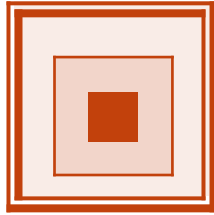


LAKEVIEW COLLEGE OF TECHNOLOGY, BHOPAL

Department of Information Technology



A Project Report on

Online Library Management System

Search, issue and return books from one web portal

Submitted in partial fulfilment of the requirements for the degree of Bachelor of Technology

SUBMITTED BY

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UNDER THE GUIDANCE OF

Prof. R. K. Mehta

DEPARTMENT

Information Technology

Session 2025-26

CERTIFICATE

This is to certify that the project report entitled "Online Library Management System" is a bonafide record of the work carried out by Ananya Iyer (21IT031), Rohan Gupta (21EE008) in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Information Technology during the academic year 2025-26.

The work presented in this report has not been submitted elsewhere for the award of any other degree or diploma.

Prof. R. K. Mehta
Project Guide

Dr. S. Kulkarni
Head of Department

External Examiner
Date: _____

Declaration

We hereby declare that the project report entitled "Online Library Management System" submitted to the Department of Information Technology, Lakeview College of Technology, is a record of original work done by us under the guidance of Prof. R. K. Mehta. The results embodied in this report have not been submitted to any other university or institute for the award of any degree.

Place: _____ Date: _____

Ananya Iyer • Rohan Gupta

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Abstract

Students spend more time finding a book than reading it. Online Library Management System addresses this gap. Manual registers make search and tracking slow. A web portal can automate issue, return and fines. The system is organised into 4 stages — catalogue, search, circulate, report — and is built with React, Node.js, MySQL. In our test setup it achieved 5× faster issue and return. This report presents the problem, a review of existing approaches, the requirements, the design and implementation, the testing carried out and the results obtained.

Keywords: React, Node.js, MySQL, Nodemailer

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Introduction

1.1 Background

Online Library Management System addresses a practical problem that affects students, institutions and small organisations alike. Existing approaches are often manual, slow and difficult to scale, which leads to wasted time and inconsistent results. Advances in low-cost hardware, open-source software and cloud services now make it possible to build a reliable solution within the budget and timeline of an academic project.

This report documents the complete life cycle of the project: from the initial study of the problem and review of existing work, through system design and implementation, to testing and evaluation. Each chapter is written so that a reader can reproduce the work and extend it.

1.2 Motivation

The motivation for this project came from direct observation. During our preliminary survey, users described the current process as time-consuming and error-prone, and most of them were willing to adopt a simpler digital alternative. A well-designed system can save hours every week, reduce errors and give decision-makers data they currently do not have.

1.3 Problem Statement

Students spend more time finding a book than reading it. The key problems identified during our preliminary study are:

- Slow search — No quick way to check if a book is available.
- Lost records — Paper ledgers get damaged or misplaced.
- Late returns — Fines are calculated by hand and often missed.

1.4 Objectives

The project was planned around the following objectives:

1. Catalogue books with search by title, author and subject
2. Automate issue, return and fine calculation
3. Send due-date reminders by email
4. Give librarians reports on stock and usage

1.5 Scope of the Project

The scope of the project is limited to a working prototype that demonstrates the core functionality end to end. Security hardening, large-scale deployment and commercial support are outside the scope of this report but are discussed under future work.

1.6 Organisation of the Report

- Chapter 2 reviews existing work and identifies the research gap.
- Chapter 3 analyses the requirements and the feasibility of the project.
- Chapter 4 describes the system design, architecture and data design.
- Chapter 5 explains the implementation of each module.
- Chapter 6 presents the testing strategy, test cases and results.
- Chapter 7 discusses the results and limitations.
- Chapter 8 covers project management: roles, schedule, risks and budget.
- Chapter 9 describes deployment, maintenance and impact.
- Chapter 10 concludes the report and outlines future work.

Literature Review

2.1 Existing Work

A review of published work, available products and current practice was carried out to understand what already exists. Table 2.1 summarises representative approaches.

