

NUGAWELA CENTRAL COLLEGE
LIBRARY MANAGEMENT SYSTEM FOR SCHOOL

DIPLOMA IN SOFTWARE ENGINEERING

21.1 – PART TIME

FINAL PROJECT

2023

Name	Index Number
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D.G.G.S.Senavirathne:	KADSE21.1P-013
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NATIONAL INSTITUTE OF BUSINESS MANAGEMENT

Kandy Reginal Center, No: 02, Asgiriya Road, Kandy

LIBRARY MANAGEMENT SYSTEM

Diploma in Software Engineering

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Supervisor : Mrs. Inoka Abhayasinghe

19 – 05 – 2023

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Declaration

“I certify that this project does not incorporate without acknowledgement, any materials previously submitted for a Diploma in any institution and do the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my project report, if accepted, to be made available for Photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations.”

Project : Library Management System for School

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D.G.R.N.Munasinghe	KADSE21.1P-007	
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Supervisor : Mrs. Inoka Abhayasinghe

Date : 19 – 05 – 2023

Signature :

Acknowledgement

The successful completion of our Diploma final project required a lot of guidance and assistance from many people and we would like to extend our sincere thanks to all of them.

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We would like to thank our parents and friends for being supportive in the process.

Project Summary

The proposed solution School Library Management System is the solution to overcome the problems of the manual systems drawbacks. Under chapter introduction the project background describes about the background of the project and weaknesses of the existing system is explained. The solution for the problem domain is mentioned in the proposed solution section. The expected outcome part explains the output of the system that is expected to be delivered to the client.

The analysis section describes how the problem was analyzed. With the use of following diagrams to present the outcomes of the analysis.

- Data Flow Diagrams
- ER Diagrams
- Use Case Diagrams
- Interfaces
- UML Activity Diagrams
- UML Sequence Diagrams
- UML Class Diagrams

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Chapter 01 : Introduction

1.1. Project Background

This is a project for Library Management System for a School, which mainly focus to manage the movement of books and maintain records of the members are the large-scale processes at a Library. The project “Library Management System” is develop using C# Language.

“Library Management System” is a windows application written for 64-bit Windows operating systems, design to help users and admins to maintain and organize library. My Software is easy to use for both beginners and advanced users. It features a familiar and well thought-out, an attractive user interface, combine with strong searching Insertion and reporting capabilities. The report generation facility of library system helps to get a good idea of which the books

borrow by the members, makes users possible to generate report’s hard copy.

1.2. Problems related to the manual system

- Consuming more Time.

System being depend on people it takes time due to various factors like human error.

- There is a labor cost and training

To carry out the functions of the manual system it needs labors and those labors need to be trained in accordance to use the system.

- Lack of security.

The manual system data is stored in hard copies which has high risk of data loss and violation.

- Lack of storage.

- Data duplication.

- Too much paper wastage.

- Spends a lot of their time on mechanical, clerical tasks rather than liaising with library visitors.

- Need of lot of space to keep the data.

- Unavailability of Information.

- Calculation errors.

- Unclear handwriting.

- Often the books are lost, and the librarian is not aware of this.

- No proper records for workers, members, and books transaction.

- Not accurate and efficient.

- The system is not centralized.

- Failure to know the available books at the library immediately.

1.3. Aims and Objectives

1.3.1. Aims

The aim of this project is to identify the drawbacks of the existing system and to provide a solution to overcome it and help the organization improve their performance by managing tasks being a user-friendly system which lets the user to use functions of the application effectively and have stored data for analytics.

1.3.2. Objectives

- To have a user-friendly interface.
- Store entered data in the database.
- Save cost.
- Save time.

1.4. Proposed Solution

This “Library Management System” is developed for provide the Teachers / Students of the School Library and staff with books information, viewing available books and many other facilities. It tracks the records of the number of books in the library, how many books are issued, or how many books have been returned or renewed or late fine charges, etc. You can find books in an instant, issue/reissue books quickly, and manage all the data efficiently and orderly using this system.

