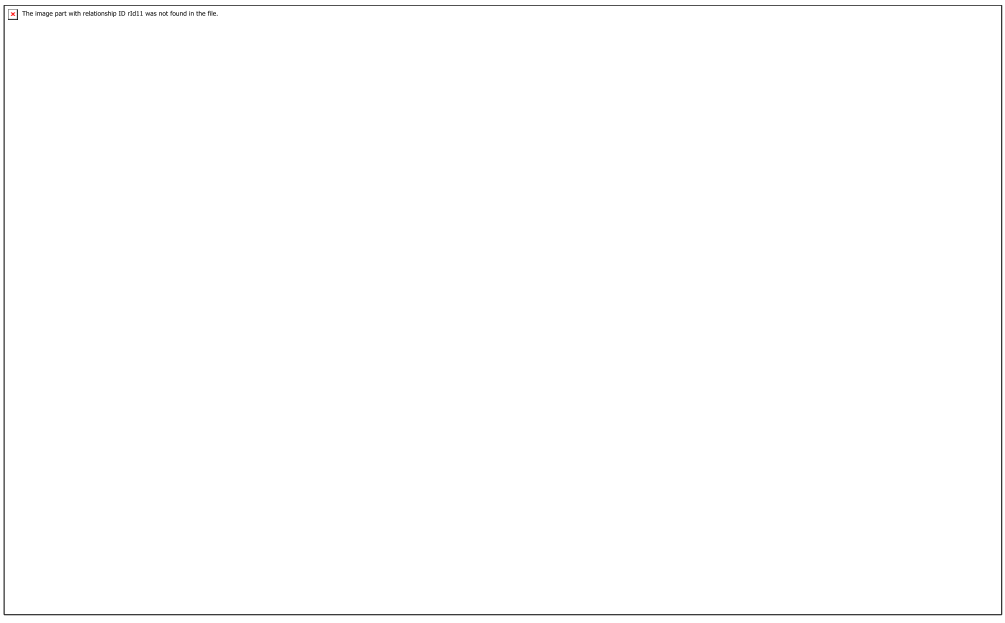

Figure 47: Libib Dashboard

Source: https://s2.research.com/wp-content/uploads/2022/06/28225107/Libib-dashboard-1024x626.png

Note: The list of Library Automation software is inexhaustible. Please see Appendix One for more examples. Also, visit the following sites for more information on Library Management Systems/Library Automation Software packages.

- https://research.com/software/best-library-management-software.
- https://sourceforge.net/software/library-management/

Describe any five (5) library automation software of your choice.

2.6 SUMMARY

This unit examined library automation software. It discussed the meaning, types and qualities. Equally discussed were examples of the library automation software available in the market. Library automation software act as the central hub for all library-related tasks, allows libraries to become more effective and librarians to be more efficient, and drive member engagement. The library automation software has enabled the digital transformation of libraries, making them more accessible to the digital-native generation and 21st-century compliant. The robustness of the automation software in use largely determines the success of a library automation process.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a). Library automation software is a ---------- information system.
b). The library management software helps libraries to ---------- data and information.
c). ---------- is a software that is designed to manage all the functional activities of a library.
d). KnowAll Matrix Library Management System is a ---------- integrated library management system.
e). ---------- is an intuitive cloud cataloguing platform
f). Apollo is a hosted integrated library system (ILS) for ----------.
g). Mandarin M5 is a ---------- library management system.
h). Alexandria is built to meet the ---------- of every library.

2.7 GLOSSARY

- **Cloud-based library software:** This refers to the applications, storage, on-demand services, computer networks, or other resources that are accessed with an Internet connection through another provider's shared cloud computing framework.
- **Library Management Software:** This refers to a multi-component information system whose objective is to facilitate the management of library information resources.

- **On-Premise Library Software solutions** are those in which data, applications, and software are powered entirely by in-house computer servers.
- **Perpetual Licence Software:** A perpetual software license is a software license that authorizes an individual to use a program indefinitely.
- **Subscription Library Software:** Subscription offerings refer to a monthly or annual licencing model, allowing users to pay a per-user fee for application and data access.

2.8 REFERENCES/FURTHER READING

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2.9 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a). Multi-component.
b). Optimise.
c). Library Management System.
d). Browser-based.
e). Libib Library Management Service.
f). Public libraries.
g). Modern web-based.
h). Unique needs.

UNIT 3: LIBRARY MANAGEMENT SYSTEM STRUCTURE

3.1 INTRODUCTION

The library management system is considered the central nervous system of library automation as it acts as a bridge between the library, librarians and users. A Library management system is vital to building an automated library collection, maintaining book records efficiently, and providing access to a library's collection and external resources. Also, the library management system ensures better library functions as it improves the efficiency and productivity of the library staff. Therefore,

understanding what is expected of you as part of your training and preparation to be a librarian/information professional is imperative. Knowing the characteristics, advantages and structure of library management systems will better prepare you to understand the tools to expect in the world of work as an information professional. Therefore, this unit focuses on a library management system's characteristics, advantages and structure.

3.2 LEARNING OUTCOMES

By the end of this unit, you should be able to:

- Define library management system;
- State the characteristics of the library management system; and
- Describe the structure of a library management system.

3.3 THE LIBRARY MANAGEMENT SYSTEM

The Library Management System is a complex and integrated system that brings together a wide variety of records for use in a single transaction, and all the functional modules share a common bibliographic database (Kumar, 2019; Lucidea, 2019; Bilal, 2014; and Chow & Bucknall, 2012). The library management system is an information retrieval and storage system with software designed to manage library operations. The system consists of inter-connected processes that streamline input and retrieval of information for both library personnel and patrons; and are composed of interlocking modules that track items and functions within an information centre (Lucidea, 2019).

The library management system is an enterprise resource planning system that manages acquisition, circulation, cataloguing, serials and membership. It provides an online or digital interface that centralises back-end administrative features. (TrustRadius, 2022). Also, the system comprised relational database software to act on that database and two graphic user interfaces (one for patrons and library staff) (New World Encyclopedia, 2018). The system also provides patron portals, allowing library patrons to easily access or reserve library resources (TrustRadius, 2022).

What is a library management system?

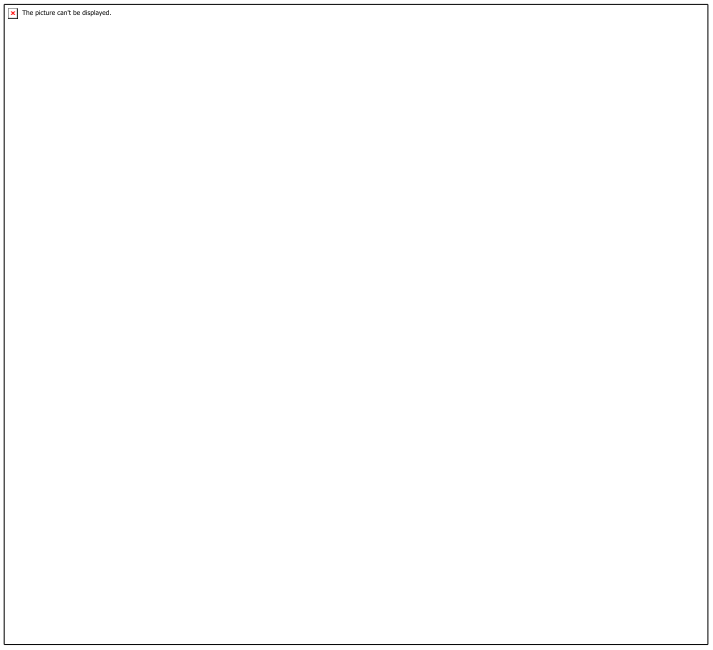

Figure 48: Library Management System
Source:https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.skoolbeep.com%2Fblog%2Flibrarymanagementsystem%2F&psig=

3.3.1 Characteristics of Library Management System

The library management system automates essential housekeeping functions and accelerates the flow of information and resources to library patrons. Characteristics of a library management system are

a. **Components:** The automated system consists of modules primarily designed to support library operations, functions, processes, and tasks.

b. **Interrelated:** All the functional modules in a library management system are interrelated. They work seamlessly with the hardware and system software to enhance effective library service delivery.

c. **Boundary:** As is the characteristic of every system, the library management system has a boundary which separates it from the environment and defines its scope. The scope consists of modules and sub-modules which make up the internal entities.

d. **Environment**: The system's environment refers to everything outside the library management system that interacts with it, such as library staff, users, lecturers, administrators, vendors and other stakeholders. Similarly, it interacts with the environment in return by receiving input from patrons, processing it, and returning output.

e. **Import of MARC records:** The cataloguing module allows libraries to import MARC records from other institutions into their database instead of starting from scratch.

f. **Interface:** The interface refers to the library management search and retrieval interface, which allows users to communicate and use the automation system. Depending on the operating system, the interface can be a graphic user or command line.

g. **Purpose:** The interrelationship between the automation system components is to support and manage library operations and services using the application software and hardware on which it operates.

h. **Input:** This refers to how users (staff and students) interact with the LMS by using the search buttons to find the information they need.

i. **Output:** Output refers to the library management system's response to the library patrons' inquiry information of search results.

j. **Constraints:** Constraints can result from the system's incompatibility with hardware, poor infrastructure, low Internet bandwidth, inadequate storage capacity, budget cuts, and power supply, all of which constitute a constraint to the proper functioning of the automation system.

Discuss any five (5) characteristics of the library management system.

3.3.2. Advantages of Library Management System

A library management system is software that is designed to manage all the functions of a library. According to Gopinath (2020), the advantages are:

1. **User-friendly system:** The library management system is flexible, simple and easy to use. It provides online and offline data storage, automatic updates and data backups. In addition, the system can be adapted to the needs of the institutions, library staff and students.

2. **Simplification of duties:** The system allows library staff to maintain a vast collection of books, periodicals and electronic resources. The addition and deletion of books function, tracking and tracing of missing books, reservations and renewals can be performed very quickly.

3. **Access and increase engagement:** The cloud-based library management system software can be accessed anywhere and anytime with Internet facilities. Members can search the database from any location when the Internet is available. Also, the system provides access to smartphones and

tablets to search for books and resources. Thus, easy access increases the engagement of the users.

4. **Data management:** The automated system software hosted from a cloud platform is very efficient. The functions of cataloguing, indexing, referencing, and book circulation is managed automatically and saved on the cloud for reliable and secure operations.
5. **Saves time:** The automated library system saves the library staff time and effort by eliminating manual record entries and processing repetitive clerical tasks, thereby making the database error-free and accurate.
6. **Automated reports:** The system reports the performance of the library automatically. Charts and graphs are provided for review and tracking of the library functions. This aids in making changes and improvements to the library
7. **Cost-effective: Automated** library systems eliminate the need for extensive paperwork and too many staff. Maintenance overheads and operation costs are reduced
8. **Communication:** The library management system enables seamless communication among the library's librarians, patrons and vendors.

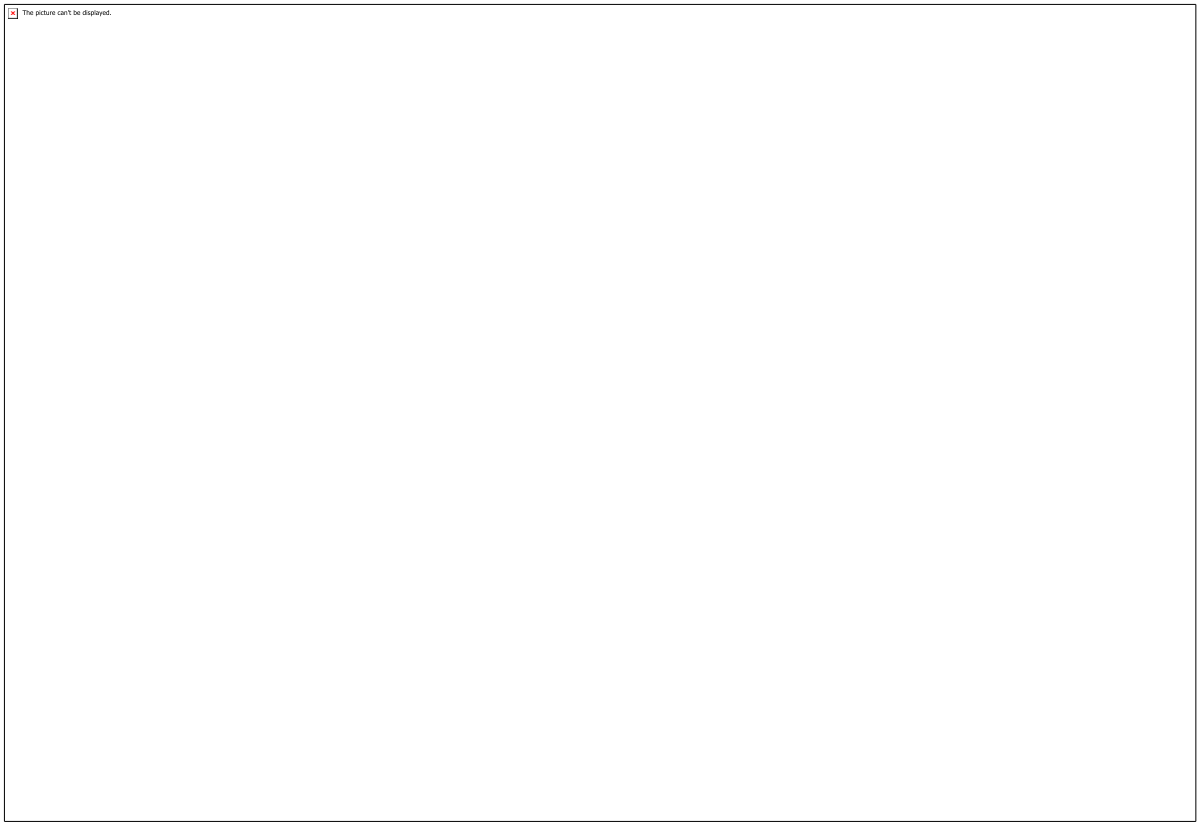

Figure 49: Library Management Systems Advantages

Source: **https://www.skoolbeep.com/blog/wp-content/uploads/2020/12/WHY-SHOULD-LIBRAIRES-INVEST-IN-LIBRARY-MANAGEMENT-SYSTEM-SOFTWARE-min-768x527.png**

3.4 STRUCTURE OF A LIBRARY MANAGEMENT SYSTEM

The library management system is software designed to manage all library functions effectively, efficiently, and at a reduced cost by streamlining all the activities involved in its operation. The modules in an integrated library management system are:

3.4.1 Acquisition Management Module

The acquisition management module helps library staff manage book suggestions, approvals, orderings and cancellations, reminders, document receipt, accessioning, vendor administration, book publishers, payment, fund control, the master files, currency tables and users. Through the acquisition module, library personnel generate reports of activities. Also, the acquisition and cataloguing modules are linked together, making it easy for library staff to check for duplicates before ordering, allowing library patrons to see a list of books on order, produce a catalogue of books ordered, and circulate them upon arrival.

3.4.2 Cataloguing Management Module

The cataloguing module is a primary component of an automated library system. The module oversees the export and import of bibliographic records, creating catalogue cards, managing authority files, user services, retrospective conversion, stock verification, report compilation, and maintaining union databases (local level). The module has an adaptable menu and command-driven interface that defines parameters and a searchable catalogue, allowing for data abstractions, accessible text, and a data display mode where records can be modified and deleted. Also, with the cataloguing module, the MARC-formatted documents can be catalogued using the AACR II standards and categorising items into reference, special, and reserve. In addition, this module can convert books, process books obtained through acquisition, search print verification records by title and accession number, and create publisher authorisation files.

3.4.3 Circulation Management Module

The circulation management module is the transaction module that allows the system to loan out and receive returned materials. The transactions are automatically linked to the cataloguing module to enable users to find out if materials are available or borrowed. The module facilitates reservations, calculates fines, sends borrowers reminders, returns, renewals, regulates the charging and discharging of library

materials, and library users' data, sends notices to members and defines lending periods and membership types. Also, the module changes member records, verifies borrowers' identities, produces books on loan and due date lists.

3.4.4 Serials Management Module

The serials management module, sometimes incorporated into the acquisition management module, streamlines indexing database; subscription cancellation; handling e-journals, e-databases subscriptions and renewal; budget generation of department or section; managing articles and journal requests directly from OPAC, among other functions. The module equally enables automated reminders, invoice processing, and multi-location budget control activities. It is used to order new journal or magazine issues without manually entering the details for each one. It predicts when items are due to arrive and can generate automatic claims for items not received.

3.4.5 Report Management Module

The report management module is an independent module that helps to keep track of the library and its many activities to ensure an efficient operation. Although many software packages combine reporting functions within other modules, the circulation and cataloguing modules have a report-generating facility for stock reports. However, a separate report module often allows for greater flexibility in the reports the system can generate.

3.4.6 Online Public Access Catalogue

The Online Public Access Catalogue (OPAC) is a computer-based and supported library catalogue designed to provide access to library holdings through a computer terminal so library users can directly search for and retrieve bibliographic records without a human intermediary. In some systems, the OPAC is part of the cataloguing module. It permits searching by author, name, title, and subject using a menu-driven or windows-style interface.

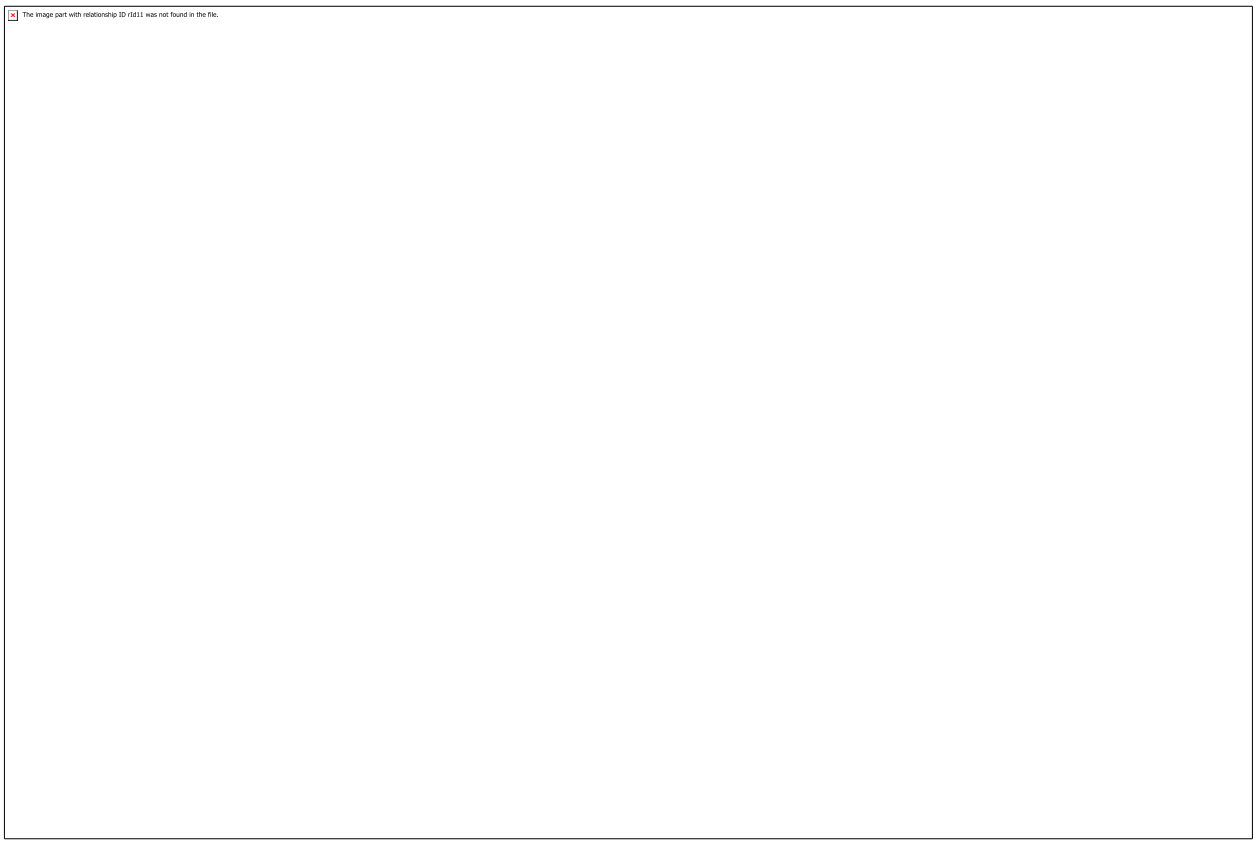

Figure 50: Online Public Access Catalogue
Source:https://itechindia.co/wp-content/uploads/2021/11/inner2-5.jpeg

3.4.7 Inter-Library Loan Management Module

The inter-library loan module generates requests for other libraries, notifying the users of the availability of items and keeping records of item requests and loans or returns.

3.4.8 Community Information Management Module

The community information management module provides and keeps track of the names and addresses of contacts such as local organisations. Also, through this module, a library can develop its database of information for public use.