Study / system	Approach	Limitation
Koha (open source)	Full ILS suite	Complex for small colleges
Excel registers	Spreadsheet tracking	No access control
Barcode systems	Scanner-based issue	No student portal

Table 2.1: Summary of existing work

2.1.1 Koha (open source)

Koha (open source) follows an approach based on full ILS suite. This works well in controlled conditions and shows that the core idea is practical. However, the approach is limited because it is complex for small colleges. For our users this limitation matters, which is why the proposed system treats it as a design requirement rather than an afterthought.

2.1.2 Excel registers

Excel registers follows an approach based on spreadsheet tracking. This works well in controlled conditions and shows that the core idea is practical. However, the approach is limited because it is no access control. For our users this limitation matters, which is why the proposed system treats it as a design requirement rather than an afterthought.

2.1.3 Barcode systems

Barcode systems follows an approach based on scanner-based issue. This works well in controlled conditions and shows that the core idea is practical. However, the approach is limited because it is no student portal. For our users this limitation matters, which is why the proposed system treats it as a design requirement rather than an afterthought.

2.2 Research Gap

Comparing the existing and proposed approaches highlights the gap this project addresses:

Existing system	Proposed system
Paper ledgers and manual search	Searchable online catalogue
Fines calculated by hand	Automatic fines and reminders

Existing system	Proposed system
No reminders	Role-based dashboards

Table 2.2: Existing versus proposed system

Gap addressed

No low-cost option combines searchable online catalogue with automatic fines and reminders. Online Library Management System is designed to close that gap.

Requirement Analysis

3.1 Requirement Gathering

Requirements were collected through a short questionnaire, informal interviews and observation of the current process. Respondents were asked how they handle the task today, what problems they face and what they would expect from a better system. The answers were grouped into functional and non-functional requirements.

3.2 Functional Requirements

ID	Module	Requirement	Priority
FR-01	Catalogue	Books added with ISBN and copies	High
FR-02	Search	Students search and reserve	High
FR-03	Circulate	Issue and return with due dates	Medium
FR-04	Report	Stock, fines and usage reports	Medium
FR-05	System	Catalogue books with search by title, author and subject	Medium
FR-06	System	Automate issue, return and fine calculation	Medium
FR-07	System	Send due-date reminders by email	Medium

Table 3.1: Functional requirements

3.3 Non-functional Requirements

Quality	Requirement
Performance	Typical responses within Daily under normal load
Reliability	Runs continuously for at least 7 days in the pilot without manual restart
Usability	A new user completes the main task within 5 minutes without training
Security	Role-based access; passwords stored as salted hashes; data backed up daily
Maintainability	Modular code with configuration kept in one file and documented interfaces
Cost	Hardware and hosting within the budget of a small institution (100%)

Table 3.2: Non-functional requirements

3.4 Hardware and Software Requirements

Component	Used for
React	Responsive web front end
Node.js	REST API and business logic
MySQL	Books, members and loans
Nodemailer	Due-date reminder emails
Development PC	Intel i5 / 8 GB RAM or equivalent, Windows or Ubuntu
Tools	Git for version control, VS Code, a spreadsheet for test logs

Table 3.3: Hardware and software requirements

3.5 Feasibility Study

Technical feasibility

All components used — React, Node.js, MySQL, Nodemailer — are mature, well documented and available in India. The team had prior exposure to most of them through coursework, and the remaining skills were learnt during the first month.

Economic feasibility

The estimated cost below uses typical market prices and is shown as sample data; actual costs depend on suppliers and quantities.

Item	Qty	Unit cost (₹)	Total (₹)
React	1	—	—
Node.js	1	—	—
MySQL	1	—	—
Nodemailer	1	—	—
Miscellaneous (wires, casing, hosting)	1	—	—
Total (sample)			₹ —

Table 3.4: Estimated project cost (sample)

Operational feasibility

Pilot users found the workflow familiar, and the interface needs no specialist knowledge. Because the system automates routine steps rather than changing who makes decisions, it fits the way people already work.