This system expects the flexibility of the library staff as well as the members.

1.5. Expected Outcome

This software is developed to manage all the functions of a library. It helps librarian to maintain the database of new books and the books that are borrowed by members along with their due dates. This system completely automates all the school library's activities. The best way to maintain, organize, and handle countless books systematically is to implement a library management system software. The purpose of a library management system is to provide instant and accurate data regarding any type of book, thereby saving a lot of time and effort.

Chapter 02 : Analysis

2.1. Project Schedule

Task Name	2023 January Weeks					2023 February Weeks					2023 March Weeks					2023 April Weeks			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Planning																			
Analysis																			
Research																			
Design																			
Data entering																			
Coding																			
Testing																			
Implementation																			
Maintenance																			

2.2. Information Gathering Techniques

2.2.1. Observation

The skill to observe is one that analysts must develop. To achieve his goal, the analysts must notice the appropriate information, choose the right person, and look in the proper spot. He should be a skilled observer and have a clear view of how each location works and how work flows between them.

2.2.2. Interviewing

Interviews with users are essential in designing excellent software. Without knowing the user's expectations and goals, we must also grasp the perspectives of all interviewees in order to reply effectively and assess their views. Listening, like a good analyst, is a characteristic that allows a great analyst to get a higher value during an interview than a mediocre analyst.

2.3. System Requirements

2.3.1. Functional Requirements

- Only authentic admins and users can access to the system.
- Only the admin and user can provide the information related to the library.
- User can:
 - Get information regarding books.
 - Search for required books from database.
- Admin can:
 - Add new book to the database.
 - Add new user to the database.
 - Update, Delete books information at the Database.
 - Update, Delete user information at the Database.
 - Add, Delete fine information at the Database.

- Enter data of issued book to the Database.
- Enter information of return books.
- Calculate fines.
- Generate management reports.

2.3.2. Non-Functional Requirements

- Performance – System can perform desired tasks in reasonable unit of time.
- Security - The system would provide access to only authentic admins and users.
- Ease of use – User friendly System and provide Graphical User Interface (GUI).
- Maintainability - Ease of maintain and extend.
- Availability - The system is available 100% for the admin and user.