3.4.9 Import/Export Management Module

This module allows the import and export of catalogue records to and from the library's system in United Kingdom Machine-Readable Catalogue (UKMARC) format to other systems. For example, the Global Cataloguing Service (GCS)SYSTEM holds records in UKMARC format.

3.4.10 Reference Service Management Module

The reference service module proves helpful in answering users' questions and providing the required information.

3.4.11 Barcode scanning System

Barcodes are machine-readable codes represented visually as numbers and parallel lines on a given product for easy identification. In the library, barcoding is performed based on the book's title, author, subject, and publication date. For book identification, each barcode is matched with a corresponding entry in the computer database for regular updates whenever books are issued or returned.

3.4.12 Search function Management System

The search function allows staff and students to search the library database using the integrated library automated system. Search terms include author names, subjects, or publishers; a search filter will define the search field based on the user's requirements. The result will advise the user if the resource is accessible and where to locate it.

3.4.13 Authority Control module

The authority control module links authority-controlled headings with authority records using standardised headings. This module creates and manages MARC 21 bibliographic record headings like author, title, series, and subject.

3.4.14 Media Management Module

The media management module enables the effective management of multimedia resources, usage tracking and the generation of different management reports. The module allows for the scheduling, booking, searching, and tracking of multimedia resources and oversees the management of video CDs, audio CDs, DVDs, Disks, study rooms, conference rooms, and labs.

3.4.15 Electronic Resources Management Module

The Electronic Resources management module handles the management of electronic resources such as e-Books, e-Journals, and licensing procedures, access, distribution channels, record production, usage statistics, and report management.

3.4.16 Fee Management Module

The Fee management module keeps track of membership fees and manages individual student accounts. In case of unreturned, lost, or damaged books, the software automatically calculates the fine.

3.4.17 Database Management System (DBMS)

The database contains all library-related information, including machine-readable cataloguing records (MARC) and patron information. Therefore, it is crucial to any library automation project's success.

3.4.18 User Management Module

The user management module enables the creation of a detailed database of users with their names, identification cards, log-in details, and passwords. In addition, the module aids in the tracking of members' library usage. Many users may use the software without experiencing delays or access concerns in a multi-user environment.

Describe the structure of a library management system.

3.5. SUMMARY

Libraries rely on automated systems to manage collections and relationships with their members. The system's unique features have enhanced the entire library operations, allowing adequate management and dissemination of information through the simple-to-use interface and highly available platform. Also, the maintenance of the database by entering new books and recording borrowed books with the respective due dates has helped the library staff and patrons experience the optimal benefits of the system. This unit focused on the library management system vis-à-vis its characteristics, advantages and structure.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a). All the functional modules in the library management system share a common ----------.

b). ---------- automate essential housekeeping functions.

c). The circulation system is the ---------- that allows the system to loan out and receive returned materials.

d). A report generation facility is an ---------- module that helps to keep track of the library and its many activities.

e). ---------- is crucial to any library automation project's success.

3.6 GLOSSARY

- **Library management System:** This refers to an information retrieval and storage system with software designed to manage library operations.
- **Module:** This refers to one of a set of separate parts that can be joined together to form a larger object
- **System:** This refers to a set of things working together as parts of a mechanism.

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3.8 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a). Bibliographic database.
b). Library Management System.
c). Transactional module.
d). Independent.
e). Library database.

UNIT 4: SELECTION OF LIBRARY AUTOMATION SOFTWARE

UNIT STRUCTURE

4.1 INTRODUCTION

Software packages are versatile. Varieties of library management software are available in the market. Some are cloud-based with integrated modules like acquisition, cataloguing, circulation, serials control, and OPAC, while others are independent modules meant to automate single functions. A significant aspect of the library automation process is selecting a reliable and appropriate software package to adequately complement the efforts of library personnel in discharging library services and streamlining library operations to cater to the users' needs effectively and efficiently. This unit examines the software selection options, guidelines for software selection, criteria and the challenges associated with software selection.

4.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Identify the options for software selection;
- State the guidelines for software selection;
- State the criteria for software selection; and
- Mention the challenges to software selection.

4.3 LIBRARY AUTOMATION SOFTWARE SELECTION

Selecting the right automation software for a library can be daunting. Libraries require software with different specifications and capabilities to manage their collections and provide the best user experience to all stakeholders. Therefore, choosing a software solution that fits with the library's plans for automation, factors such as budget, the total collection, staff strength, the projected number of users, system compatibility and organisational support (Gopinath, 2020).

4.3.1 Options for Library Software Selection

The following options could be considered for a library automation project.

a) **Commercial software package acquisitions** are well-documented, versatile, skillfully produced, reliable, easy-to-use, pre-written, and off-the-shelf software programs designed and developed for licensing or outright sale to end users, for example, Windows.

b) **Turnkey package acquisition:** Turnkey package software refers to ready-to-use, off-the-shelf software. It is usually designed to address specific needs in industries and can be integrated into the library's procedures and operations efficiently. An example is Microsoft Dynamics 365.

c) **Subscription-based software**: A subscription-based software refers to a monthly or annual licencing model, allowing users to pay a per-user fee. Customers typically pay an initial subscription upfront and are entitled to use the software only during the subscription period. It is easy to upgrade subscription software to newer versions whenever they are released.

d) **In-House Software development:** This refers to a software solution developed by professionals within the organisation and strictly for use in the library.

e) **Outsourcing software development:** Outsourcing software development involves commissioning a third-party service provider to handle the library's software development projects for its exclusive use.

f) **Perpetual software license model**: A perpetual software license model is a type of license that allows an individual to use a software program for an indefinite period. Payment is usually made once at the beginning of the license term.

g) **Through Library Consortium:** A library consortium is a cooperative organisation of libraries created to share resources, reciprocity, and make information handling on different platforms easy. Through this arrangement, a group of libraries may decide to come together, acquire software for their libraries, and share the product key and cost of acquisition.

Describe the options available to a library for software selection.

4.4 CRITERIA FOR SELECTING LIBRARY SOFTWARE

According to Knops (2021); and Gopinath (2020), the following criteria can guide a library’s software assessment and selection procedure.

4.4.1 General criteria for Library Software selection

These are the general requirements a library must consider when selecting an automation system for its library operation. They include:

a. **Consultation**

Consult with libraries that have already automated their operations; the team will identify the process's benefits and disadvantages by gaining first-hand knowledge of library automation processes.

b. **Cost of Ownership**

Compare and consider the software's capabilities and price with the library's requirements, the available budget, and anticipated cost savings. The actual cost of ownership includes licensing fees based on the projected number of users, number of modules, cost of other software, hardware implementation, maintenance, training, and support. It is advisable to have a rough estimate of all the identified costs before contacting a software vendor.

c. **Industry expertise**

Industry expertise refers to a vendor's ability to cater to a library's specific needs based on set requirements (expectations from an automated system). A thorough evaluation of the vendor's reputation, credibility, and product scalability is vital, and the ability of the vendor to understand the workings of a library is crucial for the success of the software selection exercise.

d. **Product validation**

Product validation involves a comprehensive review of all the available software products and providing a detailed summary of every function and capability. Next, narrow down the list of vendors based on the technical evaluation of their products, request a demonstration, and ask for documents on how the system will meet your library’s requirements.

4.4.2 Technical criteria for Library Software Selection

The following technical criteria in addition to the general selection criteria should be considered in choosing between software packages and assessing their suitability for library’s automation project.

a. Technical support

Technical support services can be online, by email, chats or in real-time messaging based on the company's location. The support may include the software manufacturer's policy on updating, upgrading or outright replacing their products, after-sales service, training, maintenance and other sundry supports.

b. Hardware compatibility

Hardware compatibility refers to specific hardware or operating system (single or multi-user system) requirements that will be needed to run the software. For example, most software is programmed to work with a particular operating system, database, and sometimes on a specific hardware platform.

c. Scalability

Scalability is the ability of software to perform, support growing amounts of data and handle increased workloads while adding users and removing them with minimal cost impact. Scalability enhances software performance and data security, which is crucial and a significant cost-saver for the organization. The selection team should consider the proposed software's scalability and ability to fit into the library's expansion programme through the years to save costs.

d. Ease-of-use

The ease of use relates to the complexity of the software and the time required to train the users. Therefore, it is advisable to compare the benefits of the software program's enhanced functionality to the cost and challenges associated with training users on how to use it.

e. Customisation

Customisation is a service provided by software manufacturers to modify licensed software to suit individual libraries' requirements and specifications. Most library software packages are built with excellent functionality and are ready for use out of the box. However, it is advisable to avoid customisation wherever possible because it is not easy to change a pre-configured software.

f. Functionality

Functionality has to do with the robustness of software and its ability to be deployed for different tasks based on the library's requirements. Take the time to outline the library's needs and available options before investing in software or a subscription renewal for a known favourite. Exploring new software could give your library a much-needed boost.

g. Capability

The automation software should be capable of performing all the functions of the library, integrating all the different modules and allowing for interactions between the integrated modules.

h. Flexibility

The library automation software should be flexible and easy to upgrade, such as an open application programming interface (API) environment that allows easy integration with other services. For instance, viewing third-party catalogues that agree with other libraries. It should run on various platforms like servers, personal computers, and smartphones and be compatible with the operating system.

i. Accessibility

The automation software should be easily accessible from any location with web access / Internet connection.

4.4.3 Support criteria for Library Software Selection

Aside from the general and technical criteria already discussed, the following support criteria should equally be considered when selecting a software solution for the library.

a. Documentation

Detailed documentation, such as a newsletter, information bulletin, or updated publications, must include all the developments about the software, its use, and training references should consist of an introduction to the basic features, a list of commands, an online help system, tutorial support, and the option to interface at different levels based on the user experience. The document can be in hard or soft copy format. For the training, a reference manual with the table of contents, glossary, index and step-by-step instructions on how to use the software.

b. Installation and Maintenance

Examining the software company's after-sales support and maintenance policy carefully vis-a-vis the system's installation, after-sales maintenance, training, software modification, upgrading and updating to keep up with customer needs will attract additional charges.

c. Training

Training requirements differ based on the complexity of each software package. It is essential to inquire with the vendors about their training and support programmes if the exercise is provided free or at additional cost and available options vis-à-vis live and recorded online training sessions, self-help resources, and in-person training. There is a need to adequately train the library staff and users on how to work with computers and use software to operate the library effectively.

d. User group support

These groups share expertise and experience in the software application, discuss problems and limitations in using the software and present a concerted front to the software supplier for solving problems and asking for improvements.

e. User-friendly

The library automation software package should be user-friendly such as the ability to use after a short training and practice. Both library staff and patrons should be able to use and understand the software. New and experienced users should find the interface easy to use.

Note: Before making a final decision, it is advisable to try out the

software with real-world examples because the essential features of the software, such as record entry, editing, cursor navigation, response time, and ease of use, can only be experienced by using it.

State **the criteria to consider in software selection.**

4.5 LIBRARY SOFTWARE SELECTION PROCESS

Selecting a library management system is time-consuming. It requires a long-term commitment of financial and personnel resources. Therefore, the outcome of the needs assessment, literature review, evaluation, and comparison of existing software packages should inform the selection decision in conjunction with the following steps:

a. Reexamination of the needs assessment was done during the planning stage.

b. Use the knowledge gained from literature to review set priorities, staff and user information needs, and budgets.

c. Translate the identified needs into software features needed in an automated system.

d. Test and evaluate available software packages for the library's needs.

e. Request and study interactive software demonstration videos, but be aware that they may be incomplete.

f. Visit libraries that have used the software under consideration to see how well the software performs in real-world scenarios.

g. Invite a sales representative from each software company for an in-house demonstration and interaction based on an understanding of the products available.

h. Narrow down the options based on prior knowledge gained from literature, previews, demonstrations, and firsthand experience with the software packages in automated libraries, taking into account the following:

- Consider the software package’s capabilities, availability of all modules required by the library and the ability to integrate multiple modules.

- Ensure the presence of essential features in each module corresponds to the library's specific needs.

- Consider the overall software capabilities like multi-user access, Web access, networking, client/server architecture and upgrading.

- Consider the software package's compliance with the most current bibliographic standards (MARC21) and the information retrieval standard (Z39.50).

- Consider the software company's update frequency, service quality, return time, and hours of service availability.

- Consider the cost of software installation, upgrades, updates and maintenance, vendor's application plan, training cost and types of training.

- Evaluate software documentation and organisation.

i. Consult with members of the automation advisory committee for feedback.

j. Develop a request for proposal (RFP) based on the needs assessment, observatory notes, software features and company checklists, and in consultation with colleagues whose libraries are automated. This is because it allows you to compare and evaluate various systems and choose the one that best meets your library's needs.

Note: Librarians are the most knowledgeable about the collection, users' demands, information-seeking behaviour, and administrative conditions of their workplace. They should be a part of the selection process. Above all,
making a good decision about library automation requires adequate preparation from the library management.

Describe the software selection process

4.6 CHALLENGES TO LIBRARY SOFTWARE SELECTION

Selection of suitable software for library automation is a complex process usually accompanied by challenges such as:

a. **Software proliferation:** Due to the proliferation of library software packages on the market, buyers are sometimes overwhelmed by the number and variety of available options.

b. **Cost:** The automation software is a one-off investment for the library. However, comparing the software's price with the hardware it will run on, one may discover that it is more expensive.

c. **Overrating of software**: Most of the claims from some software companies about the features, capabilities, performance and ingenuity of their products in catalogues, brochures, fliers and online are sometimes overrated, all in a bid to confuse the buyers.

d. **Purpose** The inability to ascertain the purpose, simplicity, flexibility, ease of use and compatibility of a library software at a glance can constitute a challenge for the buyer.

e. **Environment:** The operating environment of the automation software could hinder its proper operation and defeat the purpose of automation.

f. **Usability:** The manufacturer's claims about the software's versatility, compatibility, interface, ease of use, and usability may not meet user expectations.

g. Documentation: Most times, the documentation supplied with the product may be inadequate for its installation and the user's self-help activities.

Selecting software for a library can be arduous. Discuss?

4.7 SUMMARY

Selecting software is no simple task. Choosing the right software for a library is a long process with many factors to consider because most library management automation systems provide similar basic functionalities. It is essential to consider the flexibility and ease of use that places the functionality in the hands of library users, and bearing in mind that a software product that is easy to manage and maintain will offer a predictable implementation time frame and a lower total cost of ownership. The selection team should remember that software selection is complicated and that the appearance of the software vis-à-vis the packaging, names, directories, commercial details, brochure, or visual demonstration, is never enough to determine its inherent capabilities and disadvantages. Therefore, a good understanding of the software features, guided by software/hardware experts, may help the selection process.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a) ---------- package is off-the-shelf and ready-to-use software for various purposes.

b) Selecting the right library management system software for a library can be a ----------.

c) The library automation software should be ----------and easy to upgrade.

d) ---------- involves familiarisation with the software package, run

procedures, and the sequence of operations needed to operate a new system.

e) Most Library Management software either are ----------or ----------based

4.8 GLOSSARY

- **Criteria:** This refers to a standard or principle for judging, evaluating, or selecting something**.**
- **Software:** This refers to a set of instructions, data or programs used to operate computers and execute specific tasks.

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4.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a). Turnkey.
b). Challenging.
c). Flexible.
d). Training.
e). Cloud and Web.

MODULE THREE: AUTOMATED SYSTEM IMPLEMENTATION AND PROCESSES

Unit 1 System Requirements for Library Automation.
Unit 2 Library Automation Process.
Unit 3 Library Automated System Implementation.
Unit 4 Training in Library Automation.
Unit 5 Funding for Library Automation.

Unit 1: System Requirements for Library Automation

UNIT STRUCTURE

1.1 INTRODUCTION

System requirements list thesoftware programs or hardware devices required to operate the program (Computer Hope, 2021). The most common requirements

defined by an operating system are the hardware with the following requirements: its architecture, processing power, memory, secondary storage, display adapter, and peripherals. For example, an iPhone may require a specific operating system to run an app. Before investing in a software solution or hardware device, it is advisable to check the requirements, which are usually printed on the packaging to ensure compatibility. This unit focuses on the system requirements and library automation's system selection decision process.

1.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Define system requirements;
- Describe the system requirements for library automation;
- Mention the types of hardware configuration;
- State the advantages of hardware configuration;
- List the disadvantages of hardware configuration;
- Define computer architecture;
- Describe the types of computer architecture; and
- Describe the system selection decision process.

1.3 SYSTEM REQUIREMENTS FOR LIBRARY AUTOMATION

System requirements are the specifications a device must have to effectively use specific hardware or software (Christenson, 2020). The software manufacturer recommends these vital physical computer resources as prerequisites for the proper installation and optimal functioning of library automation software. The library management system defines the requirement for operations, users, and the required interface to achieve a successful interface, learns about users' interaction with the interface, and the processes carried out for the users to access the library database from any location with Internet facilities. However, failure to meet these stipulated guidelines can result in installation and performance problems, such as preventing a device or application from getting installed, causing the system to malfunction, or performing below expectation (Christenson, 2020; Techopedia, 2015).

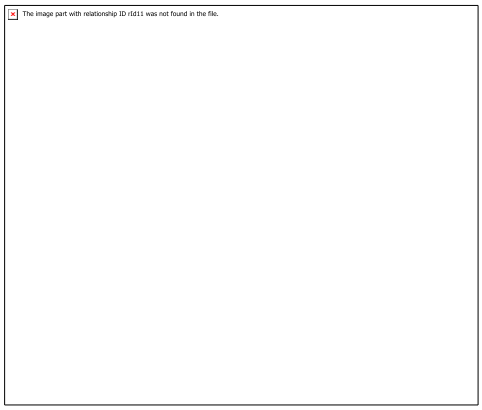

Figure 51: Windows 7 System Requirements
Source: https://www.computerhope.com/jargon/s/system-requirements.jpg

1.3.1 Hardware requirements for Library Automation System implementation

Hardware requirements are the requirements of a hardware device required for successfully installing software solutions. Most computer hardware has guidelines for operating system compatibility (Computer Hope, 2022). Also, the hardware requirements are a statement that identifies the functionality needed by a system to meet users' requirements and reduce implementation costs (Siedle, 2015).

The majority of the library software packages are cloud-based. The hardware required will include client computers, servers, networking devices, printers, scanners, UPS and other peripherals to support the system's operation. In defining hardware parameters for a library automation system, it is vital to consider that each software solution has its proper installation and performance guidelines. Therefore, it is recommended that the hardware that exceeds the minimum specifications required for the automation should be purchased so that the hardware will accommodate future software enhancements and developments. However, if the computers in place meet the minimum requirements but fail to meet the suggested requirements, the computer(s) can be upgraded.

Table 3: System requirements for Library Automation

Component	Hardware Requirements
• **Processor** • **RAM** • **Hard Disk Drive** • **Monitor** • **Operating System** • **Server** • **Secondary memory** • **Database Server**	**Intel Core i7** **16GB** **1 – 2 TB, depending on the size of the library.** **“18.5” FHD LED** **WINDOWS 10 Professional 64 Bits** **Router** **1TB SSD (Solid State Drive)**

Source: https://www.educba.com/types-of-cpu/?source=leftnav

Table 4: System Requirements for Library Management System

Single user	Multi-user	Client
• Processor: Intel Core i5 • RAM: 8 GB (32-bit) • Monitor: Coloured LED • Hard Disk Drive: 1 TB/ • SSD (Solid State Drives • Operating System: Windows XP/2000 /7 /8.1	• Processor: Intel Core i7 • RAM: 16 GB (64-bit) • Monitor: Coloured LED • Hard Disk Drive: 2 TB • SSD (Solid State Drive) • Operating System Windows XP/ 2000/	• Processor: Intel Core i7 • RAM: 16 GB (64- bit) • Monitor: Colour LED • Hard Disk Drive 2 TB • SSD (Solid State Drive) • Operating System: Windows XP/2000 /7 /8.1

• Ports (Ethernet /USB) • Wireless connectivity	2003/2008/ • Server: Windows 2012 Server • Database Server (MSSQ2) • Internet Information Server • Ports (Ethernet /USB) • Wireless connectivity	• Ports (Ethernet /USB) • Wireless connectivity

Source: http://www.librarysoftware.in/library-automation-librarian-systemreq.html

State hardware system requirement for an automated system?

1.3.1.1 System Requirements for Hardware Installation

System requirements for hardware are the configuration a system must have for a hardware or software application to run smoothly and efficiently (Techopedia, 2015). For example, the minimum system requirements for hardware installation for library automation are:

a. **Operating System:** This computer program explicitly manages the allocation of computer resources, among other programs. Examples are Windows XP, Unix and Ubuntu.
b. **Ports:** This is a communication endpoint that connects devices in a wired local area network or wide area network. For example, USB and Ethernet.
c. **Wireless connectivity:** This is telecommunication and data transmission without wires. Examples include Wi-Fi, mobile networks, and Bluetooth.
d. **Graphic Processing Unit (GPU):** This refers to a programmable processor dedicated to rendering all images on the computer's screen (minimum for displays and graphic hardware).