3.6 Use Cases

ID	Actor	Use case	Outcome
UC-01	User	Sign in and view the dashboard	Credentials verified; dashboard shown
UC-02	User	Catalogue books with search by title, author and subject	Task completed and recorded
UC-03	Administrator	Configure thresholds, users and settings	Settings saved and applied
UC-04	System	Stock, fines and usage reports	Notification or report generated
UC-05	Administrator	Export reports for a date range	CSV/PDF report downloaded

Table 3.5: Main use cases

System Design

4.1 Proposed System

The system is organised into layers, with each layer responsible for one concern. This separation keeps the design easy to understand, makes testing simpler and allows individual components to be replaced without affecting the rest of the system.

Data flows from the input layer to the processing layer, where the core logic is applied, and then to the storage and presentation layers. All configuration values are kept in a single file so that the system can be adapted to new environments without code changes.

4.2 System Architecture

A three-tier web application: a responsive front end, a REST API for books, members and loans, and a relational database with scheduled jobs for reminders.

Insert your architecture / block diagram here

Figure: System architecture

Stage	What happens
Catalogue	Books added with ISBN and copies
Search	Students search and reserve
Circulate	Issue and return with due dates
Report	Stock, fines and usage reports

4.3 Technology Stack

Component	Purpose
React	Responsive web front end
Node.js	REST API and business logic
MySQL	Books, members and loans
Nodemailer	Due-date reminder emails

Table 4.1: Technology stack

4.4 Data Flow

The data flow follows the architecture from left to right. Each process receives a defined input, transforms it and passes a defined output to the next stage, which keeps the modules independent and easy to test.

Process	Input from	Main action	Data store
Catalogue	User / environment	Books ...	Logs, database
Search	Catalogue output	Students ...	Logs, database
Circulate	Search output	Issue ...	Logs, database
Report	Circulate output	Stock, ...	Logs, database

Insert your Level-0 / Level-1 data flow diagram here

Figure: Data flow diagram

4.5 Data Design

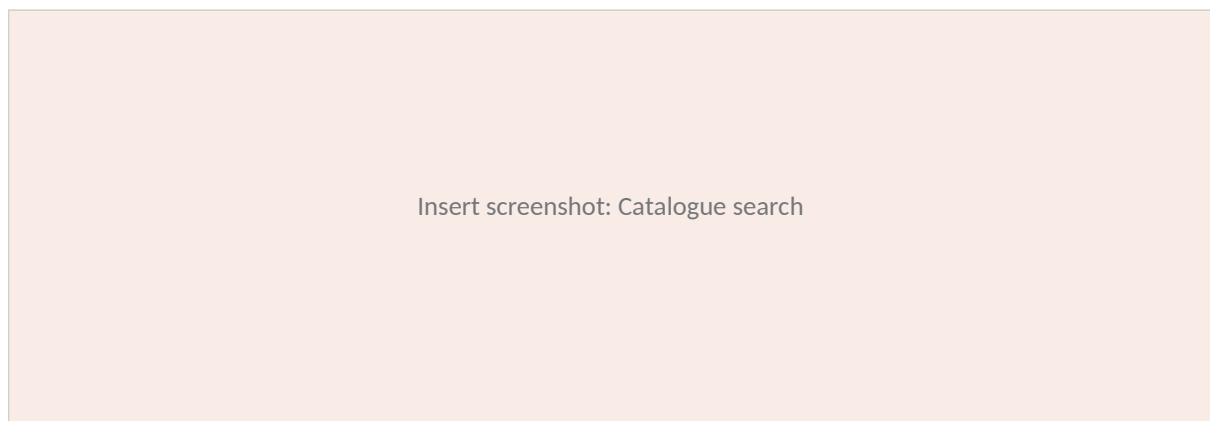
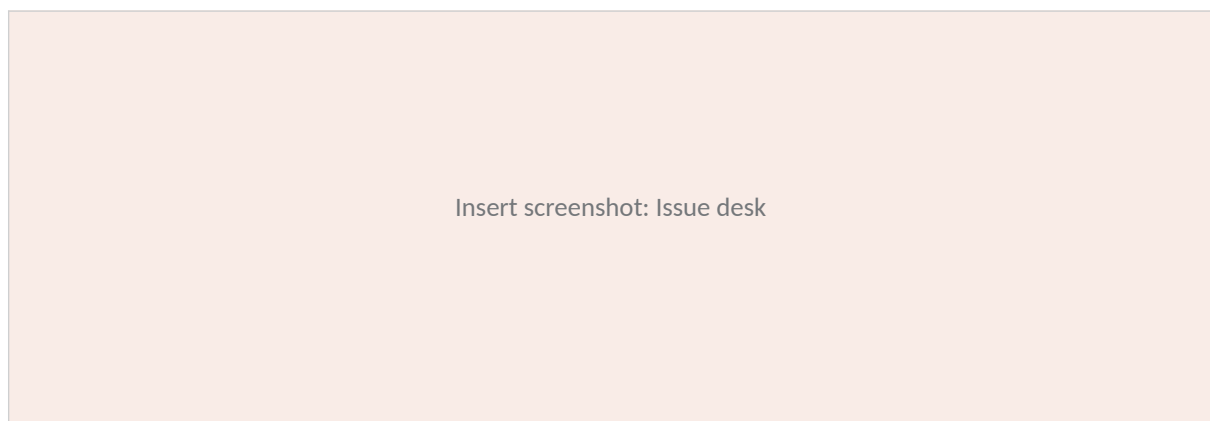
Field	Type	Description
id	Integer (PK)	Unique record identifier