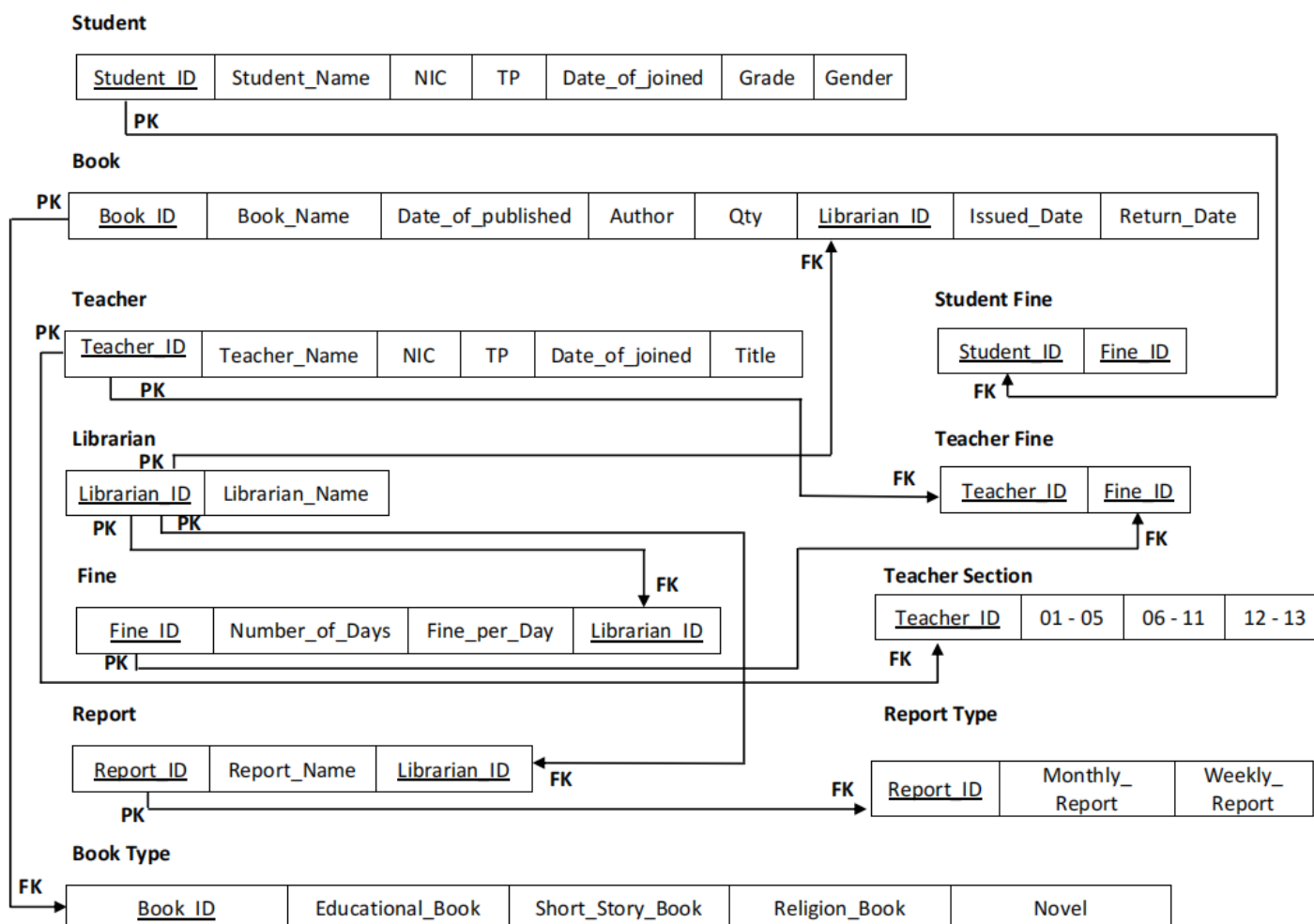
Chapter 03 : Design

3.1. ER Diagram

Assumptions

- 1 : 1 - Library : Librarian
The library has one Librarian.
- 1 : m - Library : Student
They are many students register at the library.
- 1 : m - Library : Teacher
They are many teachers register at the library.
- 1 : m - Library : Book
They are many books at the library.
- 1 : m - Librarian : Book
The librarian issues many books.
- 1 : m - Librarian : Fine
The librarian issues many fines.
- 1 : m - Librarian : Report
The librarian issues many reports.
- m : n - Student : Fine
Students pay fines.
- m : n - Teacher : Fine
Teachers pay fines.

3.2. Schema Diagram



Normalization

01st NF

Student (Student_ID , Student_Name , NIC , TP , Date_of_joined , Grade , Gender)

Book (Book_ID , Book_Name , Date_of_published , Author , Qty , Librarian_ID , Issued_Date , Return_Date)

Teacher (Teacher_ID , Teacher_Name , NIC , TP , Date_of_joined , Title)

Librarian (Librarian_ID , Librarian_Name)

Fine (Fine_ID , Number_of_Days , Fine_per_Day , Librarian_ID)

Report (Report_ID , Report_Name , Librarian_ID)