Discuss the basic system requirements for hardware installation.

1.3.2 System requirements for Software programme

System requirements for software are the required specifications an automated system must have to use specific hardware (TechTerms, 2022). In addition to the basic requirements, software requirements often specify additional software dependencies, such as libraries, drivers, and framework versions (Techopedia, 2022). For example, in conjunction with the following capability features added to a library management system:

- International Standards protocols (MARC21, Z39.50, AACR2);
- Modules for acquisition, cataloguing, circulation, serials, reports, OPAC;
- Barcode scanner / Radio Frequency Identification (RFID) Technology;

- UNICODE technology for multiuser, multi-currencies and multi-lingual to manage any type or size of library, a standard library management system enhanced with the following capabilities.

The minimum system requirements for the Software program are as follows:

Table 5: Minimum System requirement for Software Program

Component	Specification
• Operating System • Minimum CPU / Processor speed • Minimum GPU / Video memory • Minimum system memory • Minimum free storage space • Monitor resolution • Audio hardware • Internet	• Windows 10. • 2.8 GHz or faster processor. • Nvidia GeForce GTX 1660 /Quadro T1000. • RAMDisk storage 4GB of free disk space. • 1920x1080 LED Coloured. • Sound card, Speakers. • Software activation.

Source: Christenson (2020)

State the minimum system requirement of a software programme.

1.3.3 System Requirements for a Library Management System

The minimum system requirements for an integrated library system such as Koha, with features such as client-server architecture, bibliographic standard protocols for information exchanging (with and outside the library premises), and facilitating the integration of outside information sources into local systems are as follows:

Table 6: Minimum Hardware / Software / Manpower System requirement for Library Management System

Component	Specification
• Hardware Processor • RAM • Hard Disk Drive • Secondary storage • Monitor • Operating System • Software • Server computer	• Intel core i7 Processor. • 16 GB. • 1 TB. • High-speed SSD Drive. • **"**18.5**"** FHD LED. • Any flavour of Linux Operating System such as Ubuntu or Fedora, for installation on Linux. • Windows 10 Professional 64-bit Service pack 2 or 3 for higher installation of Koha on windows. • Server class computer for Koha installation in libraries with excellent

	IT infrastructure.
• Internet configuration	• A high-speed dedicated Internet link / Wireless connectivity.
• Workstation PC	• For large libraries that want heavy-duty performance machines. Better than Desktop PC in terms of performance and durability.
• Cloud computing Access	• Through cloud service providers like Amazon or Google for the software installation.
• Ports	• Ethernet / USB.
• Manpower	• Professionals with expertise in Linux Operating system and knowledge of LAN.

Sources: **https://www.educba.com/types-of-cpu/?source=leftnav**
http://www.librarysoftware.in/library-automation-librarian-systemreq.html
Lopez (2015)

1.4 HARDWARE CONFIGURATION OF AUTOMATED SYSTEM

Hardware configuration is the details and system resource settings assigned to a particular device. It refers to the specific hardware and software details in terms of devices attached, capacity and precisely what the system is made up of. To enhance the performance of hardware, the configurations can be adjusted. There are two main categories of hardware configuration. These are:

1.4.1 Non-networked Hardware configuration

A non-networked configuration includes one or more computer stations that operate independently. The automation software is installed and updated on each computer's hard disk, ensuring that individual computer has everything required to perform automated functions. This hardware setup is suitable for libraries that wish to begin automation with a single module (such as the Circulation module) or small libraries with a limited collection, financial resources and few users. It is important to note that standalone hardware and a standalone software configuration are different. A standalone software configuration denotes a non-integrated software program.

1.4.1.1 Advantages of non-networked configuration

The following are the advantages of a non-networked hardware configuration:

a) **Cost:** Non-networked hardware configuration is cost-effective compared to setting up a local area network in a library. It is a better option for a small library with a limited collection and financial resources

b) **Efficient.** The services and operations of a non-networked configuration are efficient since each computer functions independently. The failure of one computer will not affect the operation of the others.

c) **Update:** In a non-networked configuration, each database resides on the hard disk of individual computer systems in the library, so updating the database to a new version of the software will not pose any problem.

1.4.1.2 Disadvantages of non-networked configuration

Some of the identified disadvantages of non-networked configuration are as follows:

a) **Expensive to maintain:** It is costly to maintain because the automation software must be installed and updated on each computer station individually, as opposed to being accessed from a server, thereby increasing the cost of the software

b) **Time-consuming:** Software updates are performed on individual computer stations separately. The more computer stations there are, the longer it takes to install and update the software. Also, problem diagnosis and troubleshooting, especially when more than one or two computer systems are experiencing downtime, can be frustrating and time-consuming.

Briefly explain non-networked hardware configuration.

1.4.2 Networked Hardware configuration

Networked hardware configuration refers to a network arrangement /setup that requires a client/server network architecture. There are two types of this configuration.

1.4.2.1 Local Area Network-based Hardware Configuration

A local area network (LAN) is a collection of devices connected to one physical location. In a LAN-based configuration, the automated software resides on the LAN server of the library and is wholly for the use of the library. All the processing tasks, such as circulation and import of MARC records, are performed locally.

A. Advantages of LAN-based Hardware Configuration

The advantages of LAN-based hardware configuration are as follows:

a. The library has total control of its database, installing, updating, and upgrading the automated software.

b. Users can easily access the library collection because cataloguing records are downloaded locally.

c. Troubleshooting and diagnosing computer system problems is fast when there is an in-house IT expert.

d. Easy updating of the library's OPAC locally is equally accessible on the web.

B Disadvantages of LAN-based Configuration

Some of the identified disadvantages of LAN-based hardware configuration are:

a. Users only have access to a limited library collection because they can only see the local holdings.

b. Library personnel are saddled with software installation, system troubleshooting, database backup, Server and database maintenance responsibilities.

c. Users have access to only the library collection. Although therefore, they cannot see the holdings of other libraries except in WAN-based configuration; if they are not adequately skilled in the art of information retrieval, problems may arise.

State the advantages and disadvantages of LAN-based hardware configuration.

1.4.2.2 Wide Area Network-based Hardware Configurations

A wide area network (WAN) is a computer network that exists over a large-scale geographical area. In a WAN-based hardware configuration environment, the library automated software is kept in a central place on a WAN server, and most processing tasks are done there. This makes the library automated software to be remotely accessible to each library in the wide area network. The union catalogue is an example of a shared automated system that operates over a wide area network.

A. Advantages of WAN-based Configurations

A wide area network is a network of networks. The advantages of a WAN-based hardware configuration are as follows:

b. In a WAN-based configuration automated system, users have access to the holdings of multiple libraries.

c. Users with adequate information retrieval skills can search both the local and union catalogues over the WAN.

d. The availability of a union catalogue over the WAN makes it possible for users to access a rich collection, and they can issue an automated interlibrary loan form to request an item when the feature is available online.

d. Access to the WAN-based automated system to bibliographic standard protocols such as the Online Computer Library Centre (OCLC) will reduce the time spent doing original cataloguing because copy cataloguing can be performed easily over the network.

e. Proper training of centrally cataloguing staff over the WAN-based automated system may result in the generation of higher quality MARC records and consistency in In-house cataloguing material.

f. The installation, updating and upgrading of automated software in a WAN-based environment are more cost-effective than in a LAN-based environment.

B Disadvantages of WAN-based Hardware Configurations

Disadvantages of WAN-based configurations are:

a. A reliable and fast telecommunication connection is required in a shared automated system over a WAN-based environment. Anytime a disruption occurs over the connection, quick access to information may be truncated due to the volume of traffic recorded on the communication highway.

b. Whenever there is downtime over the network, all the client computers linked to servers in the central location will be affected. This will make help to be far away from the users, and the library personnel may not be unable to seek assistance from neighbouring libraries due to the disruption.

c. If users are not properly skilled in the art of information retrieval and the ability to identify information from their local system, learning to use a shared automated system in a WAN-based environment may be difficult because the shared system may have additional features that a local system does not have.

State the disadvantages of WAN-based hardware configurations.

1.5 COMPUTER ARCHITECTURE

Computer architecture refers to a set of rules and methods describing computer functionality, management and implementation (Tutorialspoint, 2021). Computer architecture is the design of computers, data storage devices, and networking components that store and execute programs, convey data, and facilitate communication between computers, across networks, and with people (Britannica, 2022). In other words, computer architecture balances a computer system's performance, efficiency, cost and reliability and design the rules by which a system performs and operates. For example, the best architecture for a networked configuration is the client/server architecture, regardless of the type of hardware configuration a library may adopt.

1.5.1 Client / Server Architecture

Client/Server architecture is a computing model in which multiple components communicate in strictly defined roles, and the server hosts deliver and manage most

of the client's resources and services (Techopedia, 2020). In a client/server architecture, the computing environment shares application processing between a client's computer and the application server. Also, the server is a dedicated, high-end computer station used to maximise client requests, provide access to files, applications, and network communications, perform database management, information retrieval, and transaction processing tasks.

Furthermore, Client computers provide an interface allowing a computer user to request services from the server and display the request's outcome. Therefore, servers deliver access to files, applications and network communications while the client handle screen formatting, resulting in display and other input/output related to specific tasks. For example, a LAN may contain multiple servers such as application servers, file servers, Web servers, e-mail servers, and print servers. For optimally integrated library automated system performance, client/server architecture is the best.

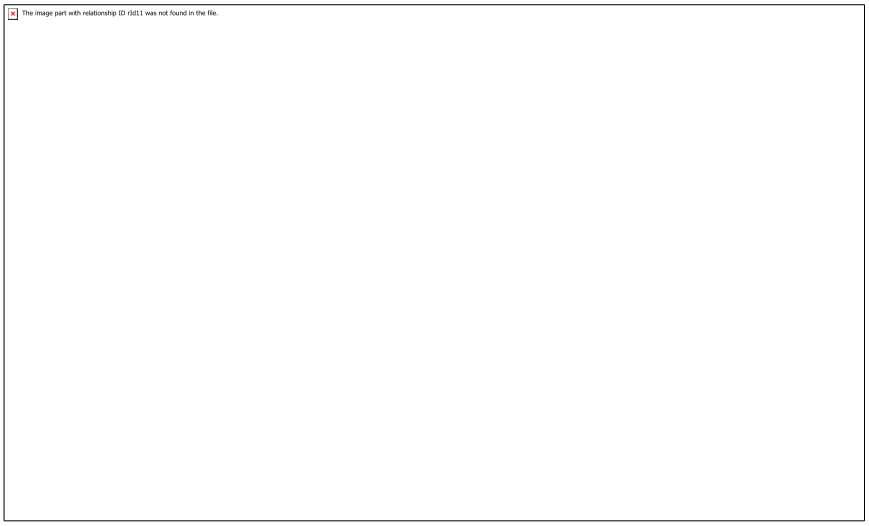

Figure 52: Client/server architecture
Source: https://en.wikipedia.org/wiki/Client%E2%80%93server_model

1.5.1.1 Types of Client/Server Architecture

Client/Server Architecture is a distributed computing system where tasks are shared between the server computer and the software on the client computer (Harrington, 2016). Types of Client/Server architecture are as follows:

1.5.1.1.1 Two-tier Client / Server Architecture

A two-tier architecture is a software architecture in which a presentation layer or interface operates on a client (desktop computer), and a data layer/structure gets stored on a server (provider) (Techopedia, 2022). In this type, the client's program runs the output code and handles application processing, such as data manipulation, screen formatting, and input/output-related task, while the server's database

management system handles database processing. This type performs better in a local area network (LAN) setting.

1.5.1.1.2 Three-tier Architecture Client/Server Architecture

A three-tier architecture is a client-server architecture in which the functional process logic, data access, computer data storage, and user interface are developed and maintained as independent modules on separate platforms (Techopedia, 2021). In a three-tier design, part of the application logic runs on the client (the interface), which are desktop computer with processing power, while the other half runs on the server. As a result, the system handles high-volume transactions, and more servers speed up network data transmission. Three-tier systems may be appropriate in a WAN environment as they are used to access and operate application software like word processing, web page development, and other tasks that necessitate using hard disk storage.

1.5.1.1.3 Thin Client Architecture

Thin Client architecture (lean client) is a virtual desktop computing model that runs on the resources stored on a central server instead of a computer's resources (Gillis, 2022). They are computer terminals (not desktop computers) that perform minimal or no data processing. The client solely processes keyboard input and output to the screen while the server performs all application processing duties. Thin clients are utilised in a client/server architecture to reduce the expense of networked personal computers. Also, a thin client can be coupled with a "thick" or "fat" client in a network. They are used as email, Web, and/or OPAC stations.

Describe the different types of Client / Server architecture.

1.5.1.2 Advantages of a Client/Server Architecture

The advantages of a client/server architecture are many. It includes:

a. **Scalability**: The client/server architecture is highly scalable. The design can handle the increasing tasks by adding resources to the system (small and large applications). A small and very large library system implementation can be configured using the same software and more server power.

b. Clients and servers are independent of the network structure (e.g., Ethernet, token ring) and can run on various computer platforms (PCs).

c. A client may establish a connection to one or more servers (e.g., an OPAC server, a Web server, an e-mail server), while a server may connect to multiple clients simultaneously.

d. There is less network traffic and fewer tasks for the server to handle because the Graphical User Interface (GUI) software is on the client's computer. The client controls input/output, data manipulation tasks, and screen display reformatting.

e. Users have immediate access to new items added to the collection anytime the automation software on servers and clients are updated.

f. Users can access the OPAC remotely if their client computers have a modem with reliable Internet connections.

g. The ability of the users to share computer peripherals e.g. printers saves hardware costs.

Discuss the advantages of Client/Server architecture.

1.5.1.3 Disadvantages of Client/Server Architecture

Though the advantages of a client/server architecture are many, some of the disadvantages are as follows:

a. In a client/server setup, LAN/WAN hardware and software are more expensive than stand-alone.

b. Each client computer in a network must have client software installed and updated.

c. In a WAN setting, installing and upgrading client software on all machines can be a nightmare.

d. Server and network failures can make a client/server system inoperable because the server cannot be reached.

e. Numerous requests from a particular client may hinder and cause every other network client to wait very long for a response.

f. Data transmission speed and quality in a LAN or WAN environment depend on the network cables used (e.g., coaxial, twisted pair, fibre optics), the network architecture (e.g., Ethernet, token ring, FDDI), and the design (two-tier, three-tier, or thin client).

g. Remote access to the OPAC is delayed when telephone lines are occupied, which may distress users. Lack of access will frustrate the users and interfere with the efficiency that automation is supposed to introduce.

h. Implementing, operating, and maintaining a client/server system is expensive. For example, the cost of networking computer systems and servers is very high because it requires high-end servers, a licensing fee, and a networking card for each client, among other things.

i. Downtime can frustrate both users and staff, thus, affecting automation's goal of efficiency.

j. Client/server maintenance and troubleshooting require networking abilities. Librarians without this understanding must pay for experienced staff or consultants.

State the disadvantages of Client /Server architecture.

1.6 SUMMARY

An automated library system is a software developed to handle essential housekeeping functions of a library. The system interfaces with the requirements to achieve a successful interface. It interfaces with some hardware, such as a barcode scanner, computer, and printer, to function correctly through a computer network for effective and efficient library operation. Consequently, the automation system helps library staff with their work; it organises and monitors all library-related materials and data systems to ensure a seamless workflow.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate.

a. Hardware configuration is the details and ----------settings assigned to a particular device.

b. ---------- hardware configuration comprises one or more stand-alone microcomputers.

c. A ----------is an example of a shared automated system that operates over a wide area network.?

d. System requirements for software are the required ----------an automated system must have to use specific software.

e. ----------, ----------, and ---------- are types of Client /Server architecture?

f. ---------- is a communication endpoint that connects devices in a networked area.

g Most computer hardware has laid down guidelines for ---------- ---------- compatibility.

h. ---------- and ---------- are categories of hardware configuration.?

i. ---------- **to** a set of rules and methods that describes the functionality.

j. Another name for thin client is ----------

1.7 GLOSSARY

- **Automated system:** This refers to software developed to handle essential housekeeping functions of a library.
- **Computer architecture** refers to a set of rules and methods describing computer functionality, management and implementation.
- **Hardware configuration:** Hardware configuration is the details and system resource settings assigned to a particular device.
- **Local Area Network:** A local area network (LAN) is a collection of devices connected in one physical location, such as a building,
- **Thin Client architecture:** Thin Client architecture or lean client is a virtual desktop computing model that runs on the resources stored on a central server instead of a computer's resources.
- **Three-tier architecture** refers to a client-server architecture in which the functional process logic, data access, computer data storage and user interface are developed and maintained as independent modules on separate platforms.
- **Two-tier architecture** refers to a software architecture in which a presentation layer or interface operates on a client (desktop computer), and a data layer/structure gets stored on a server (provider).
- **Wide Area Network:** A wide area network is a telecommunications network that extends over a large geographic area.

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1.9 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. System resource.
b. Non-networked
c. Union catalogue.
d. Specifications.
e. Two-tier, Three-tier, and Thin Client Architecture.
f. Ports.
g. Operating system.
h. Non-networked and Networked
i. Computer Architecture.
j. Lean Client.

UNIT 2 THE LIBRARY AUTOMATION PROCESS

UNIT STRUCTURE

2.1 INTRODUCTION

The system implementation plan is the hub for all planning activities associated with developing and implementing a library management information system. The implementation process involves installing and using the new system, which is vital to completing the automation project. This phase should be handled with utmost care to prevent errors that could mar the automated system's performance. In the previous unit, we examined the system requirements, hardware configuration and computer architecture required to install an automated system in the library. A clear

understanding of these concepts is a prerequisite to a successful implementation. This unit, therefore, focuses on activities in library automation implementation.

2.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Describe the automated system implementation plan;
- Discuss the activities in the system implementation process;
- Outline collection preparation process;
- Describe bibliographic format and standards;
- Highlight the retrospective conversion process;
- State the methods of retrospective conversion;
- Describe the barcoding of collections; and
- Mention types of barcodes.

2.3 AUTOMATION SYSTEM IMPLEMENTATION PLAN

The system implementation plan is the most crucial stage in library automation. This refers to procedures to complete the design in the approved document, test, install, and begin using the new or amended system (Open University of Hong Kong, 2016). The automated system implementation plan is about the physical design of an information system, ensuring that the system is operational, used, and meets the quality assurance standard expected of a library management system. Therefore, the implementation plan involves putting the new automated system in place, making it operational and functional (Saharan, 2014). Activities in the library automation implementation plan are as follows:

2.3.1 Collection preparation

Collection preparation is a crucial step in the retrospective conversion of the library's collection from a manual to an automated system. The following are the activities involved in collection preparation:

2.3.1.1 Weeding

Weeding is an essential component of a library's collection management system, often related to the organisation's goals and mission. Weeding involves the removal and appropriate discharge of items that no longer meet the needs of the patrons from the library's collection based on appearance, condition, content, age, relevancy, and duplicates, aside from materials of archival, classical and historical value (American Library Association, 2017; Bilal, 2002). It is one of the very vital library activities because it saves time and money, makes it easier to browse the collection, saves shelf space, removes outdated materials and prevents library staff from keeping unwanted items in the library. Accordingly, a library's collection development policy on weeding guides library staff when preparing a collection for retrospective conversion.

2.3.1.2 Take Inventory

Inventory is a process that compares the information in the item record with the physical materials on the shelf. The library needs to organise a detailed library collection inventory to identify items without shelf list cards and the materials for which cards are missing. After discarding old items during the wedding, a new inventory of items kept should be completed. Inventory serves as a record with which stocktaking may be done to find missing items by checking the accession number of each book on the shelf against the shelflist, which should match what books are on the shelf. The importance of shelflist is ensuring that the call number assigned to a particular material is unique and maintaining the file's integrity. A good inventory will ensure the new system is accurate and help with future inventories and audits.

2.3.1.3 Shelflist analysis

Shelflist , also referred to as the master catalogue, is a file of bibliographic records arranged by call number, with the entries arranged like materials on the shelves. The shelflist analysis requires knowing what to include in the new collection that will be automated. The site needs to be prepared (shelving, tags), and the final number of items for automation needs to be determined. Also, shelflist analysis is done to ascertain the completeness and accuracy of the shelflist, any variations in, and consistency of all the collections' call numbers, their physical locations, and prefixes. All materials to be converted must have shelf list cards, which should be complete and accurate. A standardised shelf list promotes uniformity and consistency, and makes information retrieval more effective, especially in a union catalogue environment.

In analysing the shelflist, ensure that each card contains the following information:

- Accurate bibliographic details such as author, title, and publication information;
- A call number and a standard prefix, for example, R or REF, for Reference;
- Number of copies and volumes held for multi-volume items for barcode generation;
- Complete bibliographic information, including subject headings, ISBN, LCCN.

Describe the activities involved in collection preparation in readiness for the library management system implementation.