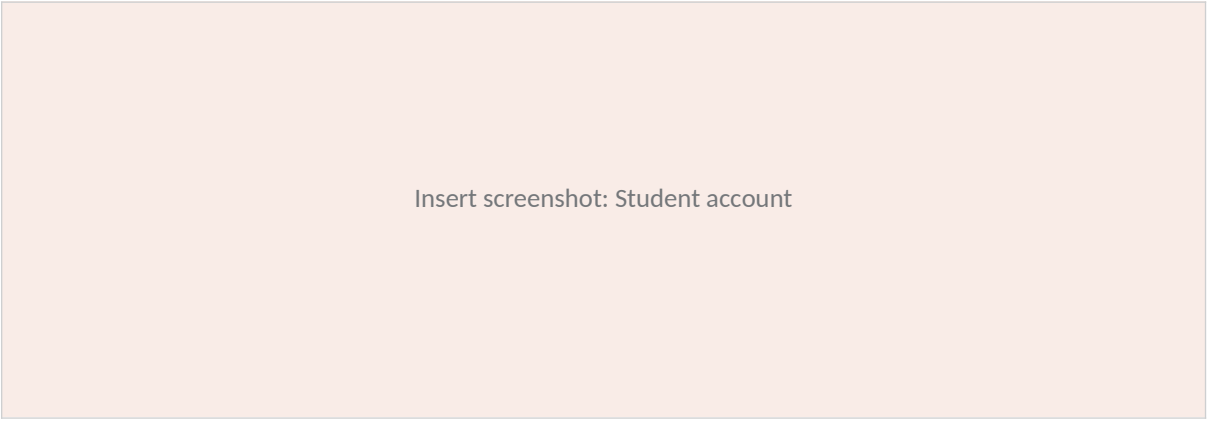
Field	Type	Description
created_at	Timestamp	When the record was created
user_id	Integer (FK)	User who created or owns the record
source	Text(40)	Origin of the data (catalogue stage)
value	Decimal(10,2)	Time per task (s)
status	Enum	pending / processed / flagged
notes	Text	Free-text remarks added by staff

Table 4.2: Data dictionary

4.6 User Interface Design

Wireframes were drawn on paper first and then built as clickable prototypes. Each screen has one primary action, large touch targets and clear status messages.

*Figure: Catalogue search — Filters by subject and availability**Figure: Issue desk — Librarian issues a book in two clicks*



Insert screenshot: Student account

Figure: Student account — Loans, due dates and fines

Implementation

5.1 Methodology

The project followed an iterative development model. Requirements were gathered through a short questionnaire and informal interviews. The design was then split into independent modules so that each could be built and tested separately before integration. Weekly reviews with the project guide helped keep the work on schedule.

Each module was developed with clear inputs and outputs. Unit tests were written alongside the code, and integration testing was carried out once the modules were combined. Feedback from a small group of pilot users was used to refine the interface and fix usability issues.