02nd NF

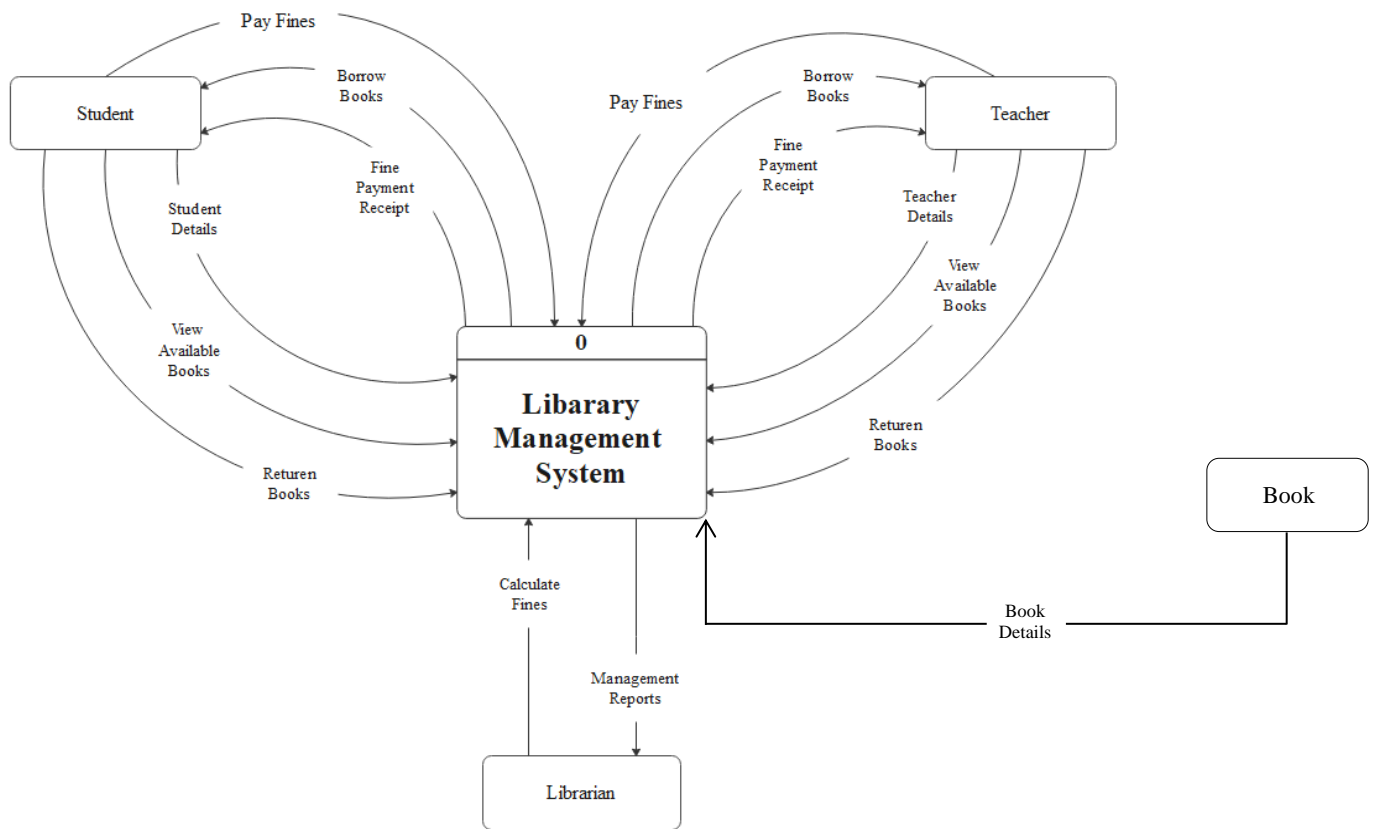
Student (Student_ID , Student_Name , NIC , TP , Date_of_joined , Grade , Gender)

Teacher (Teacher_ID , Teacher_Name , NIC , TP , Date_of_joined , Title)