2.3.2 Bibliographic Formats and Standards

Bibliographic standards are one of the essential standards for librarians. It provides basic information to assist all library users in locating required resources and guides bibliographic and holdings information in World Cat's machine-readable cataloguing records (Bilal, 2014). The standards include tagging, conventions, input standards, and guidelines for getting started in a cooperative environment. Bibliographic standards focus on providing bibliographic data in machine-readable form to facilitate the technical processing of acquisition, cataloguing and sharing of these data among libraries (Wiggins, 1988). The primary purpose of all the standards is to

allow libraries to share automated catalogues and transfer records from one automated system to another. It also ensures the format and content of a database are based on recognised bibliographic standards such as MARC, ISBD, AACR2 and Z39.50. Therefore, adhering to standards eliminates redundant efforts and help reduce cataloguing cost, especially in a resource-sharing environment. The standards include the following:

2.3.2.1 Machine Readable Cataloguing Standard (MARC 21)

Machine Readable Cataloguing Standard (MARC 21) is an integrated format developed and maintained by the Library of Congress to identify and describe different bibliographic materials, and store and communicate cataloguing data (Library of Congress 2022). According to Bilal (2014), MARC 21 is a standard format for exchanging data with a local database, allowing electronic access to the catalogue and automated circulation using the patron's and item's barcodes. In addition, MARC is a standard used for the representation and communication of bibliographic and related information for books and other library materials in machine-readable form and their communication to and from other computers (David, 2006). Therefore, MARC 21 specifications are defined for books, serials, computer files, maps, music, visual materials, and mixed material. The format also allows libraries to:

- Describe resources in the format that will enable the library to print correctly, display, and catalogue records.
- Search for, and retrieve certain types of information within specific fields.
- Have a standard format that makes sharing bibliographic resources with other libraries possible.
- Easily migrate into another library system.

2.3.2.2 Anglo-American Cataloguing Rules (AACR)

The Anglo-American Cataloguing Rules (AACR) describes various materials, including a comprehensive set of rules and guidelines for producing metadata in a surrogate record to represent library resources (Bilal, 2014). AACR is used to create catalogues and other lists in libraries of all sizes, maintain consistency in cataloguing and enhance information retrieval. In addition, it provides instructions for describing library materials and access points for the creators of the materials. Thus, it is essential and the most widely used cataloguing code for the descriptive cataloguing of various types of information resources by libraries in the United States, Great Britain, Canada, and Australia (Haider, 2021).

2.3.2.3 International Standard Bibliographic Description (ISBD)

The International Standard Bibliographic Description (ISBD) is a standard produced and maintained by the International Federation of Library Associations (IFLA) to provide consistency when sharing bibliographic information. ISBD is a concise, easily understood set of rules and a human-readable representation of a bibliographic record without knowing the language of the resource(s) (Bilal, 2014). ISBD's primary

concern is resource descriptions rather than access points or authority control. In addition, ISBD is a standard that specifies eight description elements for various types of materials; it regularises the form and content of bibliographic descriptions; and a punctuation system to record the data elements in a specific sequence as the basis of the catalogued resource's description (IFLA, 2022).

2.3.2.4 Z39.50 Standard

Z39.50 is a national and international protocol standard used primarily by the library and information-related systems. Z39.50 Standard specifies a client/server application layer-based communications protocol for searching and retrieving information from remote databases simultaneously using a single interface over a TCP/IP computer network. The standard makes it possible for:

- A user in one system to search and retrieve information from other computer systems without knowing the search syntax used by those other systems.
- Exchanging information, such as surrogate records or full text, between otherwise non-compatible computer systems.
- The sharing of cataloguing records by importing MARC records into an integrated library system.

- Personal bibliographic reference software to be used widely in library environments.
- Interlibrary catalogue searches for interlibrary loans.

Bibliographic Standards and Formats are recognised bibliographic standards facilitating the sharing of bibliographic data in machine-readable form and the transfer of records from one automated system to another. Discuss?

2.3.3. Retrospective Conversion (RECON)

A retrospective conversion exercise is crucial to the successful implementation of the library management system. According to Bilal (2014), retrospective conversion is the process by which libraries convert a shelflist into a searchable, computerised database by matching the shelf list cards against MARC databases. In RECON, relevant MARC records are copied onto a drive or transferred electronically from the Web to a library's computer system. The copied records from the MARC database would form the backbone of automation, provide statistics and other information needed to improve existing library services and introduce new ones. The accuracy and completeness of the shelflist analysis determine the quality of the retrospective conversion process.

Objectives of Retrospective Conversion

Objectives of RECON as outlined by Kumar (2019), are to:

a. Create a library automation system database.
b. Increase access to the entire library collection.
c. Enhance library services and operations.
d. Reduce the time it takes library staff and patrons to find a document.

e. Improve library procedures by automating and streamlining acquisition and cataloguing.
f. Maximise the return on automation investments.
g. Obtaining complete MARC 21 records for each item in a library.

State the objectives of RECON

2.3.3.1 Retrospective Conversion Specifications

The retrospective conversion specifications stipulate what to include and exclude from each MARC record and identify the fields that require editing, improvement, or special attention (Bilal, 2014). This allows the library to customise the content of the MARC database and maintain consistency in its format for the automation system. In addition, the RECON specifications will guide the vendors in developing a profile of the MARC records to use in retrospective conversion and any future requests for newly acquired materials. Equally, the specifications will help the in-house staff to have an idea of the specification guidelines and ensure that the outcome of the process aligns with the library's requirements. Therefore, irrespective of the conversion method adopted by the library, it is important to establish specifications for the RECON exercise.

RECON specifications may include:

- Classification numbers.
- Subject headings identifier.
- Special MARC fields.
- Record format.
- MARC designators.
- General material descriptors for non-print material.
- RECON database and accuracy rate of matched records.

Developing RECON specifications for a library operation will require an adequate knowledge of AACR and MARC record format for interpreting the records and consistently preserving MARC database contents.

2.3.3.2 Methods of Retrospective Conversion

The cornerstone of library automation is successfully creating a machine-readable database (Saharan, 2014). However, the RECON process is expensive; hence, the method used for the conversion should be flexible based on funds available in the library. Methods of retrospective conversion are:

A. In-House Conversion method

The In-House method refers to an operation done within the library instead of outsourcing to a third party. The library staff will carry out the conversion procedure using the Library of Congress Control Number (LCCN), International Standard Book Number (ISBN), and other parameters. The MARC record matches will be searched for, modified, edited, and enhanced as required; linked each matched record with a

barcode before saving. The saved records will be downloaded later into the cataloguing module for implementation. The outcome of the In-House conversion process usually leads to high-quality control, meeting library requirements and the objectives of the conversion because the staff understands the users' needs.

Advantages of In-House Conversion Method

The In-house conversion method has the following advantages:

a) The shelflist remains the property of the library.

b) Library staff members have first-hand knowledge of the entire collection, which helps to increase the accuracy of the shelflist.

c) With an Internet connection, it will be easy for library staff to work remotely locating and matching MARC records with the library's shelflist.

d) There is no distraction for library staff engaged in the exercise; thereby, the quality of the conversion process is guaranteed.

Disadvantages of In-house Conversion Method

The disadvantages of in-house conversion are:

a) If the library does not have access to a comprehensive CD-ROM database of MARC records to match the library shelflist, the level of record mismatch will be high.

b) Because most of the commercial CD-ROM databases are updated monthly or quarterly, the library can generate mismatched items and backlog.

c) The conversion may take a long time to complete if the library is understaffed because the more extensive the library collections, the longer the RECON process.

d) Because of the length of time spent on RECON by the library staff, there are tendencies for other library services to be neglected

e) Regular staff interruption may result in a high error rate, lowering the database's quality.

f) The larger the collection, the higher the labour cost.

g) Delay due to hardware/software failure can cause the conversion exercise to be prolonged.

h) When Internet traffic is high, web-based services may experience disruption.

B. **Combined Conversion Method (Outsourced / In-House)**

The combined conversion procedure involves outsourcing some aspects while the library staff will handle the other part of the conversion exercise. For instance, library staff may handle non-print materials In-House, while the conversion of print materials will be outsourced to a third party. This method combines both the advantages and disadvantages of outsourced and In-House conversion methods. The preferred conversion method will be determined by cost, knowledge, the skill of the library staff saddled with the In-house process, staffing and the timeline for implementing the automation project.

C Outsourced / Off-site Conversion Method

Outsourcing is the process of hiring third parties to carry out operations that the organisation typically performs. Often, outsourcing is used so an organisation can focus on its core operations and cut labour costs. Outsourced RECON exercise is solely handled by a vendor or an organisation away from the library.

Advantages Outsourced /Off-site Conversion Method

The advantages of the outsourced off-site method are as follows:

a. The entire process can be completed within the stipulated time frame with minimal impact on the library's routine work.

b. Outsourcing the RECON process will enable library staff to engage in other on-site activities while the conversion process is underway.

c. Outsourcing of the process allows for faster database creation because the operators are well-versed in the procedure and may engage many full-time workers for the project.

d. The time required to complete the exercise can be predicted. This will assist planners and managers in developing a timetable for implementing the automated system.

e. There is a tendency for the outcome of the exercise to produce a high match rate, especially when multiple databases are used.

f. The operator can create records for unmatched items, saving library staff time.

g. Smart barcodes are linked to their respective items during RECON and supplied with converted items.

h. Authority records can be linked to converted items, thereby saving time when creating cross-references after the automated system is implemented.

Disadvantages Outsourced /off-site Conversion Method

The identified disadvantages of outsourced / off-site conversion method are:

a) The conversion process may be prolonged, and the shelflist may be lost in transit.

b) There is always the possibility of record errors and mismatches. As a result, cleaning up the database after downloading the MARC records into the cataloguing database is advised.

c) The absence of the library's shelflist may make it difficult to answer some users' questions. For example, a user may want to know how many volumes of a specific work the library owns. This information may appear on the shelflist but not on the card catalogue.

Note: Before settling for a RECON method, each method's cost analysis should be carried out. It is the outcome that will help the library to decide on the conversion method to adopt.

2.3.3.3 Challenges of Retrospective Conversion

The success of a retrospective conversion exercise will depend on the level of planning and documentation put in place by the library management before the commencement of the automation project. The entire process may appear simple when a library moves from one automation system to another. However, the challenges of the process, according to Panda (2019), are as follows:

a) Lack of standardisation in assigning MARC content designators to machine-readable record elements.

b) Inadequate training of the library personnel in the various aspect of retrospective conversion may hamper the success of the entire process.

c) Lack of consensus across diverse bibliographical communities regarding the organisation of data contents in machine-readable records.

d) Poor funding can impede the procedure in a small library.

e) At times lack of expertise to meet the standard for retrospective conversion, bibliographic content, and machine-readable format coupled with incomplete or incorrect bibliographic information may prevent matching the shelf list cards to the correct MARC data. This may lead to the addition of inaccurate records to the database.

f) Poor supervision of the editing aspect of the entire process could impede the designated authorities' ability to monitor and coordinate the procedure effectively.

State the objectives of retrospective conversion.
Discuss the methods of retrospective conversion

2.3.4 Barcoding the Collection

Barcodes are an integral part of the automation system since they track and identify library items. Barcoding involves assigning a barcode to each database item in the library. They can be produced through automation system software or vendors. They should be placed in a consistent position using a range of barcodes to keep the correct sequence continuing through the automated items.

2.3.4.1 Types of Barcodes

A barcode is a small image of lines and spaces affixed to library books to identify a particular item in a collection and are linked to their respective items during retrospective conversion. The two types of barcodes are:

A. **Smart Barcodes**

Smart barcodes are customised and created from computerised bibliographic records. The barcode contains the item's title, call number, author, and institution's name; it identifies the individual item without scanning it in the automated system and is linked to their respective items during retrospective conversion. Therefore, depending on record conversion, the barcode on the item must be correct.

B. **Generic/Dumb Barcodes**

Generic or Dumb barcodes have no pre-defined connection to items in the collection; unless linked, they cannot identify any item's titles, call numbers or authors to their respective items in the automated system. Dumb barcodes are linked to individual items as they are catalogued, converted, or checked out of the library.

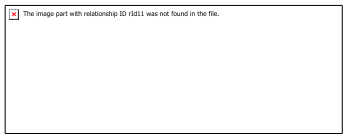

Figure 53: Barcode sample
Source: https://www.computerhope.com/jargon/b/barcode.htm

Describe the types of barcodes

2.3.5 Spine Labels

The spine label refers to the paper or leather descriptive tag attached to the book's spine, most commonly providing the LC number, the Cutter number, the copy

number and a collection prefix for shelving. The library must decide on the format of the spine labels for the new automation system.

2.4 SUMMARY

The library automation system plan encompasses collection preparation, bibliographic formats and standards, retrospective conversion, barcoding of collection and spine labels. Each of these activities can be time-consuming because decisions must be made at each stage, especially about weeding, inventorying the collection, shelflist analysis, and identifying the part of the collection that is the subject of retrospective conversion**.** No doubt**,** implementing a new automation system can be tedious but worth the while when it is completed. Therefore, each phase must be handled painstakingly for the success of the automation project.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a. Weeding involves the ---------- from the library collection.
b. AACR is widely used ---------- for the descriptive cataloguing of various types of information resources by libraries.
c. ISBD is a concise set of rules and a simple ---------- representation of a bibliographic record.
d. Barcoding involves ---------- to each database item in the library.
e. Outsourcing is the process of ---------- to conduct services that the organisation typically performs.
f. ---------- is a process that compares the information in the item record with the physical materials on the shelf.
g. Shelflist is a file of ---------- arranged by call number, in which entries are arranged in the same manner as materials on the shelves.
h. The ----------refers to the paper or leather descriptive tag attached to the book's spine.
i. Barcodes are classified into ---------- and ----------
j. Z39.50 is a national and international standard that defines ---------- for computer-to-computer information search and retrieval.
k. The process by which libraries convert a shelflist (master catalogue) into a searchable, computerised database is ----------?
l. ---------- help vendors and in-house staff understand what is expected of them and ensure the process's outcome aligns with the library's requirements.
m. Outsourcing is the process of hiring ---------- to conduct services that were typically performed by the organisation.
n. ISBD is a standard that specifies eight ---------- for various types of materials.
o. ---------- is a standard format for exchanging data with a local database.
p. ---------- standards are one of the most important standards to librarians.

2.5 GLOSSARY

- **Barcode:** This refers to the small image of lines (bars) and spaces affixed to library books to identify a particular product number.

- **Bibliographic standards** refer to standards that provide a common base level of information necessary to help all library users find the resources they need.

- **Inventory:** Inventory is a process that compares the information in the item record with the physical materials on the shelf.

- **Shelflist**: Shelflist is a file of bibliographic records arranged by call number, in which entries are arranged in the same manner as materials on the shelves.

- **Retrospective conversion**: Retrospective conversion is the process by which libraries convert a shelflist (master catalogue) into a searchable, computerized database by matching the shelf list cards against MARC databases.

- **System implementation:** This refers to a set of procedures to complete the design contained in the approved systems design document, test, install, and begin using the new or amended information system.

- **Weeding:** Weeding is the systematic removal of resources from a library based on selected criteria.

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2.8 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. Removal of resources.
b. Cataloguing code.
c. Human-readable.
d. Assigning a barcode.
e. Hiring third parties.
f. Inventory.
g. Bibliographic records.
h. Spine label.
i. Smart and Dumb.
j. A protocol.
k. Retrospective conversion.
l. Specification.
m. Third parties
n. Descriptive elements
o. MARC 21
p. Bibliographic

UNIT 3 LIBRARY AUTOMATED SYSTEM IMPLEMENTATION

UNIT STRUCTURE

3.1 INTRODUCTION

System implementation is the final step toward completing the library automation project. It defines how the automated system should be installed (physical system design), train the users on how to handle the system and plan for a smooth conversion (Tutorialspoint, 2022). The project team need to assess and approve the appropriateness of the existing facility with consideration for the users' needs. The first four activities were automation planning, hardware configuration, software selection, and implementation. This unit examines the automated system implementation vis-a-vis site preparation, software installation and testing, system conversion, maintenance, evaluation and factors promoting the successful implementation of an automated system.

3.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Describe the system implementation process;
- State the activities in system implementation;
- Describe software installation;
- Describe system conversion;
- Outline the methods of system conversion;
- Explain system maintenance;
- Highlight system maintenance tips;
- Discuss the forms of system evaluation; and
- Enumerate factors that promote the successful implementation of a library automation system.

3.3 SYSTEM IMPLEMENTATION

System implementation defines how the automation system should be built and ensures that the system is operational, used, and meets quality assurance standards (University of Kentucky, 2022). System implementation allows the users to take over

the operation of the system for use and evaluation. The implementation of the automation system involves the following:

3.3.1 Site Preparation

Site preparation encompasses a common understanding of environmental requirements and how the systems will be delivered, configured, installed, and maintained (Sun, 2014). Site preparation helps create a suitable facility and successfully install the computer systems, Servers and related equipment. Therefore, planning the site as a whole rather than in batches is vital. Preparation includes

- ensuring that the computer room and equipment are adequately secured and accessible to the right person,
- installing air conditioning systems to cool the computer systems, and
- alarm system for notification.

Also, provisions should be made at the front and back of the cabinets and racks to allow easy passage to library personnel and for system servicing.

Site preparation activities for the library's management system include:

- hardware selection, placement, and installation;
- physical facility design to house the hardware and other equipment, and
- furniture placement to ensure necessary hardware is available during system installation and testing.

The following equipment should be available on-site as part of the library's readiness for smooth installation and take-off of the automated system.

3.3.1.1 Computer Workstation

Workstations are high-performance, single-user computers with advanced graphics capabilities, large storage capacity, and a powerful central processing unit (Britannica, 2022). Workstations are more powerful than personal computers but less advanced than a Server (which can manage a vast network of PCs and undertake data processing and reporting activities). The total number of systems to acquire will depend on the anticipated number of concurrent users accessing the OPAC and the number of library staff assisting users and performing administrative tasks. Equally important is the location of the library building and the need for networking. In a networked environment, remote and office access to the OPAC may be possible.

The software provider is responsible for providing the minimum hardware requirements for computer systems and ensuring their compatibility with the automation software. For the installation of the automated system for library management, the following types of computer lookup stations are required:

- Lookup stations for OPAC.
- Lookup stations for circulation and information services.
- Lookup stations for administrative duties.

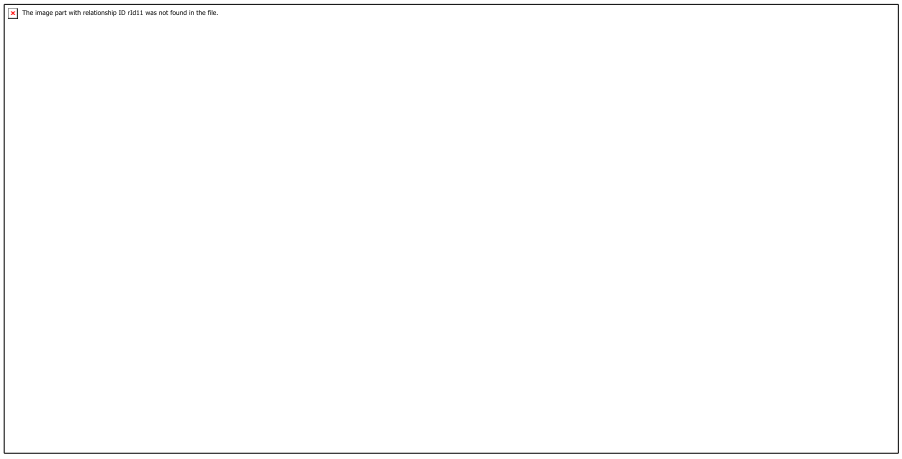

Figure 54: OPAC Lookup Station
Source: **https://www.google.com/search?source=univ&tbm=isch&q=computer+lookup+stations&fir=vHRf5IfESoEv1M%252ColhV8cHwv_KIqM%252C_%253BFHrfjp6C6n2**

3.3.1.2 Barcode Reader

A barcode reader is a hand-held or fixed device that reads barcodes. It has a scanner, decoder (built-in or external), and cable to connect to a computer. There are different kinds on the market, and the library's choice depends on the software vendor's recommendations for compatibility. The total number to acquire will depend on the volume of daily circulation activities in the library.