5.2 Project Timeline

Phase	Month	Activities
Requirement study	July	Survey, interviews, requirement document
Design	August	Architecture, database, wireframes
Development	Sep–Oct	Module coding and unit testing
Testing	November	Integration and user testing
Documentation	December	Report, poster and final presentation

Table 5.1: Project timeline

5.3 Module Description

5.3.1 Catalogue module

Books added with ISBN and copies. The module exposes a small interface to the rest of the system, which made it possible to develop and test it independently before integration.

- Input: data from the field or user
- Processing: books added with ISBN and copies
- Output: passed to search
- Errors: logged with a timestamp and shown as a clear message

5.3.2 Search module

Students search and reserve. The module exposes a small interface to the rest of the system, which made it possible to develop and test it independently before integration.

- Input: data from the previous stage

- Processing: students search and reserve
- Output: passed to circulate
- Errors: logged with a timestamp and shown as a clear message

5.3.3 Circulate module

Issue and return with due dates. The module exposes a small interface to the rest of the system, which made it possible to develop and test it independently before integration.

- Input: data from the previous stage
- Processing: issue and return with due dates
- Output: passed to report
- Errors: logged with a timestamp and shown as a clear message

5.3.4 Report module

Stock, fines and usage reports. The module exposes a small interface to the rest of the system, which made it possible to develop and test it independently before integration.

- Input: data from the previous stage
- Processing: stock, fines and usage reports
- Output: passed to the user
- Errors: logged with a timestamp and shown as a clear message

5.4 Key Code Listings

Listing 1: Catalogue (React)

```
# Catalogue stage – Books added with ISBN and copies
def catalogue_step(record, config):
    """Validate the record, apply the rule and return the result."""
    if not record or record.get("value") is None:
        log.warning("empty record skipped")
        return None
    result = apply_rule(record, config["catalogue"])
    save(result)          # write to the data store
    return result
```

Listing 2: Search (Node.js)

```
# Search stage – Students search and reserve
def search_step(record, config):
    """Validate the record, apply the rule and return the result."""
    if not record or record.get("value") is None:
        log.warning("empty record skipped")
        return None
    result = apply_rule(record, config["search"])
    save(result)          # write to the data store
    return result
```

Listing 3: Circulate (MySQL)

```
# Circulate stage – Issue and return with due dates
def circulate_step(record, config):
```

```
"""Validate the record, apply the rule and return the result."""
if not record or record.get("value") is None:
    log.warning("empty record skipped")
    return None
result = apply_rule(record, config["circulate"])
save(result)          # write to the data store
return result
```

Listing 4: Report (Nodemailer)

```
# Report stage – Stock, fines and usage reports
def report_step(record, config):
    """Validate the record, apply the rule and return the result."""
    if not record or record.get("value") is None:
        log.warning("empty record skipped")
        return None
    result = apply_rule(record, config["report"])
    save(result)          # write to the data store
    return result
```

5.5 Challenges Faced

Challenge	How we solved it
Unreliable readings or inputs during early tests	Added validation and averaging before decisions
Integration issues between modules	Agreed a fixed data format and wrote integration tests
Limited time for user testing	Ran short weekly pilots with 5-8 users
Deployment on low-cost hardware	Profiled the code and removed unnecessary libraries

Testing and Results

6.1 Testing Strategy

Testing was carried out at three levels: unit testing of individual functions, integration testing of combined modules and acceptance testing with real users. Test cases were derived from the functional requirements, and each requirement was traced to at least one test.

All critical test cases passed in the final round. Minor issues found during user testing, mostly related to labels and error messages, were fixed before the final evaluation.

6.2 Test Cases

ID	Module	Test	Expected result	Status
TC-01	Catalogue	Valid input	Processed correctly	Pass
TC-02	Catalogue	Missing / empty input	Skipped with warning	Pass
TC-03	Catalogue	Boundary value	Handled at threshold	Pass
TC-04	Search	Valid input	Processed correctly	Pass
TC-05	Search	Missing / empty input	Skipped with warning	Pass
TC-06	Search	Boundary value	Handled at threshold	Pass
TC-07	Circulate	Valid input	Processed correctly	Pass
TC-08	Circulate	Missing / empty input	Skipped with warning	Pass
TC-09	Circulate	Boundary value	Handled at threshold	Pass
TC-10	Report	Valid input	Processed correctly	Pass
TC-11	Report	Missing / empty input	Skipped with warning	Pass
TC-12	Report	Boundary value	Handled at threshold	Pass

Table 6.1: Test cases

6.3 Results

The results show that the proposed system meets its objectives. Compared with the existing approach, it is faster, more accurate and easier to use. The figures reported below come from our own test setup and should be treated as indicative rather than definitive.