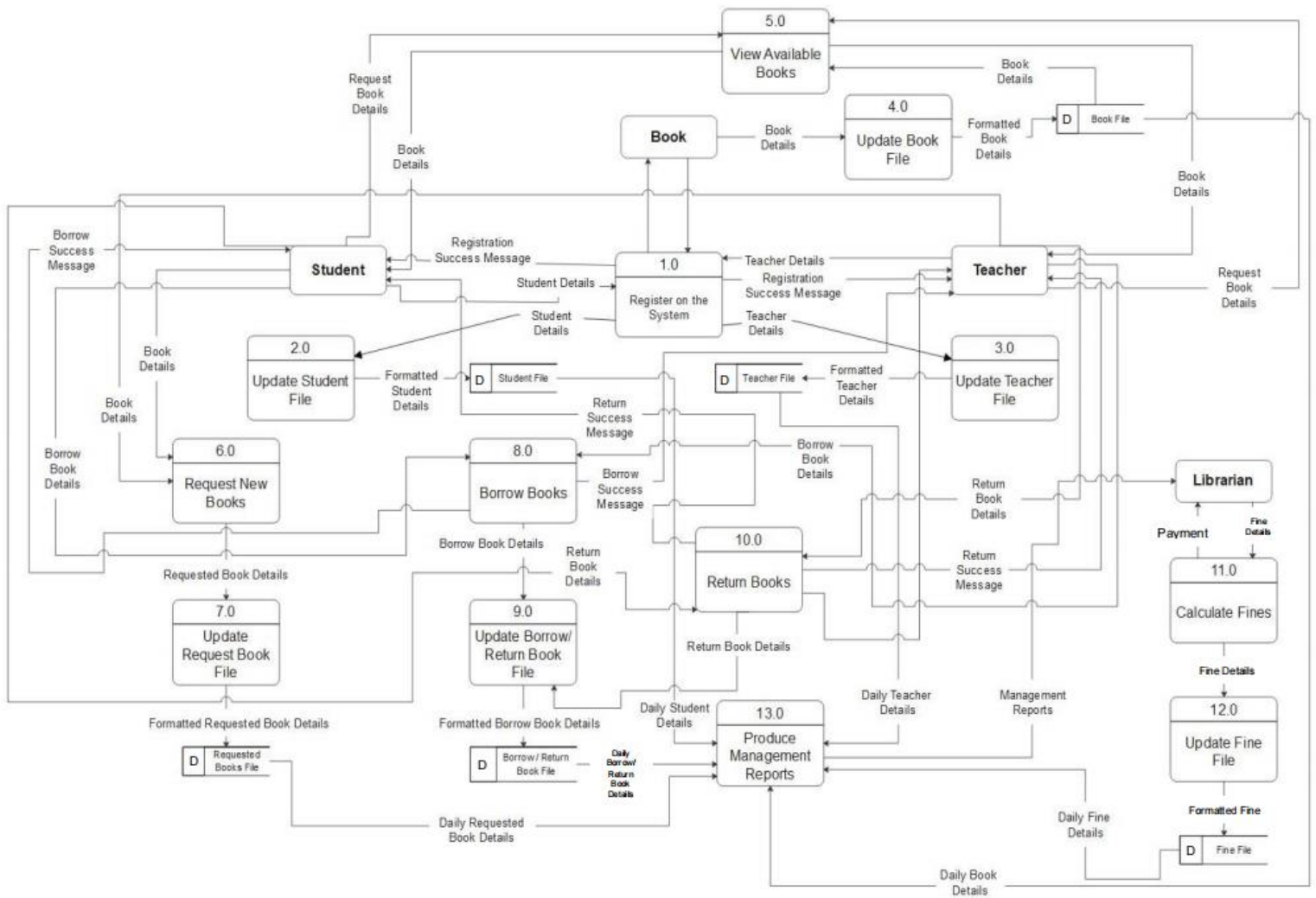
Book (Book_ID , Book_Name , Date_of_published , Author , Qty)

Book 2 (Book_ID , Librarian_ID , Issued_Date , Return_Date)