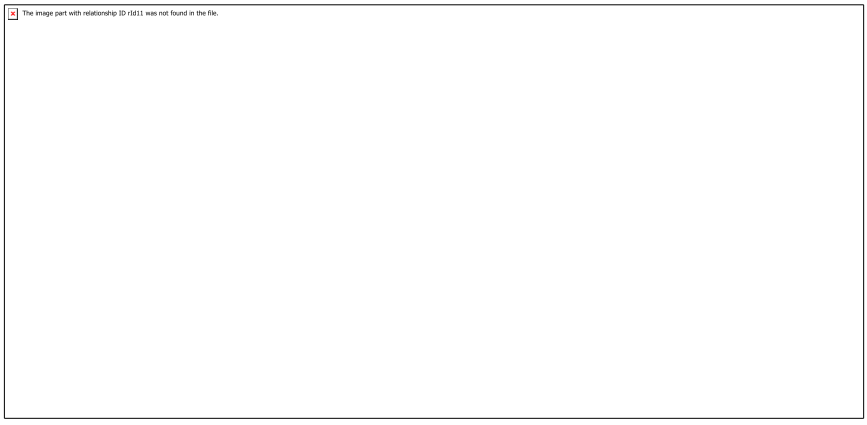

Figure 55: Barcode-reader
Source: **https://previews.123rf.com/images/lucadp/lucadp1401/lucadp140100093/25213384-closeup-of-a-barcode-reader-that-reads-a-bar-code-3d-render-.jpg**

3.3.1.3 Printers

Printers are hardware output devices that print electronic data from a computer or other device(s). They are needed to print OPAC users' search results, citations, and bibliographies and to support administrative functions. The number of printers installed will depend on the library's size, user population, and cost. However, based

on the software vendor's recommendations, the best brand must be chosen (see pg.59. Figure 16).

3.3.1.4 Furniture

The computer desk and related ergonomic desks are furniture pieces designed to comfortably and aesthetically provide a working surface and house or conceal office equipment, including computers, peripherals and cabling for office users. There are different designs and styles of furniture on the market, and the specification and guidelines for the right set of furniture and other equipment to acquire for the library are available from vendors. Users' comfort and available funds must guide a library's choice of furniture because a poorly designed workstation can lead to poor health, induce and increase stress, and cause people to react negatively to the new automated system. Also, ensure that computer terminals are placed on adjustable tables so users can sit or stand. When purchasing furniture, pay attention to all users (staff and patrons), including those with special needs. Furnishings, especially chairs, should be ergonomic and comfortable.

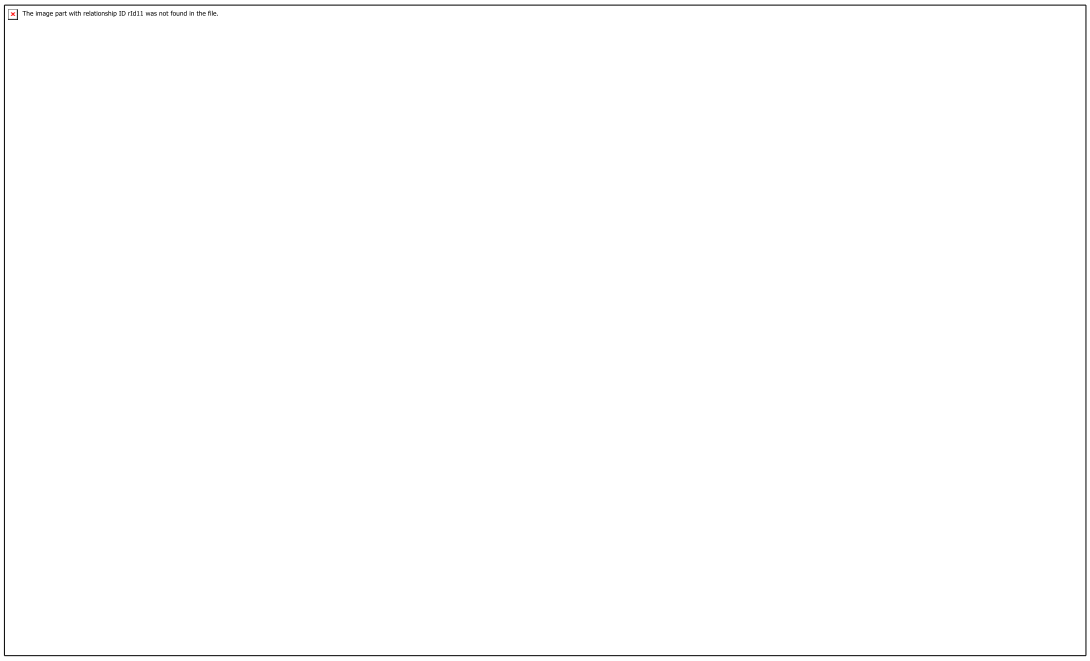

Figure 56: Computer Lookup Stations
Source: **https://www.google.com/search?source=univ&tbm=isch&q=computer+lookup+stations&fir=vHRf5IfESoEv1M%252ColhV8cHwv_KIqM%252C_%253BFHrfjp6C6n2**

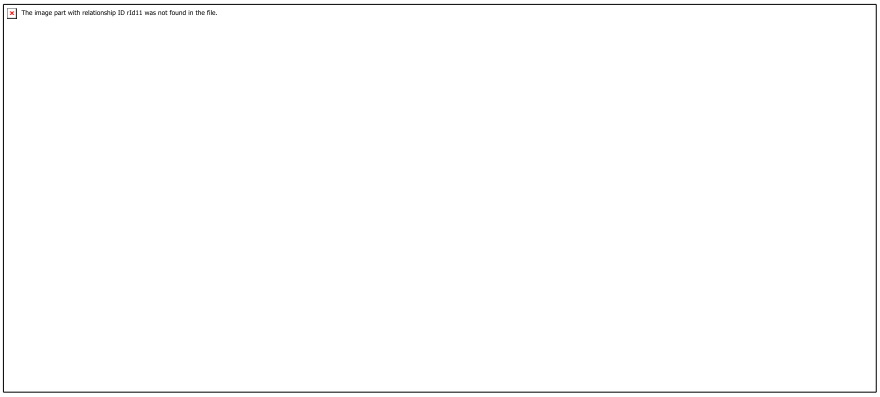

Figure 57: Library Computer Furniture
Source:https://www.agati.com/wp-content/uploads/2017/08/1-Copy-of-Manifest_5_Person_ZigZag_Cherry-960x755.jpg

Describe the equipment that should be available on-site for the installation of an automation system.

3.4 INSTALLATION AND TESTING OF SOFTWARE

3.4.1 Installation

Installation is the process of making software ready for use (Techopedia, 2017). or setup of a computer program, including device drivers and plugins, prepares the program for execution (Wikipedia, 2022). The installation refers to software or hardware configuration to make it usable with the computer. Consequently, after installing and completing the retrospective conversion process, downloading MARC records and creating bibliographic database entries, library staff are expected to test the automation software by creating and entering patrons' records to ensure the circulation module is functional.

3.4.2 Software Testing

Software testing is the process of assessing the functionality of a software program. The process checks for errors and gaps and whether the outcome of the application matches desired expectations before the software is installed and used (Yazer, 2022). Software testing ensures that all the modules are integrated and perform to specifications. Hands-on-practical should be organised on each module to ensure that the library management system works perfectly as specified by the vendor. In addition, problems such as the inability to connect a device, use a barcode reader, or access one of the modules may arise. As such, ample time should be allowed to train employees to adapt to the new system's functionality and operation. Also, the software vendor should endeavour to fix all identified problems before the system becomes fully operational. Finally, testing should be ongoing to ensure the system's performance, hardware compatibility, and compliance with the library's requirements and staff members are proficient in its use.

3.4.3 Patron Records

The patron record is a repository of information about a particular patron in the library's database. It holds and updates information like the patron's name, physical and email address, matriculation number, phone number, department, faculty, and other necessary information about a patron. It is important to have the records of all library users in the circulation modules for seamless circulation activities. Therefore, creating patrons' records using the newly installed software will help test the capability of the database.

Note: The Automation Advisory team should consult with the software vendor before importing records into the circulation module to ensure the integrity of the library database because creating each user's record manually into the library's database is time-consuming.

Figure 58: Patron's Record
Source: **https://audienceviewcommunities.force.com/Professional/servlet/rtaImage?eid=ka04T000000dp1a&feoid=00N4T000000edkU&refid=0EM4T000001EJHr**

Note: Log on to http://wvls.org/wp-content/uploads/2016/11/creating-a-aNew patron-record-Fields.pdf for an example of a filled patron record.

3.5 SYSTEM CONVERSION

System conversion is migrating from the old system to the new one. The conversion process must be planned and adequately executed to prevent problems. There are five approaches to a system's conversion. These are

3.5.1 Direct conversion Approach

The direct system conversion approach rapidly implements and replaces an old system. However, the main limitation of this method is that if any problem arises with the new system, there is no other system to fall back on. In addition, this

approach can be risky because even with sufficient testing, it is impossible to ensure everything runs smoothly with the new system.

3.5.2 **Parallel conversion Approach**

A parallel conversion approach is one in which the old and new systems work simultaneously to make the old system available as a backup until the new system works satisfactorily (Callahan, 2017). This approach is the ideal conversion approach since it prevents malfunctions in the new system. If a problem arises with the new system, the library can revert to the old one without losing time or service. However, this strategy has the problem of duplicating infrastructure and employees to maintain the two systems. Also, knowing people can revert to old techniques may hinder testing the new system.

3.5.3 Phased conversion Approach

The system implementation and conversion occur in phases in the phased conversion approach. A part of the new system is introduced while the rest of the old system remains in use. The advantage of this approach is that the rate of change can be minimised. The data processing resources can be acquired gradually over an extended period, and any identified problem in the new system can be corrected. However, the strategy may only work in some situations because of interface issues. For example, deciding which processes to automate first may be difficult where modules share data and extra costs are incurred to develop temporary interfaces with old systems.

3.5.4 Modular Conversion Approach

In the modular approach, each departmental operational sub-system is changed from the old system to the new one in a gradual manner. As each module is modified and accepted, it is put into use. One advantage is that each module is thoroughly tested before being used. If any problems occur in the system, such can be rectified before further implementation, and other staff can be trained before implementing the new system in their department.

3.5.5 Pilot conversion Approach

In the pilot approach, the new system will be installed in a part of the organisation the moment it has been declared operational. While the remaining part of the organisation continues to use the old system. This localizes problems to the pilot group so that support resources can focus on them. However, there can be interface issues where organisational units share data.

Describe the different approaches to a system conversion.

3.6 SYSTEM MAINTENANCE

System maintenance is an umbrella term encompassing the various forms of computer or Server maintenance required to keep a computer system (hardware and software) functional and operational (Richards, 2022 & Wiesen, 2022). System maintenance entails all effort put in place by a system developer to ensure that the software remains effective and efficient in meeting users' demands. The essence of system maintenance is the sustenance of a system's capability to provide a service. This process monitors the system's capability to deliver services, record problems for analysis, take corrective, adaptive and preventive actions, and confirms restored capabilities. The two main components of system maintenance are:

3.6.1 Preventive maintenance

Preventive maintenance is a routine or regularly scheduled action to maintain equipment, prevent deterioration or failure, and identify corrective work to prevent non-productive time. It involves actions to maintain the computer system running correctly and avoid problems before they emerge. However, if any preventative measures fail, it is a good idea to keep a backup of vital files on an external storage drive. Preventive measures to safeguard the system include:

- Installing Windows updates.
- Scan for viruses and malware at least once a week and run cleaning programs.
- Run updates for these programs whenever they are released, as new viruses and malware spring up constantly.
- Keep the network secure by installing a firewall.
- Engage in safe downloading practices that protect your computer and any information from being compromised.
- Protect the hardware by investing in a surge protector and cleaning the equipment periodically to remove dust because power surges and overheating can destroy electronic equipment.

3.6.2 Corrective maintenance

Corrective maintenance is the process of fixing a faulty computer. This type of maintenance seeks to restore system operability by addressing the problem or replacing the damaged components. Bear in mind that many common computer problems can be resolved without the assistance of an IT professional. However, if there is a need to fix an identified problem, an IT specialist should be consulted to diagnose the identified problem before performing corrective maintenance on the system. Some corrective measures include:

- Removing viruses and malware.
- Uninstalling harmful programs.
- Reformatting.
- Run a system restore.

3.6.3 Levels of System Maintenance

System maintenance helps keep the system updated and removes bugs and changes in the operating environment. Routine system maintenance is essential to avoid hardware failure and data loss and to guarantee that the system works correctly and

that problems are avoided before they occur. System maintenance is divided into three levels:

3.6.3.1 Hardware maintenance

Hardware maintenance involves testing, cleaning, and ensuring adequate functioning of the system's physical components. Generally, computers, peripherals, cabling and other devices are exposed to wear and tear and accidents that can damage their components. Also, factors such as overheating, dirt/dust accumulation, usage, and the passage of time can damage a machine and cause a breakdown.

3.6.3.1.1 Tips for Computer Hardware Maintenance

Richards (2022); and the University of Washington (2022) listed the tips to help keep hardware healthy and functional. They include:

- Regular cleaning of the system, especially the inside, air filters and ventilation paths. This helps reduce the presence of dirt and facilitates better computer cooling.
- Proper placement of the systems to avoid exposure to harmful environments such as sun, heat, dirt, and humidity, which could cause damage to their components.
- Checking the resistance of the system under extreme conditions. For example, if Servers are to be used, they should be tested to see what temperatures they can withstand without compromising performance.
- Shut down, then power off the system before changing any part or plug (except serial port devices and ethernet interfaces.
- Use an anti-static mat and wrist strap.
- Be firm but gentle when seating boards, chips, and connectors.
- Leave it powered up all the time (except the video display).
- Do not drink anything around your machinery.
- Put a power surge suppressor on the power line.
- Avoid vibrations and shocks (avoid stacking components).

3.6.3.2 Software maintenance

Software maintenance updates operating systems and application programs to add new functions and change data formats. It also includes fixing bugs and adapting the software to new hardware devices. According to Pardo (2018), software maintenance refers to the group of tasks that guarantee the good functioning of the software and the integrity of the data stored. This is done after the product has been launched. Software maintenance tasks include:

- System configuration and updating of the operating system.
- Database maintenance.
- Protection.
- Detection and cleaning of malware (viruses, Trojans, spyware, etc.) that can be found on computers.
- Control of commercial software licenses.
- Overall improvement of the software.

- Debugging and boosting performance.

3.6.3.3 Documentation maintenance

The documentation of a computer system involves information about the technical and usage characteristics of the parts and the system in general. Its maintenance will ensure that the documentation is up-to-date and available for use. However, due to the complexity of specific computer systems, and the rotation of the personnel in charge of their use and maintenance, it is important to have documentation that can guide professionals to continue working on the system, enable audit-related tasks, and show users how to use it. The documentation maintenance tasks include:

- Incorporating user manuals for new software.
- Registering the maintenance tasks that have been carried out.

3.6.4 System Maintenance Activities

System maintenance is a routine and ongoing activity, such as reviewing computer performance, ensuring proper installation and configuration of the automated system monitoring devices, identifying security risks, and regular back-up of data. The primary maintenance activities are:

3.6.4.1 Environmental Care

Cleanliness is vital for computer workstations and other automated system components. Environmental care involves protecting the physical environment where the automated system is placed in the library. The computer stations, Servers, hubs, and LAN equipment must be clean and secure. Also, ensure that the system, peripherals and cabling are not exposed to direct sunlight, heat or breeze, dust/dirt (can cause overheating and circuit failure), window glare, and traffic patterns when organising computer stations. Furthermore, the air conditioners, power supply equipment generators, and other related support equipment must meet the demands of all the Servers and other equipment.

3.6.4.1.1 Tips on Environmental Care of the Library Management System

Tips for protecting and elongating the life span of the library management system include the following:

- The environment housing the system and other equipment must be air-conditioned.
- Systems' board components should be clean with secured data connections.
- Hard disk drives and CD ROM drives must be cleaned and tested regularly.
- Check cable connectors and ensure that the keyboards, mice, monitors, barcode reader and printers are clean.
- Keep the computer systems and cables away from humidifiers and wet areas to prevent rusting.
- LAN cabling systems should not be stored in a flood-prone area like the basement and must be covered with conduits to prevent data loss and tripping.
- Cable endpoints, hubs and other devices should be stored in a secured wire closet.

- Servers should be placed in a safe room away from traffic and patrons.
- Uninterrupted power supply (UPS) / surge protectors should be provided to prevent power surges and total blackouts.

State the measures to ensure proper environmental care of the library management system.

3.6.4.2 System Backup

System data backup is critical to a successful disaster recovery plan. It is a vital infrastructure component in any organisation because they help guide against data loss by providing a way of restoring deleted files or recovering a file when it is accidentally overwritten. For example, backups are an organisation's best option for recovering from a ransomware attack or a severe data loss catastrophe, such as a data centre fire (Posey, Miller and Kran, 2022). System backup primarily ensures that not only the user data in a system is saved but also the system's state or operational condition. This helps restore the system to the last-saved state and all the selected backup data. The system backup is performed through backup software, and the end file (system backup) generated through this process is known as the system snapshot/image. System backup restores a computer's integrity after a hardware/software failure, theft, power loss, or accidental deletion.

Libraries need to have a backup strategy for data re-entering and to allow network users to retrieve stored information in the case of a system breakdown. The manual with the automation system for backup and data recovery instructions should be consulted. System backups can be done daily, weekly, bi-monthly, or monthly using the cloud, external hard drives, Blu-ray discs, and solid-state drives. This should be checked regularly to ensure data recovery. Data files should be backed up daily, and the system should be backed up weekly. Ensure that the backup drives are appropriately labelled and kept off-site.

State the importance of system backup

3.6.4.3 Computer Security

Computer security, also known as cybersecurity, refers to protecting computer systems and information from harm, theft, and unauthorised use. Computer hardware can be safeguarded and improved security using methods such as passwords, encryption, and firewalls, as well as denying physical access to its location (Britannica, 2022; Computer Hope, 2022). The security of the library management system is critical because it protects the operating system's privacy and integrity. A system is secure when its resources are used and accessed as intended and when the application works properly. Libraries should implement a theft detection system,

firewalls, virus protection software, and computer-stock devices to protect software and hardware.

3.6.5 Maintenance and Security Tips for the Library Management System

Maintenance is modifying an information system to satisfy organisational and user requirements continually. To ensure the security and maintenance of the library management system, the library personnel in charge should ensure the following:

- Do not turn off the computer's power switch until Windows has shut down properly.
- Install an uninterruptible power supply (UPS) for the computer system.
- Never unplug a peripheral from a running system.
- Install security patches on network computers for data protection.
- Review computer logs regularly for hacking/security alerts.
- Ensure that the antivirus software on all networked computers is updated regularly.
- Run a disk scan and defragmentation at least once a month.
- Use a firewall program for a fast Internet connection.
- Save the software disk that came with your system and the new peripherals.
- Backup data to external drives such as SSD, CDs, USB drives, memory cards, and the Cloud. Unauthorised person(s) does not have access to the computer room.

Enumerate the tips for the maintenance and security of the library management system.

3.7 SYSTEM EVALUATION

Evaluation of the automated system refers to post-installation assessment. Systems evaluation provides feedback for system improvement and measures the success of a developed system (The University of Kentucky, 2020). System evaluation includes measuring the final system against its initial performance goals and performing ongoing testing to ensure it continues to meet those goals. Once an automated system is in place in the library, it should be monitored and assessed.

Evaluation of the system identifies its strengths and weaknesses, the success of the automated system development and implementation, and provides valuable information for future library projects. After a careful review, the results may be used to modify the system to increase its overall efficiency and gain maximum benefit.

3.7.1 Forms of system evaluation

System evaluation involves testing the system's performance. Forms of System evaluation include:

- **Operational evaluation:** This includes assessing how the system functions, such as ease of use, suitability of information formats, overall reliability, and performance levels.
- **Organisational impact:** This entails identifying and measuring financial and non-financial benefits to the organisation.
- **User-staff evaluation:** User-staff evaluation, also known as subjective evaluation, refers to an assessment of the users' and the staff's attitudes toward the new system, including testing for user satisfaction with the new system.

3.8 FACTORS THAT PROMOTE SUCCESSFUL IMPLEMENTATION OF THE LIBRARY AUTOMATION SYSTEM

According to Monyane (2019), the factors that promote the successful implementation of library management system include:

a) **Adequate financial support:** Provision of sufficient funding by the parent institution to procure the automation software and other related equipment, train users, and enhance the Internet bandwidth to ensure a reliable and fast Internet connection. However, the lack of a sufficient budget to cater to all the library needs for the success of the automation project may hinder the successful implementation.

b) **Technical support:** Good and reliable software vendors' support ensures new software solutions are installed promptly and train users so the automated system performs smoothly.

c) **Project management skills:** Employees' ability to facilitate and implement the automation process as specified by the vendor. Also, there should be proper communication, clearly defined roles and responsibilities for each employee, and proper stakeholder engagement.

d) **Strategic alignment:** is required between the parent organisation, the library, and staff members. This will allow library managers to collaborate and plan realistic goals and objectives. Thus, the library's plan must align with the parent organisation's strategic goals to receive adequate management support.

e) **Capacity building:** Regular in-house capacity training for librarians will aid in successfully implementing the library automation process.

f) **Power supply:** The library's automated system requires a regular, uninterrupted, alternate power supply to succeed.

g) **Technology:** Changes in hardware, software, and access to Internet bandwidth due to geographical location make the technological industry very dynamic.