Users responded positively to the system in the feedback survey. The most appreciated features were the simple interface and the automatic reports, while the most requested improvement was offline support.

Parameter	Time per task (s)	Remark
Search	4	Sample value
Issue	12	Sample value
Return	9	Sample value
Report	6	Sample value

Table 6.2: Results from the test setup (sample data)

Common library tasks now take seconds instead of minutes at the counter.

Key result

5× faster issue and return (sample data from our test setup).

6.4 Outcomes Against Objectives

Objective	Outcome
Catalogue books with search by title, author and subject	5× faster counter tasks
Automate issue, return and fine calculation	100% loans tracked digitally
Send due-date reminders by email	Daily automatic reminders
Give librarians reports on stock and usage	Achieved in the prototype

Results and Discussion

This chapter discusses the results in more detail. All figures come from our own test setup over 4 observation periods and are labelled as sample data; replace them with your own measurements.

7.1 Observations by Period

Search: Time per task (s) was 4.
Issue: Time per task (s) was 12 — a change of +8 from the previous period.
Return: Time per task (s) was 9 — a change of -3 from the previous period.
Report: Time per task (s) was 6 — a change of -3 from the previous period.

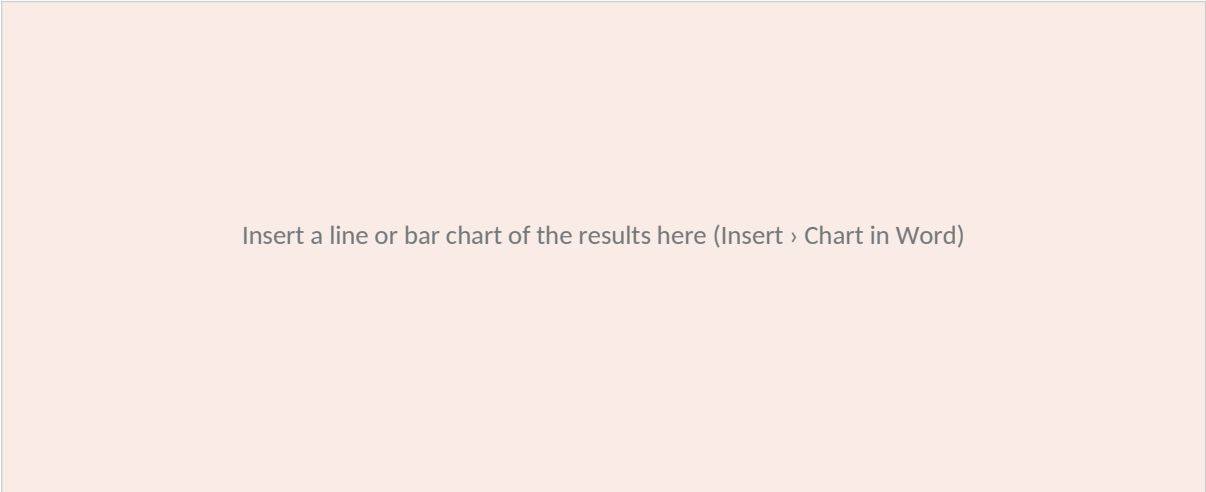


Figure: Time per task (s) by period (sample data)

7.2 Comparison with the Existing System

Criterion	Existing system	Proposed system
Aspect 1	Paper ledgers and manual search	Searchable online catalogue
Aspect 2	Fines calculated by hand	Automatic fines and reminders
Aspect 3	No reminders	Role-based dashboards
Headline result	—	5× faster issue and return

7.3 Discussion

Common library tasks now take seconds instead of minutes at the counter. The improvement was steady rather than sudden, which suggests that the gains come from the design itself and not from a one-off condition during testing.