Discuss the factors that can promote the successful implementation of an automated system in the library.

3.9 SUMMARY

System implementation allows the users to take over the operation of a system for use and evaluation. The implementation programme encompasses site preparation, software installation and testing, system conversion, maintenance and evaluation. To ensure the successful implementation and use of the automated system, the software vendor should train the library staff on operating all the modules. Hands-on practice for library staff during the training is vital as it will expose them to the workings of the new system and familiarise them with its operations.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a. System implementation is the ---------- how the system should build and ensures it is operational.
b. Workstations are high-performance, ---------- with advanced graphics capabilities.
c. Installation refers to the process of making ---------- configuration usable with the computer.
d. Software testing is the process of assessing the ---------- of a software program.
e. The patron record is a ---------- of information about a particular patron in the library's database.
f. ---------- is an umbrella term that encompasses various forms of computer maintenance needed to keep a system running.
g. Components of system maintenance are ---------- and ---------- maintenance.
h. The levels of system maintenance are----------, ----------, and ----------.
i. The end file generated through system backup process is known as the ----------.
j. Evaluation of the automated system refers to ---------- assessment.
k. System data backup is critical to a successful----------plan and are vital infrastructure components in any organisation.
l. ---------- refers to the protection of the computer systems and information from harm.
m. Forms of system evaluation are ----------, ---------- and ----------.

3.10 GLOSSARY

- **Computer security:** Computer security refers to the protection of a computer's hardware and the data that it holds.

- **Corrective maintenance**: involves replacing or repairing a system or its components after they have already failed.
- **Evaluation:** Evaluation refers to a post-installation assessment of an automated system**.**
- **Maintenance:** Maintenance is continually modifying an information system to satisfy organisational and user requirements.
- **Preventive maintenance**: Preventive maintenance is the proactive maintenance of equipment before a fault or failure occurs.
- **Site preparation:** Site preparation entails a common understanding of environmental requirements and how the systems will be delivered, configured, installed, and maintained**.**
- **Software maintenance** is the process of changing, modifying, and updating software to keep up with customer needs.
- **System backup:** A system backup is a process of backing up the operating system, files and system-specific useful/essential data.
- **System conversion:** System conversion is migrating from the old system to the new one.
- **System evaluation:** System evaluation includes measuring the final system against its initial performance goals and performing ongoing testing to see that it continues to meet those goals.
- **System implementation** defines how the automated system should be installed (physical system design).
- **System maintenance**: System maintenance is a routine and ongoing activity, such as reviewing computer performance.
- **Workstations:** are high-performance, single-user computers with advanced graphics capabilities, large storage capacity, and a powerful central processing unit.

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3.12 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES WITHIN THE CONTENT

a. Process of defining.
b. Single-user computers.
c. Software/Hardware.
d. Functionality.
e. Repository.
f. System maintenance.
g. Preventive and Corrective.
h. Hardware, Software and Documentation.
i. System snapshot or image.
j. Post-installation.
k. Data recovery plan.
l. Computer Security.
m. Operational, Organisational and User-staff.

UNIT 4 TRAINING IN LIBRARY AUTOMATION

UNIT STRUCTURE

4.1 INTRODUCTION

Training is a vital component of library automation. It is key to planning and implementing the automated system. Training is the action of teaching somebody a

particular skill, such as the use of an automated system. Training library personnel and other stakeholders in deploying the new system for library operations has several benefits, as it will allow having firsthand knowledge of the benefits and capabilities of the library management system. Training should be prioritised to host the right training experiences for different employees and contribute to the successful rollout of new technology. Consequently, the library's vision and strategic plan should be the basis for technology adoption, and the training plan should serve as a roadmap for achieving the training program's objective. This unit, therefore, examines the meaning, criteria, benefits, methods, and challenges of training.

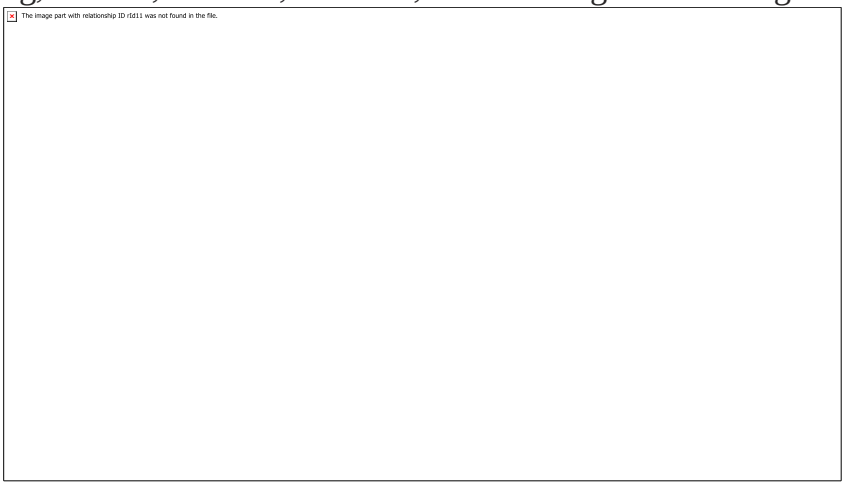

Figure 59: Training session
Source: **https://f.hubspotusercontent30.net/hubfs/3277184/employee%20training%20and%20development.png**

4.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- Define training;
- Define training plan;
- State the criteria for making a training plan;
- Outline the benefits of training;
- Mention the types of training methods;
- Describe training in the use of library automation system; and
- Discuss the challenges of library automation training.

4.2 TRAINING

Training is a formal process by which talent development professionals help individuals improve their performance at work. It is a vital component and a growth strategy for any organisation as it improves individual capabilities and performance. Training is learning the necessary skills required by the library stakeholders to use the library management system. It enables employees to gain the knowledge required to perform their duties while contributing their quota to the organisation's success.

Training is essential for successfully implementing and utilising the system as it aims to improve the library staff's capability, capacity, productivity and performance**.** Training in library automation teaches the skills to design, develop, implement, maintain, support, operate, and manage computer-based information systems**.** Thus, it is important to regularly train library personnel and patrons in technology use. This will expose them to the workings of the library management system, and equip them with relevant information retrieval, search and computer literacy skills needed to use the automated system. Therefore, end-user training is key to successfully implementing automation software.

4.3.1 Training Plan

A training plan is an organised description of employees' actions and resources to do their jobs efficiently. The plan can be as simple as a brief outline or something more complex, such as a hands-on activity or a list of questions for employees (Indeed Editorial Team, 2021).

According to Knops (2021), a comprehensive training plan should include:

- Access to training videos and documentation.
- Online tutorials and user community.
- Opportunities for in-person training.

4.3.1.1 Criteria to consider when making a Training Plan

Training is a circular process that begins with identifying needs and ends with evaluating the training programme. Training should constitute an important aspect of the library automation implementation plan as it is crucial to help library personnel and patrons adopt the automated system in the library. However, plans for training programs differ depending on the library and the members of staff needs (Gerding (2011). Criteria for organising a training plan include:

a) **Identify the purpose of training**: This encompasses the identification of gaps in the skills required to complete a job and the existing skill set of the personnel, such as what the training program intends to accomplish; in this case, it is to teach a new skill on how to use an automation system.

b) **Needs assessments**: This is the process by which the library identifies its personnel's training needs so they can do their job effectively. In creating a training programme, there is a need to evaluate the library personnel's technical skill level (s) using the library management system. The needs assessments also assist the trainers in ensuring that they have appropriate training programmes to match the identified gap.

c) **Establish training goals and objectives**: In establishing the training goals and objectives, consideration should be on the library’s desired goal with implementing the automated system and the impact on the organisation. There is a need to get users to the skill level required to do their job as quickly and accurately as they did with the old manual system at a minimum cost.

d) **Procedures** refer to the diverse ways training can be delivered to end-users. It should take different dimensions as people differ in their ability to learn.

e) **Create a training program**: The training programme should be tailored towards the peculiar needs of the end-users. For example, training on library software with practical demonstrations to point out the difference between the old way of doing the job and the new way. It is important to engage the library employees in all the stages and let them know what they stand to benefit from the training.

f) **Evaluation:** This refers to a systematic process of collecting information about the training and guiding decision-making. It determines the training sessions' relevance, effectiveness and impact based on the needs assessment.

4.3.2 Benefits of Training

The benefits of training library staff and patrons on accepting and using the library automation system are enormous. It includes:

i. **Learning opportunities:** Training offers employees learning opportunities irrespective of their level of education. It enhances their performance and skills to keep up with the latest technologies and developments.

ii. **Motivation:** Training implicitly motivates library employees to perform efficiently in their jobs and give their best to the parent organisation.

iii. **Saves time:** The library personnel can work speedily and effectively, thereby saving time for other activities with adequate knowledge of the workings of the library automation system and its applications.

iv. **Reduced chances of errors:** Training makes an employee more proficient on the job. It reduces the chances of committing errors and strengthens the abilities of the workforce.

v. **Team building:** Training brings together library personnel from different units within the library to learn and work together, thus, fostering team development, instils in their minds the creation of a common mindset and shared vision for the establishment.

vi. **Increase productivity:** Training acts as a productivity tool as it creates a skilled workforce and a major shift in the work attitude of employees. It instils in them high level of confidence and performance.

vii. **Foster growth:** Training is a tool for maximising the potential of employees. The better the training, the better the growth of the organisation**.**

viii. **Cost saving:** Adequately trained library staff will spend less time fixing a system and more time engaging in productive library activities**.**

ix. **Enhance satisfaction:** Training gives employees access to information and enhanced job satisfaction.

x. **Boost confidence:** Training helps hone employees' skills and knowledge, boosts their morale and confidence.

State the benefits of training.
Discuss the criteria to consider in making a training plan.

4.4 TYPES OF TRAINING METHODS

Different training methods can be adopted for the training of library personnel in the use of automation software. They include:

1. **Instructor-led training:** This is the most common type of training method. It involves a lecturer or a subject expert leading the discussion in a more formal setting. The outcome can result in a more enriching learning experience**.**
2. **On-the-job training:** On-the-job training refers to instruction in practical skills required by employees to function on the job through hands-on experience.
3. **On-site training:** This consist of training that occurs at the premises of the organisation.
4. **Video training:** It is one of the emerging modern training methods. It is accessible and valuable with various forms of training programmes. Short, interactive video content gives learners more flexibility than many other methods. Video training is cost-effective.
5. **Virtual classroom:** In this training, the trainer(s) and trainees meet simultaneously but not in the same area. Video conferencing, text-based Internet relay chat tools, and virtual reality packages are tools primarily utilised.
6. **Group training:** In this type of training method, the trainer meets the trainees at the same time and location for live training. An instructor usually leads the delivery method**.**
7. **Self-paced training:** The trainer and trainees are not required to meet at the same time or place. The trainees acquire skills at their convenience.
8. **Multimedia training:** In this training approach, lessons are delivered in multimedia format and stored on CD-ROM. This technique reduces the expense of building an internal program without support from an external body.
9. **Technology-based training:** This training uses the Internet or a web-based application to learn. The method provides end users with just-in-time training and allows organisations to adjust training needs. This type of training is flexible, lead to faster learning and improves retention rates.

10. **Hands-on-practice training:** This gives employees a chance to practice applying a skill/knowledge in a simulated environment or practice scenario. Employees learn through active participation.

Describe the different methods through which library personnel can be trained to use technology.

4.5 TRAINING IN THE USE OF LIBRARY AUTOMATION SYSTEM

Library automation brought tremendous changes to library operations, transformed how employees discharge their duties and how library patrons access information. Training library personnel and patrons in the library management system is paramount to the project's success. Hence, the successful implementation of an automation system requires equipping stakeholders with the right skill sets through adequate and intensive training programs to empower them to develop confidence and independence regarding using the system (Sass, n.d.).

4.5.1 Library personnel

Library personnel comprises professional and paraprofessional librarians. They carry out library tasks such as cataloguing, circulation, acquisition, and database creation. The success of the library automation project depends on the ability and preparedness of the library personnel to effectively and efficiently discharge their duties using the technology. Therefore, regular training on the use of the system for library operations and service delivery is vital.

The training programme should be short-termed, focusing on acquiring information retrieval and computer literacy skills and using hardware and software to meet 21st-century workplace demands. According to Monyane (2019), the training for library personnel on the use of the automated system should focus on:

- Data entry into the automated system.
- System troubleshooting; and
- Software-user training.

In addition, Knops (2021) explained that the training could be carried out by involving the library personnel at

- all levels of the operation analysis;
- identification of needs;
- setting of priorities;
- system specification development, and
- System analysis and evaluation.

Furthermore, the training programmes on how to use the automated system should be made a priority and adequate resources in terms of time and money should be set aside for the exercise.

4.5.2 Library Patrons

Library patrons are individuals or groups who enter the library physically or electronically to use library resources. These users are constantly using technologies to provide them with the best possible experience as the library keeps evolving.

Therefore, the regular training of library patrons and other stakeholders in using the automated system is important because most of them need help with using OPAC and other automated platforms in the library. Also, some patrons struggle with information overload and the inability to develop effective search strategies, while others accept search defaults when numerous search options are available (Bilal, 2014; 2002). Therefore, the training exercise should focus on information searching skills, search strategies, computer literacy and information retrieval skills, and the training method can be group-based, regular hands-on practical sessions, individualised, Web-based, class-integrated, or a combination of methods. Undoubtedly, the outcome of such a training programme will promote easy and quick access to information, the ability to evaluate information evaluation; and enhance the proper and creative use of information. Therefore, library personnel should develop the necessary skills to empower library users to develop confidence and independence in using the library automation system.

Training library patrons on the library automation system would help improve their information search skills and equip them with the relevant skills needed to navigate the library system effortlessly. Hence, Gerding (2011) opined that the training programs should be widely publicised using library websites, blogs, online event calendars, newsletters, direct emails, posters in public spaces, flyers placed in books at checkout points, and through library press release to have a successful training session. He stated that the trainer(s) should encourage in-depth questions after some practical sessions bearing in mind that the increase in the use of the Web and its resources in libraries makes it expedient to teach users fundamental information retrieval and computer literacy skills. This development will allow library personnel to proactively teach users and not make them experts within a period (Sass, n.d.).

4.5.3 Tips to conduct a successful Library Automation Training

Training is vital because adequately trained users tend to get the most out of any software solution and can quickly adapt to updates and changes. Also, training helps to reduce failure risk, decrease costs, and increase project effectiveness. The tips for conducting successful library automation training are:

a) **Familiarisation with the software**: The head of the library should get familiar with the workings of the software, and understand the many functions and features. S/he should try to get comfortable with the user interface and must promote the use of the automated system and how it will benefit each staff.

b) **Training:** Training of the library personnel should be prioritised by allocating enough time and resources to ensure that all staff members are trained extensively.

c) **Format:** Software training should be provided in the right formats using training packs with easy-to-follow screenshots, video tutorials or live demonstrations where possible.

d) **Interactive:** Training in the library automation system should be interactive. It can start with the more confident members who can assist the other employees. It is often easier to understand the use of the software with constant practice. Ensure that employees are engaged in developing and deploying the new technology by getting them to solve problems that may arise. Get them involved by encouraging questions and feedback from team members. Give room for mistakes and failures, and many learn from their mistakes and failures.

e) **Update**: Regular updates on IT training is vital as software changes and new staff need to receive the same level of training as the old staff members. Also, keep in mind that software is updated regularly with new features. Therefore, the library should work alongside the software vendor to keep training resources up-to-date and ensure that the library is informed of any new updates on the software.

f) **Feedback:** Ask for employee feedback on training programmes, as the outcome can be used to improve the software. Also, allow them to provide suggestions to discover a new area where digitization could be employed. Regularly be in touch with the software provider for support package training programmes.

4.6 CHALLENGES OF LIBRARY AUTOMATION TRAINING

Training in library automation is helpful for all library stakeholders. It keeps their skills up to date, helps them to leverage the latest technologies, and enhances the growth of the library. However, challenges to library automation training include:

a. **Budget limitation:** Budget limitation is a great challenge to overcome. Library automation software does not come cheap, and funds for libraries are dwindling. Therefore, finding funds to implement and sustain library automation is a big challenge.

b. **Network infrastructure:** Most libraries do not have the network infrastructure to support the library management system, which is primarily cloud-based. Robust network infrastructure and data privacy, security, and access to other digital resources are required.

c. **Training different generations:** Training becomes challenging when different generations are at the workplace and different individuals learn in different ways and paces. What may work for Generation Y may not work for the millennial generation. Therefore, for employees to train effectively, there is a need to adopt different training methods.

d. **Level of existing knowledge:** Different employees have different levels of knowledge and can understand the learning content faster. The one size fits all approach of most library management systems does not consider the current level of employees' knowledge prior to the training programme.

e. **The inability of the trainers to keep up with the latest trends:** Most software vendors rely on outdated manuals for training, forgetting that as technology changes, the manual need to be updated to the current realities.

f. **Lack of computer skills:** Some library staff may lack information and communication technology skills, thus, resulting in low confidence and comfort with technology.

g. **Lack of awareness:** Due to the rapid development of technology, some trainers may lack expertise in library automation, technology, hardware, and software. Thus, training becomes increasingly complex, and most trainers lack originality, imagination, and vision in planning for future library needs.

h. **Lack of training resources:** Technology may complement the inspiring design to help libraries succeed. However, inadequate training of library staff on library automation due to a lack of modern ICT infrastructure might impair productivity and workflow.

i. **Inflexible curriculum-based training:** Most times, trainees must learn many aspects of the application software they may never use or access.

j. **Unreliable software:** Unreliable software can constitute a challenge to training in library automation.

Describe the challenges of library automation training.

4.7 SUMMARY

Training helps to determine whether a technology implementation project is successful. Training employees on the new automated system requires a thorough and committed action plan. Planning for training should begin long before the first build of the automation system is ready for testing and rolling out the software implementation plan for the end-user experience. Library management should be guided by the type and level of training across staff and patrons because library automation can only be effective if the library staff are knowledgeable of the procedures and trained to provide automated services. Therefore, effective training programmes and processes must be planned and implemented from the outset with total involvement and commitment from the stakeholders at all levels.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate

a. Training is a formal process by which ---------- professionals help individuals improve performance at work.
b. Library patrons are individuals or groups who enter the library ----------or ---------- to use library resources.
c. A ---------- is an organised description of the actions and resources employees use to do their jobs efficiently.

d. ---------- it is the most common kind of employee training.
e. Training gives employees a better opportunity to learn important ----------and improve their job performance.
f. Training in the use of the ---------- system should be interactive.
g. ---------- method is one of the emerging modern training methods.
h. Training acts as a ---------- as it creates a skilled workforce and a major shift in the work attitude of library staff.
i. Training horns the ---------- of employees, which results in a boost of their morale.
j. Unreliable software can constitute a ----------in library automation.

4.8 GLOSSARY

- **Library patrons**: Library patrons are individuals or groups who enter the library physically or electronically to use library resources
- **Library personnel**: Library personnel comprises professional librarians and paraprofessional librarians working in libraries
- **Training:** Training is the process of learning the skills required for a particular job

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4.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. Talent development.
b. Physically or electronically.
c. Training plan.
d. Instruction-led training.
e. Skill sets.
f. Library automation.
g. Video training.
h. Productivity booster.
i. Skills and knowledge.
j. Challenge to training.

UNIT 5 FUNDING FOR LIBRARY AUTOMATION

UNIT STRUCTURE

5.1 INTRODUCTION

Funding is crucial for planning a library automation project. Adequate financial resources are the backbone of every library. Hence, libraries must be fiscally ready before embarking on the automation project. The library management should ascertain the total cost of the project, available library funds, and how to get the funding necessary to purchase and implement the system. This unit, therefore, focuses on funding sources, budgeting and cost estimation for library automation.

5.2 LEARNING OUTCOMES

By the end of this unit, you should be able to:

- Define funding;
- Discuss the sources of funding;
- Define budget;
- State the budgeting process; and
- Describe cost estimation for library automation.

5.3 FUNDING

Funding refers to money provided by an organisation for a particular purpose. Funding can be for either short-term or long-term purposes, and its availability is key to completing any project. There are a wide variety of funding sources available for projects; however, the option chosen will depend on the nature of the organisation.

5.3.1 Sources of Funding

Funding involves contributing resources to finance a program or need (Corporate Finance Institute Inc (CFI), 2022). Funding sources are budgetary resources for programs and projects. This includes grants, loans, bonds, federal or state awards, private donations, or internal money allocated to an organisation. The different sources of funding include:

a. **Loan:** A loan is a lump sum of money organisations borrow from banks or other financial institutions to manage or plan events financially. The borrower(s) incurs a debt to be paid back with interest within a given timeframe in stages or at the end of the loan period (CFI Team, 2022).

b. **Donations:** A donation is a gift for charity, humanitarian aid, or to benefit a cause. It may take various forms, including money, alms, services, or goods.

c. **Grants:** A grant is a fund given by an individual or an organisation, such as a public body, charitable foundation, specialised grant-making institution, non-

profit organisation, business or a local government body, for a specific project or purpose (Wikipedia, 2022). Grants are not to be paid back but must be applied for; the application process can be highly competitive and time-consuming.

d. **Crowdfunding:** Crowdfunding uses small amounts of capital from many individuals to finance a venture or fulfil a particular project. Crowdfunding makes use of the easy accessibility of vast networks of people through social media and crowdfunding websites to bring investors and entrepreneurs together, with the potential to increase entrepreneurship by expanding the pool of investors beyond the traditional circle of owners, relatives, and venture capitalists (Smith, 2022).

e. **Private Finance Initiative:** A private finance initiative is an attractive short-term funding that enables government departments to finance projects for which they do not have the capital. It is funding public sector projects through the private sector (Kenton, 2022). It helps alleviate the government and taxpayers' immediate burden of coming up with the capital for any projects.

Define funding. Discuss the sources of funding.

5.4 BUDGETING

Budgeting is a systematic strategy that forecasts the revenues and expenditures of an organisation and the tactical implementation of a project/business plan (CFI Team, 2022). Budgeting helps an organisation take timely corrective action in underachievement of income or excessive expenditure. Furthermore, budgeting makes performance evaluation easy as management can question any deviation from the set goals since there is a set target or goal to achieve in the budget for the pre-determined period. Thus, a budget is essential for any organisation as it helps to:

- keep track of its income and expenditure;
- ascertain that business money is being spent and invested correctly, and
- ascertain that the business's financial goals are achieved.

5.4.1 Types of Budgets

A budget is a fiscal roadmap, a tool for planning, implementing, and controlling activities for the optimum utilisation of scarce resources in an organisation (Borad, 2021). A robust budget framework is built around a master budget consisting of operating budgets, capital expenditure budgets, and cash budgets. The combined budgets generate a budgeted income statement, balance sheet, and cash flow statement. Types include:

a. **Operating Budgets:** An operating budget is a detailed projection of what an organisation expects its revenue and expenses to be over time. They are divided into major categories: revenues, salaries, benefits, and non-salary expenses.

b. **Capital budgets**: Capital budgets involve allocating money to acquire or maintain fixed assets such as property, equipment, or IT systems that create major demands on an organisation's cash flow. The purposes of capital budgets are to allocate funds, control risks in decision-making, and set priorities.

c. Cash budgets: This refers to a document produced to help a business manage its cash flow. It is usually prepared in advance and shows all the planned monthly cash incoming (receipts) and any planned cash outgoing (payments). Cash budgets tie the other two budgets together and consider the timing of payments and the cash receipt from revenues. Cash budgets help management track and manage the company's cash flow effectively by assessing whether additional capital is required, whether the company needs to raise money, or if there is excess capital.

Define budgeting.
Describe the types of budgets.

5.4.2 Goals of the Budgeting Process

Budgeting is a critical process for any business in several ways. The budgeting process involves establishing a budget, planning, forecasting, implementing, monitoring, controlling, and evaluating the budget's performance. The goals of the budgeting process include the following:

a. **Planning:** Budgeting aids in planning actual operations as the process gets managers to consider how conditions may change and what steps they need to take while also allowing managers to understand how to address problems when they arise.

b. **Coordination:** Budgeting helps coordinate the organisation's activities. It encourages managers to build relationships with the other parts of the operation and understand how the various departments and teams interact and how they all support the overall organisation.

c. **Communication:** It encourages communication of individual goals, plans, and initiatives, which all roll up together to support the growth of the business. It also ensures that appropriate individuals are made accountable for implementing the budget. The process helps managers communicate plans, ensuring everyone understands how they support the organisation.

d. **Motivation tool:** Budgeting serves as a motivation tool by getting managers to focus on participation in the budget process. It provides a challenge or target for individuals and managers by linking their compensation and performance relative to the budget.

e. **Control measures:** Managers can compare actual spending with the budget to control financial activities.

f. **Evaluation:** The process serves as a means of evaluating managers' performance and informing them of their performance in meeting targets they have set.

State the goals of the budgeting process.

5.4.3 BUDGETING FOR LIBRARY AUTOMATION

To actualise a library's strategic plan, a budget is required. A budget is a clear, descriptive road map of the automation plan. Changes can be made along the way to ensure the achievement of the desired objective(s). Budgeting for the automation project necessitates a cost estimate for the entire project, including ongoing costs.

5.4.3.1 Cost estimation for Library Automation Project

Cost estimation is calculating a budget that matches the financial commitment necessary for a successful project, such as library automation, considering direct and indirect costs (Westland, 2022). A cost estimate is more than a list of costs. It also includes a detailed Breakdown of Estimate (BOE) report, which describes the assumptions, inclusions, exclusions, accuracy and other aspects needed to interpret the total project cost; otherwise, it would be meaningless. Cost estimation is projecting the cost and other resources required to complete a project within a specific scope, typically about the overall cost generated for the project (Cost management, 2021). Cost estimation for the automation project must take into account the cost of software, hardware, personnel, training, site preparation, retrospective conversion, consumables, maintenance and other miscellaneous expenses (see page 47 for the breakdown of the cost estimates for library automation).

5.4.3.2 Principle of Cost Estimation

Cost estimation is forecasting the cost and other resources needed to complete a project within a defined scope. The principle of cost estimation include:

i. **Prediction:** Cost estimation is used to predict the quantity, cost and price of the resources required based on the scope of a project. A project might be any process that is started to perform work activities and create assets.

ii. **Decisions:** Cost estimation is needed to provide decision-makers with the means to make investment decisions, choose alternatives, and set up the budget during the front end of projects.

iii. **Breakdown**: Cost estimation is done by breaking down the total scope of a project into manageable parts to which resources can be assigned and cost. There are standardised ways of breaking down a project based on the project team's needs, and external parties' multiple structures are often implemented to align reporting and sharing of cost data. The standardised ways are:

- **Work Breakdown Structure (WBS):** This refers to a project management tool that takes a step-by-step approach to complete large projects

with several moving pieces. WBS can integrate scope, cost and deliverables into a single tool.

- **Cost Breakdown Structure (CBS)**: This refers to the breakdown of the costs of the various components of a project.

iv. **The Breakdown of Estimate (BOE) Report**: The Breakdown of Estimate report is a tool used in project management by which members of the project team, usually estimators, project managers, or cost analysts, calculate the total cost of the project.

5.5 FUNDING LIBRARY AUTOMATION

Libraries are not-for-profit service components of academic, research or other institutional bodies. Libraries are the service institutions and knowledge hubs that are society's backbone, providing information access and nurturing cultural well-being (Gul & Bano, 2019). Therefore, funding library activities are pertinent to providing information services to meet the user's information needs.

Automation of the library is costly. Funding the automation project necessitates a significant initial financial investment. Funds for the project can be earmarked in the annual budget of the parent institution and extracted from the library budget, keeping in mind that funds will be required to procure hardware, automation software, networking devices, and other computer peripherals. Therefore, funds should be budgeted, and libraries should be tactical about seeking monies to fund automation projects.

5.5.1 Source of Funding for Library Automation

Funding is crucial for the successful execution of the library's automation project. Funding sources should be identified, accounted for, and ensured that the project is funded adequately and the funds are committed to the specified purpose. However, parent organisations with the required financial strength should endeavour to absorb the cost of the automation project because dependency on external sources can delay the implementation process. Institutional support is very crucial to the success of the project because, irrespective of the source(s) of funding, donors need to be assured, usually in writing, that the institution will support ongoing maintenance and needed upgrades (Thompson, 1992). Funding sources for libraries include:

a. **Governing body**: The Governing Body is the main decision-making body of the University. It is responsible for setting and monitoring the strategy of the University. The Governing Body agrees on the strategy of the University in conjunction with the executive and monitors its implementation. It has the ultimate responsibility for the strategic plans of the University and the deployment of resources. The library management needs to inform the parent organisation of its funding and implementation plan for the library automation project, stating the importance and usefulness of the project from the onset. If the parent organisation is interested in the project, the library will not need to engage in external fundraising activities (Thompson, 1992).

b. **Foundation:** A Foundation is a non-profit corporation or a charitable trust that makes grants to organisations, institutions, or individuals for charitable purposes. A private foundation's money comes from a family, an individual, or a corporation. An example of a private foundation is the Ford Foundation. A grant-making public charity (sometimes called a "public foundation**")** gets its money from many different sources, such as foundations, individuals, and government agencies.

c. **Granting agencies:** are any public or not-for-profit funding source providing funding for a research project.

d. **Businesses:** This refers to an organisation or enterprising entity engaged in commercial, industrial, or professional activities. Businesses can be for-profit or non-profit entities, ranging from limited liability companies to sole proprietorships, corporations, and partnerships.

e. **Individual**: This refers to a single human being distinguished from a group.

f. **Donation:** A donation is a gift for charity, humanitarian aid, or to benefit a cause. A donation may take various forms, including money, contributions, services, or goods. It is a voluntary gift (money, service, or ideas) made to a worthwhile cause.

g. **Gifts:** This refers to a thing given willingly to someone or a body without payment, especially formally or as a donation or bequest.

State the sources of funding for the library automation project.

5.5.2 Techniques of securing funding for Library Automation Project

Techniques for securing funding for library automation projects are:

a. **Planning:** Planning represents one of the best ways to get budgetary approval for the project. Plan and ensure that the project is clearly stated in a future budget.

b. **Benefits:** It is imperative to state clearly the accruable benefits of the automation project to the parent organisation. Including the monetary value and other benefits the project will bring. Back it up with relevant data on how the investment will pay itself in the long run.

c. **Lobbying:** Lobbying refers to efforts to influence the decision on an organisation's behalf. Identifying and knowing whom to lobby and how such individual(s) will influence decisions in favour of the library's idea when funding the project is essential. Therefore, connecting with the right

stakeholders early in the process may help secure the necessary funds to help push the project through.

d. **Use the data:** Using data is one of the best ways to get funding for library automation projects. The request should be supported with facts, current market data, experience, and successes will all be vital in securing financing for the project. Ensure the data supports the funding request, which can comprise internal analytics and outside research.

e. **Get a grant:** Finding an alternative funding method inform of grants may be essential to progress with the library automation project.

Outline the principles of cost estimation.

5.6 SUMMARY

Automation saves library staff time when performing activities, providing services, assisting patrons, and developing new services. Therefore, a properly funded, executed, and implemented library automation project will improve user access to the collection, and enhance staff productivity, accuracy, and efficiency in completing activities and delivering library services. Undoubtedly, libraries require adequate funding for services and operations. Hence, funds for the automation project should be assessed during the planning phase to determine the funds available for present and future support, as a successful automation project depends on a sound financial plan, convincing arguments, strategies, and sensitive treatment of potential supporters of the library.

SELF-ASSESSMENT EXERCISE

Fill in as appropriate.
a. Libraries require adequate ---------- for services and operations.
b. ---------- is very crucial to the success of the library automation project.
c). Budgeting for the automation project necessitates a ----------for the entire project.
d. Funding is the act of providing ---------- to finance a project.
e). Cost estimation is made up of ---------- and ---------- costs.
f. The Breakdown of Estimate (BOE) report is a ---------- .
g. A ---------- is a nonprofit corporation or a charitable trust that makes grants to organisations, institutions, or individuals for charitable purposes.
h. Funding the automation project necessitates a significant ---------- investment.
i. ---------- a document produced to help a business manage its cash flow.
j. Libraries are ---------- service components of academic, research or other

institutional bodies.

5.7 GLOSSARY

- **Budget: A** budget is a tool for planning, implementing, and controlling activities for the optimum utilization of scarce resources in a business.
- **Budgeting:** Budgeting is a systematic strategy that forecasts the revenues and expenditures of an organisation and the tactical implementation of a project plan
- **Cost estimation:** Cost estimation is the summation of individual cost elements, using established estimating methods and valid data, to estimate the future costs of a project based on what is known today.
- **Funding:** This is the act of providing resources to finance a need, program or project

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5.9 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISE(S) WITHIN THE CONTENT

a. Funding.
b. Institutional support.
c. Cost estimate.
d. Resources.
e. Direct and Indirect.
f. Tool.
g. Foundation.
h. Initial financial.
i. Cash budget.
j. Not-for-profit.

MODULE 4: PRACTICUM IN LIBRARY AUTOMATION

UNIT 1: PRACTICUM / PRACTICAL WORK BASED ON LIBRARY AUTOMATION

UNIT STRUCTURE

1.1 INTRODUCTION

The focus of this unit will be on some practical-related examples in a bid to automate libraries.

1.2 LEARNING OUTCOMES

By the end of the unit, you should be able to:

- State the rationale for automation in libraries;
- Outline the procedures of the library automation process;
- Comprehend how to conduct a needs assessment for a non-automated library; and
- Describe the software selection process.

1.3 NATURE OF PRACTICUM

Practicum training provides students with real-world experience, bridges the theoretical and practical divide, and exposes and allows them to develop technological and soft skills (teamwork, effective communication, and work experience) inherent in learning activities. (Mason, 2013). The practicum allows students to apply what they have learned in class to a real-world environment. It is an opportunity to gain professional experience by working in a library or an information centre and practising all the students learnt in the class (Fecich, 2022; Tella, 2021). Hence, a practicum experience could boost students' confidence by expanding their subject knowledge, and reinforcing core competencies learned in previous coursework (Hendrick & Hendrick, 2011). As a result, it is now time for you to respond to the practicum questions listed below.

1.3.1 Self-Assessment Exercise

a) Select a non-automated library of your choice.
   - State the mission and goals of the selected library.
   - Observe the mode of service delivery.
   - Describe the number and type(s) of clients served by the library.
   - Mention the existing user services available in your library of choice
   - State the total collection size.

b) Prepare a checklist. Use it to collect information about the functions /activities of the library.
c) Identify the tasks that are most repetitive, tedious, and labour-intensive.
d) State the tasks that may involve inaccuracy, inefficiency, and low productivity.
e) Identify and suggest functions for automation.
f) Justify your decision.

1.3.2 Selection of software for the Library automation project

From your knowledge of the different types of automation software available in the market, as captured in Module 2, Unit 3, and Appendix 1,

- select the software of your choice for an intended automation project.
- State any five reasons for the choice made.
- Identify the modules relevant to the operation of the library of your choice
- indicate whether the software is for single-user or multi-user access.
- State if the software is for a stand-alone or a networked configuration.

1.3.3 Hardware selection for library automation project

Selection of compatible hardware for the successful operation of the software selected in the past activity

SELF-ASSESSMENT

- State the hardware requirement needed to support the operation of the automation software chosen in 1.3.2
- Mention the other hardware components the selected software will require to function perfectly.

1.4 HARDWARE CONFIGURATION

To examine the hardware configurations of an automated system used in a library.

Select an automated library in your local area.

Meet with the Systems librarian:

- Gather information about the hardware configurations in use, such as
- Type of configuration (stand-alone or LAN-based with client/server system. WAN-based with client/server system);
- Total number of computer workstations;
- Number and name of Servers;
- Type of platform used (i.e., Macintosh or PC);
- Type of network operating system used (e.g., Windows NT, Unix);
- Name of automation software and the modules implemented;
- Cost of the automation software;
- Cost of the hardware configuration;
- Reasons for the choice of the hardware configuration; and
- Advantages and disadvantages of configuration.

2. **Write a report**

- stating the mission of the library.
- Total number of patrons
- size of its collection.

3. **Based on what you have learnt in LIS 402: Library Automation**

- State the strengths and weaknesses of the hardware configuration
- Describe the type of hardware configuration you would choose or the modifications you would make to the existing configuration to serve the library and its patrons best. Justify your answer.

1.5 SUMMARY

A practicum is an experimental course that exposes students to the practical aspect of their course. Practicum provides students with an opportunity to have hands-on experience in a practical-related course. In this unit, you were introduced to practicals on some theoretical aspects of what you have learnt about library automation.

1.6 GLOSSARY

Practicum: This refers to a course involving activities emphasising the practical application in a field of study

1.7 REFERENCES/FURTHER READING

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APPENDIX 1: Examples of Library Automation Software Available in the Market

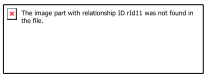
A Liberty Library Management System

Liberty is a high-performance library management software solution that will grow and change with your organisation's needs. Liberty is available for Windows, Mac, Cloud, Android, iPhone and iPad. The Liberty Library Management System is a powerful Library Management System solution for academic, corporate, special, legal, medical and public libraries with a robust management interface. The interface enables vital information to be delivered anywhere, anytime through modern devices, and it provides powerful functions with ease of use.

Features of Liberty Library Management System

The key features include:

- Management and tracking of the library's physical, virtual or electronic resources.
- View information alerts and real-time reminders.
- Create up to seven customised authority files or taxonomies.
- Secure access to resources according to your business policies.
- Send emails and text messages to users.
- Import MARC 21 records from libraries and databases worldwide with Z39.50 cataloguing support.
- 24/7 access from anywhere with predictive text searching.
- Clear presentation of results, with easy links to interactive resources.
- Staff and clients can manage their library profiles – reserve, renew, request, alert/SDI, review and save results.
- Allows faceted search.
- Deep digital integration with resources for direct borrowing/download within the public search interface.
- Report on all aspects of the library, research and resource centre management, including statistics.
- Dynamically view graphical reports using real-time library data with analytical reporting.
- Equipment and asset resource management.
- Liberty has a powerful analytics interface that can help monitor and report on all aspects of the library, such as:
    - View graphical reports using real-time library data.
    - Drag and drop reporting.
    - Save and share queries with other staff.
    - Export reports to Excel and PDF.
    - Use advanced filtering to report only the information you need.



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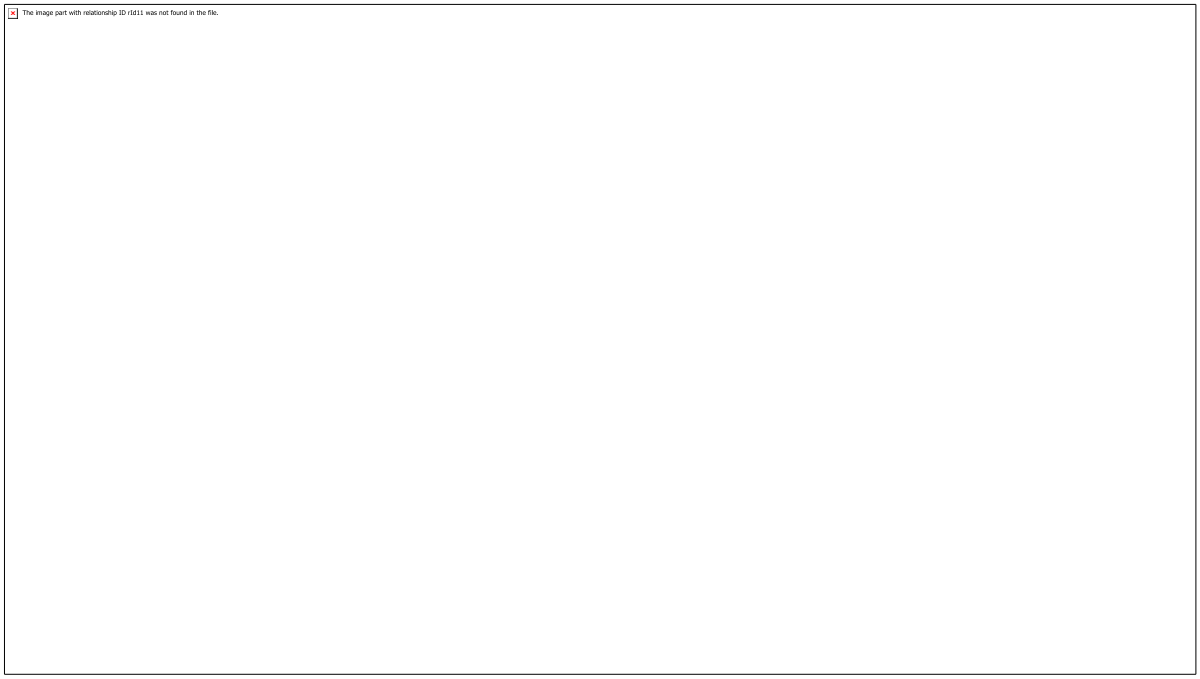


Figure 60: Liberty Library Management System Home page
Source: **https://a.fsdn.com/con/app/proj/liberty.s/screenshots/LIB4.png/max/max/1**

B Soutron

Soutron is a cloud-based Library, Archive and Information Management Solutions provider dedicated to managing transformation in libraries. It partners with special libraries and information centres worldwide to transition them from analog to digital technologies with innovative, fast, flexible, easy-to-use solutions.