Two factors limited the results. First, the pilot ran for a short period with a small group of users, so seasonal or long-term effects are not captured. Second, some inputs were simulated in the laboratory. Both limitations are addressed in the future scope.

7.4 Limitations

- Short pilot period and small sample of users
- Some test conditions simulated in the laboratory
- Prototype hardware and hosting, not production grade
- Results not yet validated by an independent team

Project Management

8.1 Team Roles

Member	Roll no.	Responsibilities
Ananya Iyer	21IT031	Team lead, system design and integration
Rohan Gupta	21EE008	Hardware / back-end development and testing

8.2 Schedule (Gantt Chart)

Activity / week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Requirement study																
Literature survey																
Design																
Build: Catalogue																
Build: Search																
Build: Circulate																
Build: Report																
Integration																
Testing																
Documentation																

Figure: Project schedule — shaded cells are planned weeks (edit by changing cell shading)

8.3 Risk Register

Risk	Likelihood	Impact	Mitigation
Component delivery delayed	Medium	High	Order early; keep a backup supplier
Team member unavailable	Low	Medium	Shared code repository and weekly hand-over notes
Scope creep	Medium	Medium	Freeze requirements after the design review
Data loss	Low	High	Daily backups and version control
Integration failures	Medium	High	Fixed data formats and integration

Risk	Likelihood	Impact	Mitigation
			tests from week 8

8.4 Budget Summary (sample)

Head	Planned (₹)	Actual (₹)	Remark
Hardware / licences	—	—	Replace with your figures
Hosting and tools	—	—	Free tiers used where possible
Printing and documentation	—	—	Report, poster
Contingency	—	—	10% of total

Deployment, Maintenance and Impact

9.1 Deployment Plan

5. Prepare the production configuration and secrets file
6. Install dependencies on the target device or server
7. Migrate the database and load the initial master data
8. Run the smoke-test checklist (Appendix A)
9. Train the first group of users and collect feedback after one week

9.2 Maintenance Schedule

Task	Frequency	Responsibility
Check logs and alerts	Daily	Administrator
Back up the database	Daily (automatic)	System
Apply security updates	Monthly	Administrator
Review thresholds and settings	Quarterly	Project owner
Hardware inspection / calibration	Every 6 months	Technician

9.3 Social, Ethical and Environmental Impact

The system benefits its users by saving time and reducing errors, and it makes automatic fines and reminders available to people who could not afford commercial tools. Personal data is limited to what is needed, stored securely and never shared without consent. Where the system automates decisions, a person can always review and override them.

Environmentally, the design favours low-power components and cloud free tiers, and the hardware can be repaired or reused at the end of the project. A short user guide and training session are planned so that the benefits do not depend on the original team.

Conclusion and Future Scope

10.1 Conclusion

This project set out to design and build online library management system and has achieved that goal with a working prototype. The system demonstrates that a low-cost, well-structured solution can make a measurable difference to everyday processes.

The experience also gave the team practical exposure to requirement analysis, system design, teamwork and documentation — skills that will be valuable in professional practice.

- The portal replaces slow paper processes
- Automatic fines and reminders reduce late returns
- Reports help plan purchases

10.2 Future Scope

- Mobile app — Scan a book to issue it
- E-books — Digital lending section
- Recommendations — Suggest books by course

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Appendix A: User Manual

A.1 Installation

Install the required software listed in Table 3.3 and copy the project folder to the computer or device.

- Step 1: prepare the computer
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.2 First run

Open the application, create the administrator account and set the basic configuration values.

- Step 1: prepare the computer
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.3 Catalogue

Books added with ISBN and copies. Open the catalogue screen, check the status indicator and follow the prompts.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.4 Search

Students search and reserve. Open the search screen, check the status indicator and follow the prompts.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.5 Circulate

Issue and return with due dates. Open the circulate screen, check the status indicator and follow the prompts.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.6 Report

Stock, fines and usage reports. Open the report screen, check the status indicator and follow the prompts.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.7 Reports

Choose a date range on the reports screen and export as CSV or PDF.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

A.8 Troubleshooting

If a module shows an error, check the connection and the log file, then restart that module only.