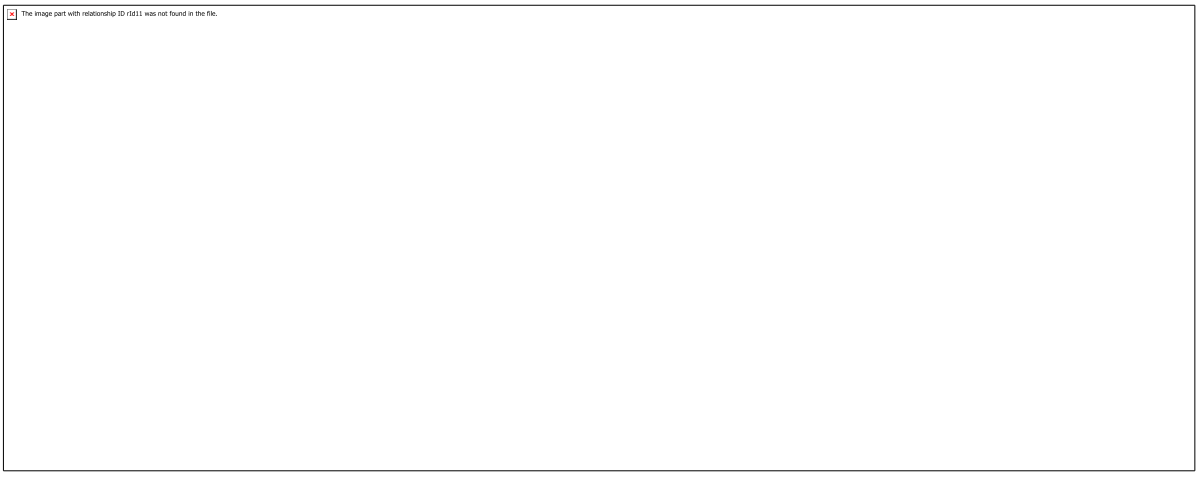


Figure 61: Soutron Dashboard
Source: **https://a.fsdn.com/con/app/proj/soutronglobal.s/screenshots/My-Account-2019.jpg/1000/auto/1**

C OPALS Automated Library System

OPALS Open-source Automated Library System is a powerful, cooperatively developed, Web-based, open-source program. It provides Internet access to information databases, library collections and digital archives. Many schools, colleges, research, business, religious and library union catalogues (that provide ILL services) use OPALS. There is no need to install software or purchase expensive computer hardware or software licenses to implement this powerful, turnkey Internet-accessible system. The "total cost of ownership" of this standard and Web-based feature-rich software is demonstrably and undeniably sustainable. OPALS can be hosted and maintained on the library servers, or we can work with your IT colleagues to install and support it at your site. Experienced programmers and technical support staff update and maintain the program, giving this open-source initiative a responsive, dependable support framework that is essential for institutions that serve the public.

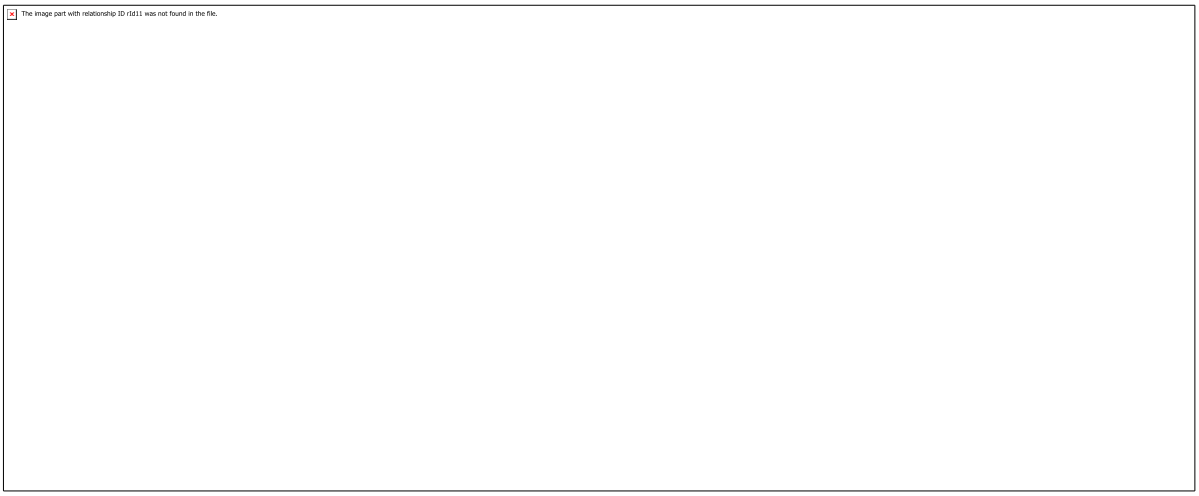
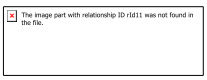


Figure 62: OPALS Dashboard
Source:https://a.fsdn.com/con/app/proj/opals.s/screenshots/Captura%20de%20pantalla%202022-05-31%20141942.png/1000/auto/1

D Eloquent Library

Eloquent Library is a fully featured, mobile-friendly integrated library management software designed to serve agencies, and SMEs. Eloquent Library has all the features of a traditional ILS and supports all types of digital content – business documents, e-books, flip books, artefacts, videos, PDFs, large maps, journals, logbooks, scrapbooks, photographs, and websites. In addition, eloquent Library provides end-to-end solutions designed for Windows. This online Library Management system offers Serials Management, Barcoding/RFID, Inventory Management, OPAC, Periodicals Management, and Fee Collection in one place.



https://youtu.be/wcFhSJxNKbY

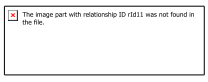
E LIBRARIAN® Library Management Software India

LIBRARIAN® is the complete library management Software in India and an automation solution that enables information providers, information resource managers & librarians to manage and disseminate information available in various kinds of resources (print and non-print items). Cataloguing, acquisition, circulation, serials control, article indexing, barcode generation, and member/student ID card generation are important LIBRARIAN® capabilities. The cataloguing module is based on the AACR2 standards. Rules are programmed to give consistent and accurate cards. The cards are available in the standard 5" x 3" size. Users can opt to print on cards or A4 Laser Sheets. The GUI is simplified for quick and easy use of the same by all. Cataloguing books, CDs, Journals, Magazines, Annual Reports, Project Reports, Presentations, PDF files and many more is possible. Users can easily add up to 20 different fields of different types for entering data on new and upcoming resources.

Features of Librarian® Library Management Software

The following are the key features of the Librarian® Library management software:

- The software is compatible with Microsoft Office 2007, using graphs and charts to represent statistical data visually.
- Librarian Library management software is compatible with Barcode printers.
- The software includes multimedia resource management.
- It supports a multi-user environment and a multi-location web interface with free e-journals and e-books.
- It has a comprehensive web OPAC for online information searches that the user can customise.
- The software includes digital references to books and other items like URLs, PDFs, PPTs, DOCs, and XLSs).
- It includes auto-scheduled tasks like email and database maintenance.
- The software supports MARC21 export/import capabilities, and Z39.50 import allows libraries to search and import records from other Z39.50 libraries worldwide.



https://youtu.be/v_SkCpsfsPo

F KOHA LIBRARY SOFTWARE

Koha is the world's first free, web-based and open-source integrated library system. It is capable of managing a wide range of administrative processes typically found in modern libraries, such as cataloguing, authority management, serials management, circulation, acquisitions, flexible reporting, label printing, and multi-format notices. It also handles offline circulation when Internet access is unavailable and much more. Koha is a fully featured, scalable library management system. The development of Koha is sponsored by libraries of various types and sizes, volunteers, and support

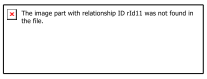
companies worldwide. The product is being used by the public, academic, and special libraries worldwide. Hence, it is available in many languages, with more being added yearly. It is flexible enough to support operations of single-location libraries and consortiums. And, as a free, open-source platform, there is no vendor lock-in.

Koha is an enterprise-class ILS with comprehensive functionality, including basic and advanced options, machine-readable cataloguing, and call number support. It is compatible with various international library standards, such as MARC21, UNIMARC, MARCXML, ISO 2709, Z39.50, SRU/SRW, SIP2, RSS, etc. Koha's feature set continues to evolve and expand to meet the needs of its user base

Features of Koha Library Software

Koha's feature set is constantly evolving and expanding to meet the needs of its user base. Some of the features are:

- Koha supports robust, scalable full-text searching utilising an RDBMS and an external search engine.
- Koha is scalable (able to be used/produced in various capacities) from the smallest to the largest.
- Koha is standards-compliant. It uses library standards and protocols to ensure compatibility between Koha and other systems and technologies while supporting existing workflows and tools.
- The software has a web-based interface that lets users interact with content/software on a distant server through a Web browser.
- Koha's OPAC, circulation management, and self-checkout interfaces comply with web technologies standards: XHTML, CSS, and Javascript.
- Library catalogue front end/OPAC/ library system intranet.
- Koha is embedded with a circulation tracking and acquisition/budgeting system.
- It has an easy-to-customise web-based interface for patrons and library employees.
- Koha is embedded with a simple acquisition system for modest libraries that can catalogue websites.
- Auto-remind notice, penalties, and Barcode support.



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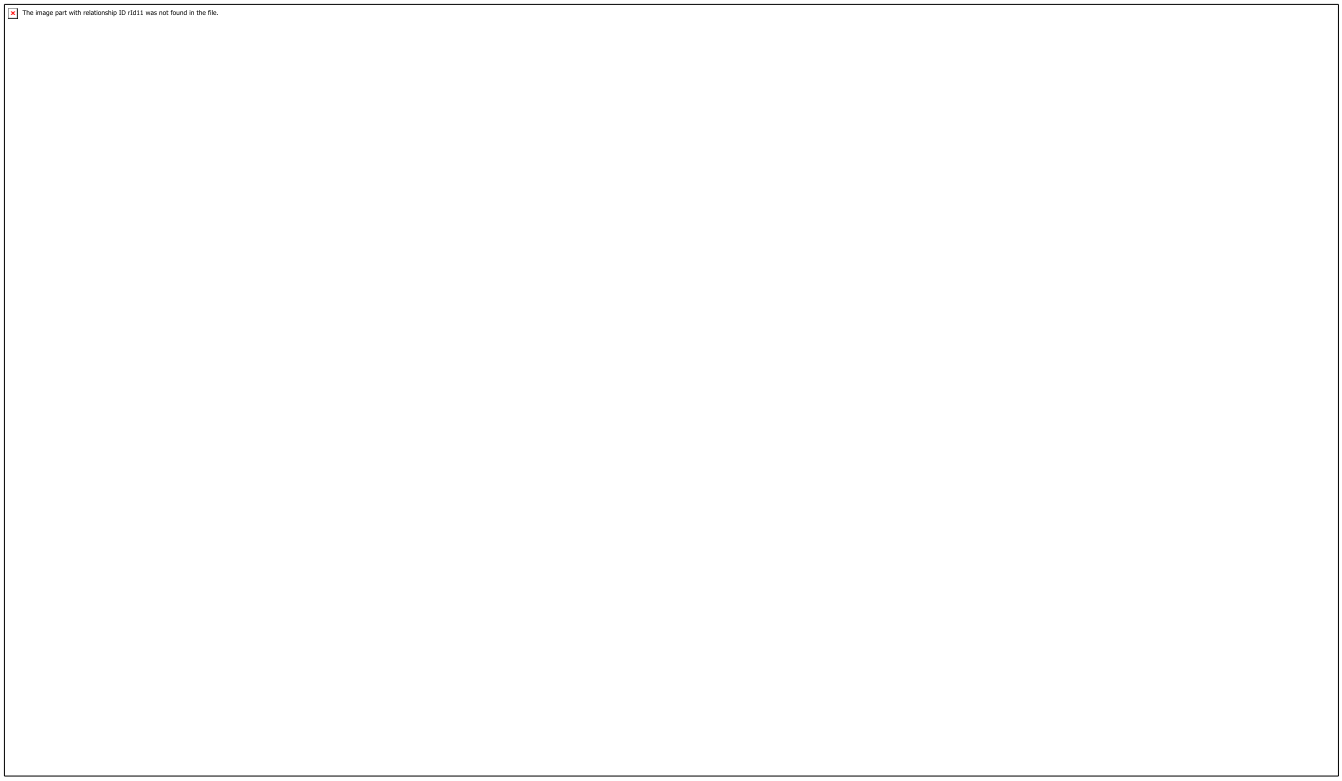

Figure 63: Koha Dashboard
Source: https://s2.research.com/wp-content/uploads/2022/06/28230631/Koha-dashboard-1024x626.png

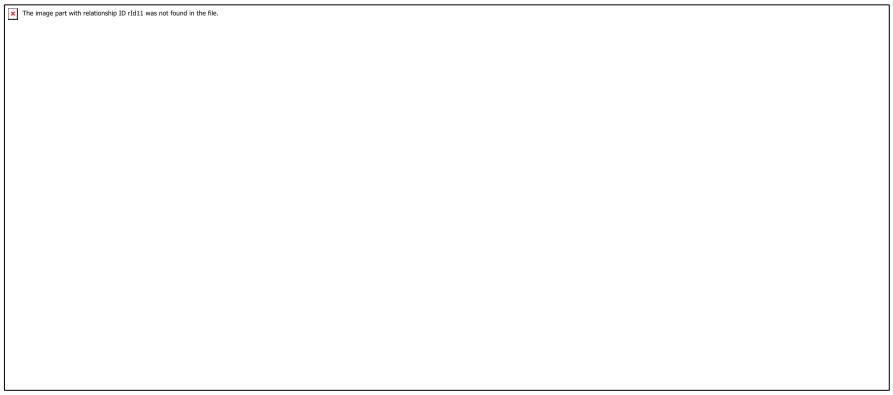

Figure 64: Koha Mobile Device
Source:https://koha-community.org/files/2019/01/koha-community-devices.png

G Sierra Library System

Sierra is an integrated and commercial library system package that provides automated workflows, integrated resource management, and open access to data. It integrates circulation, cataloguing, and acquisition to efficiently automate workflows and gives open data access.

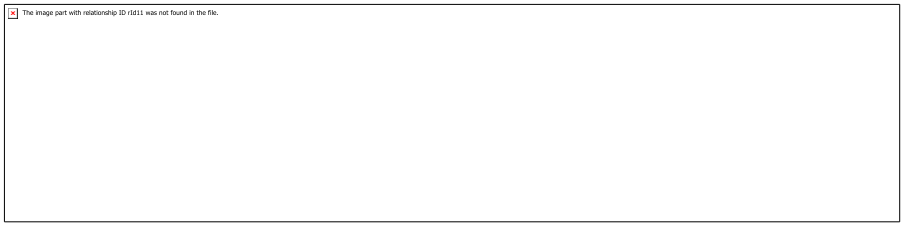

Figure 65: Sierra Log in interface
Source: Innovative Interfaces, Inc (2009). Sierra Essentials Training Manual

Features of Sierra Library System

Features of Sierra library system include the following:

- Sierra integrates eResource management, circulation, categorization, and acquisitions into one easy-to-use interface for daily progress.
- Sierra can customise users' workflow by role and connects libraries with user communities.
- Sierra manages bibliographic records, statistics, orders, vouchers, and lists.
- It promotes check-in/out and holds requests (circulation).
- It can examine and manage electronic journals and databases, including open access.
- It supports effective serials and bindery management.
- It conducts back-office, rapid, and global updates and deletes records.

H SLIM 21

iSLIM Cloud is the best cloud-based library management system that offers remarkable features to cater to the requirements of all kinds of libraries in the 21st century. All that is needed to access the iSLIM Cloud is a web browser and fast, reliable access to the Internet. iSLIM Cloud includes all the features to automate library processes related to Cataloguing, Circulation, Inventory, Reporting and many more.

F

Figure66: SLIM21 Cloud-based Library Management System Source:https://a.fsdn.com/con/app/proj/slim21.s/screenshots/Captura%20de%20pantalla%202022-07-12%20134342.png/1000/auto/1

APPENDIX II

SIERRA LIBRARY AUTOMATION SOFTWARE MODULES

A The Online Public Access Catalogue (OPAC

Figure 67: The Online Public Access Catalogue (OPAC)
Source: Sierra Training Manual (2013)

B Sierra Circulation Module

Welcome to Sierra! You are now in the Circulation function. This is where the majority of your time in Sierra will be spent. From here, you check out items and manage patron records.

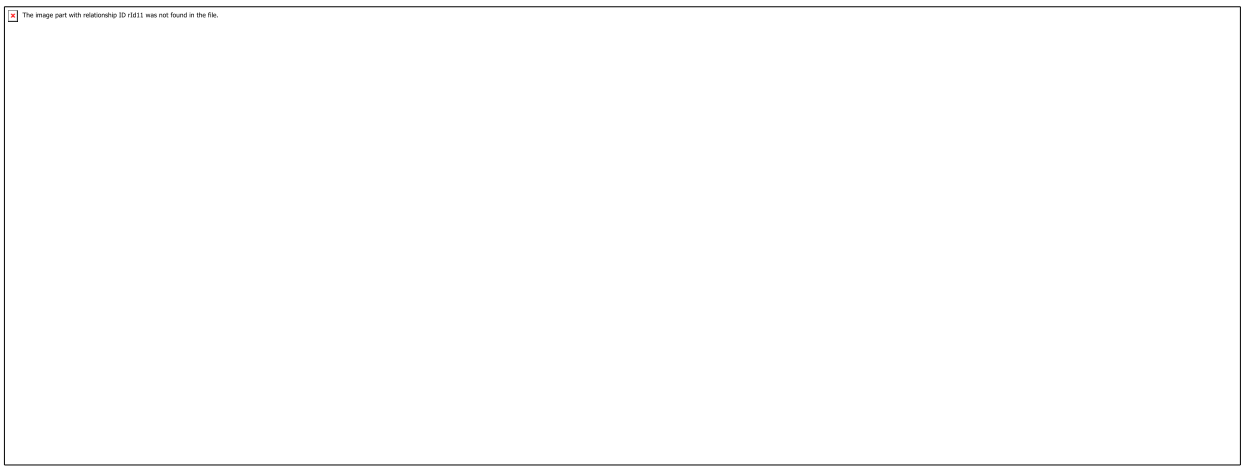

Figure 68: Sierra Circulation Module Interface
Source: Sierra Training Manual (2013)

Sierra Circulation Module allows staff to do the following:

- Check out items
- Check-in items
- Place holds
- Maintain hold queues
- Maintain course reserves lists
- Manage fines and bills
- Perform other Circulation-related functions

C Sierra Serials Module

Figure 69: Serials Module Interface
Source: Sierra Training Manual (2013)

D Sierra Catalogue module

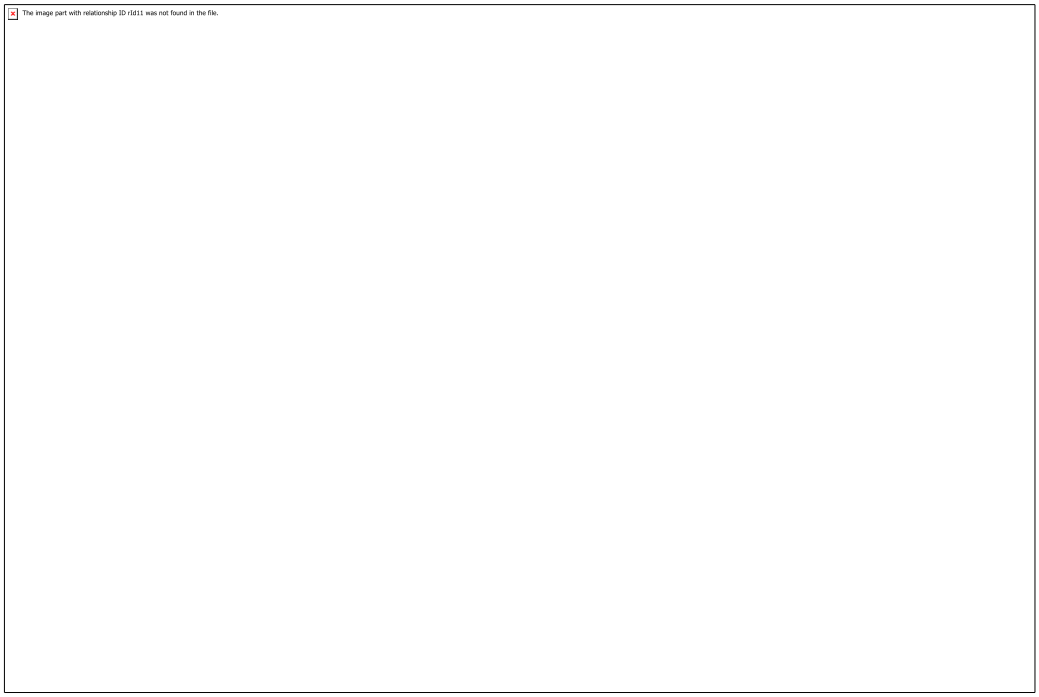

Figure 70: **Catalogue Module Interface**
Source: Sierra Training Manual (2013)

E Sierra Interlibrary loan module

Figure 71: **Interlibrary loan module Interface**
Source: Sierra Training Manual (2013