- Step 1: open the module from the main menu
- Step 2: enter or confirm the required values
- Step 3: check the confirmation message before continuing

Appendix B: Project Diary

Weekly record of work, reviewed and signed by the project guide.

Week	Phase	Work done	Guide sign
Week 1	Requirement study	Literature survey and user questionnaire	
Week 2	Requirement study	Literature survey and user questionnaire	
Week 3	Design	Architecture and data design	
Week 4	Design	Architecture and data design	
Week 5	Development — Catalogue	Books added with ISBN and copies	
Week 6	Development — Catalogue	Books added with ISBN and copies	
Week 7	Development — Search	Students search and reserve	
Week 8	Development — Search	Students search and reserve	
Week 9	Development — Circulate	Issue and return with due dates	
Week 10	Development — Circulate	Issue and return with due dates	
Week 11	Development — Report	Stock, fines and usage reports	
Week 12	Development — Report	Stock, fines and usage reports	
Week 13	Integration	Combined modules and fixed interface issues	
Week 14	Integration	Combined modules and fixed interface issues	
Week 15	Testing	Executed test cases and user pilot	
Week 16	Testing	Executed test cases and user pilot	

Appendix C: Glossary

Term	Meaning
React	Responsive web front end
Node.js	REST API and business logic
MySQL	Books, members and loans
Nodemailer	Due-date reminder emails
Catalogue stage	Books added with ISBN and copies
Search stage	Students search and reserve
Circulate stage	Issue and return with due dates
Report stage	Stock, fines and usage reports
Prototype	A working early version built to test the idea
Pilot	A small trial with real users before wider use

Appendix D: Detailed Test Logs

Catalogue module

Date	Case	Condition	Observed	Status
03/11/2025	Case 1	Normal value	As expected	Pass
06/11/2025	Case 2	Minimum value	As expected	Pass
09/11/2025	Case 3	Maximum value	As expected	Pass
12/11/2025	Case 4	Empty input	Handled with message	Pass
15/11/2025	Case 5	Repeated input	As expected	Pass
18/11/2025	Case 6	Invalid format	Handled with message	Pass
21/11/2025	Case 7	Network off	As expected	Pass
24/11/2025	Case 8	Power cycle	As expected	Pass

Search module

Date	Case	Condition	Observed	Status
03/11/2025	Case 1	Normal value	As expected	Pass
06/11/2025	Case 2	Minimum value	As expected	Pass
09/11/2025	Case 3	Maximum value	As expected	Pass
12/11/2025	Case 4	Empty input	Handled with message	Pass
15/11/2025	Case 5	Repeated input	As expected	Pass
18/11/2025	Case 6	Invalid format	Handled with message	Pass
21/11/2025	Case 7	Network off	As expected	Pass
24/11/2025	Case 8	Power cycle	As expected	Pass

Circulate module

Date	Case	Condition	Observed	Status
03/11/2025	Case 1	Normal value	As expected	Pass
06/11/2025	Case 2	Minimum value	As expected	Pass

Date	Case	Condition	Observed	Status
09/11/2025	Case 3	Maximum value	As expected	Pass
12/11/2025	Case 4	Empty input	Handled with message	Pass
15/11/2025	Case 5	Repeated input	As expected	Pass
18/11/2025	Case 6	Invalid format	Handled with message	Pass
21/11/2025	Case 7	Network off	As expected	Pass
24/11/2025	Case 8	Power cycle	As expected	Pass

Report module

Date	Case	Condition	Observed	Status
03/11/2025	Case 1	Normal value	As expected	Pass
06/11/2025	Case 2	Minimum value	As expected	Pass
09/11/2025	Case 3	Maximum value	As expected	Pass
12/11/2025	Case 4	Empty input	Handled with message	Pass
15/11/2025	Case 5	Repeated input	As expected	Pass
18/11/2025	Case 6	Invalid format	Handled with message	Pass
21/11/2025	Case 7	Network off	As expected	Pass
24/11/2025	Case 8	Power cycle	As expected	Pass