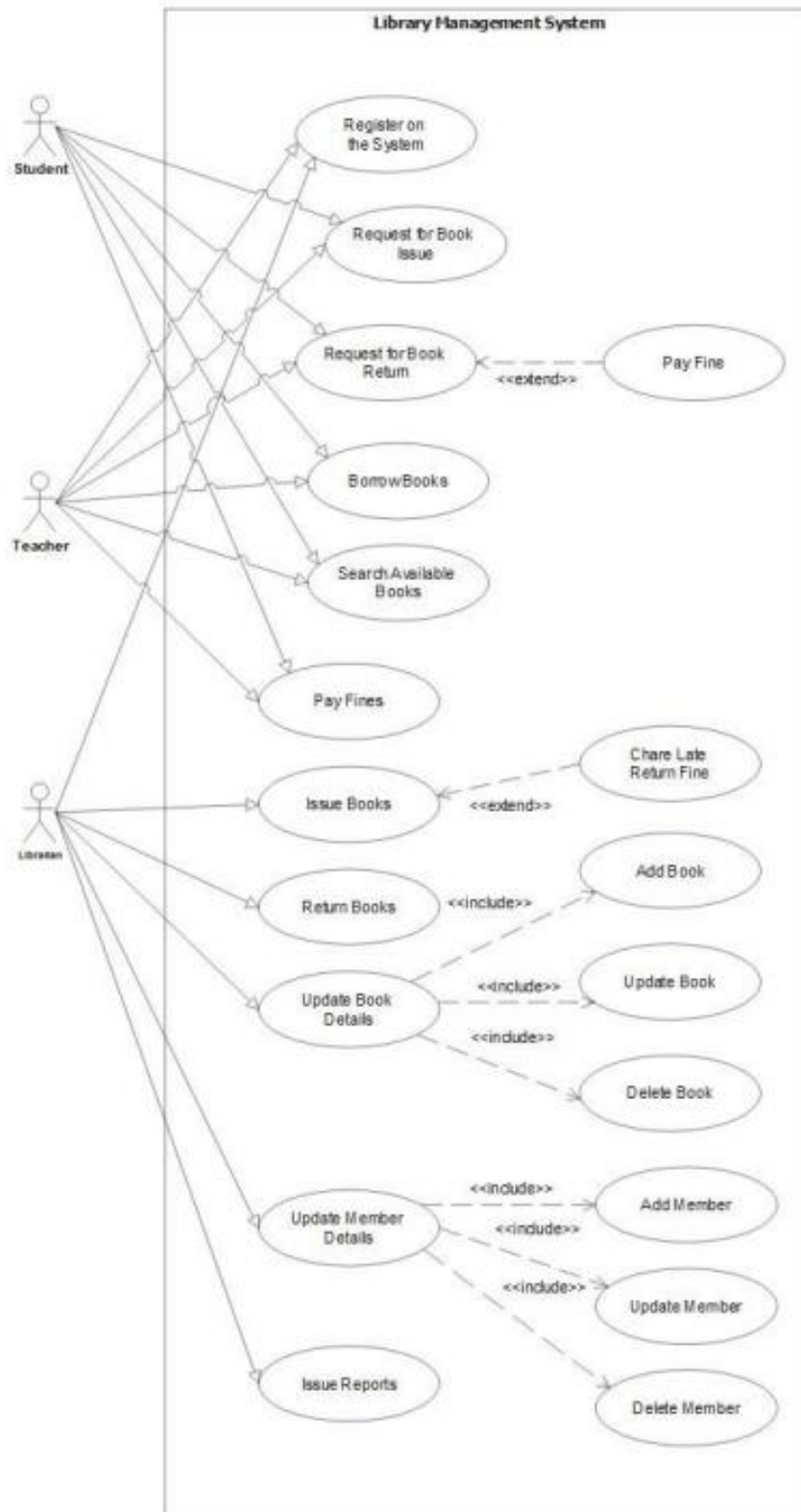
3.3. Context Diagram



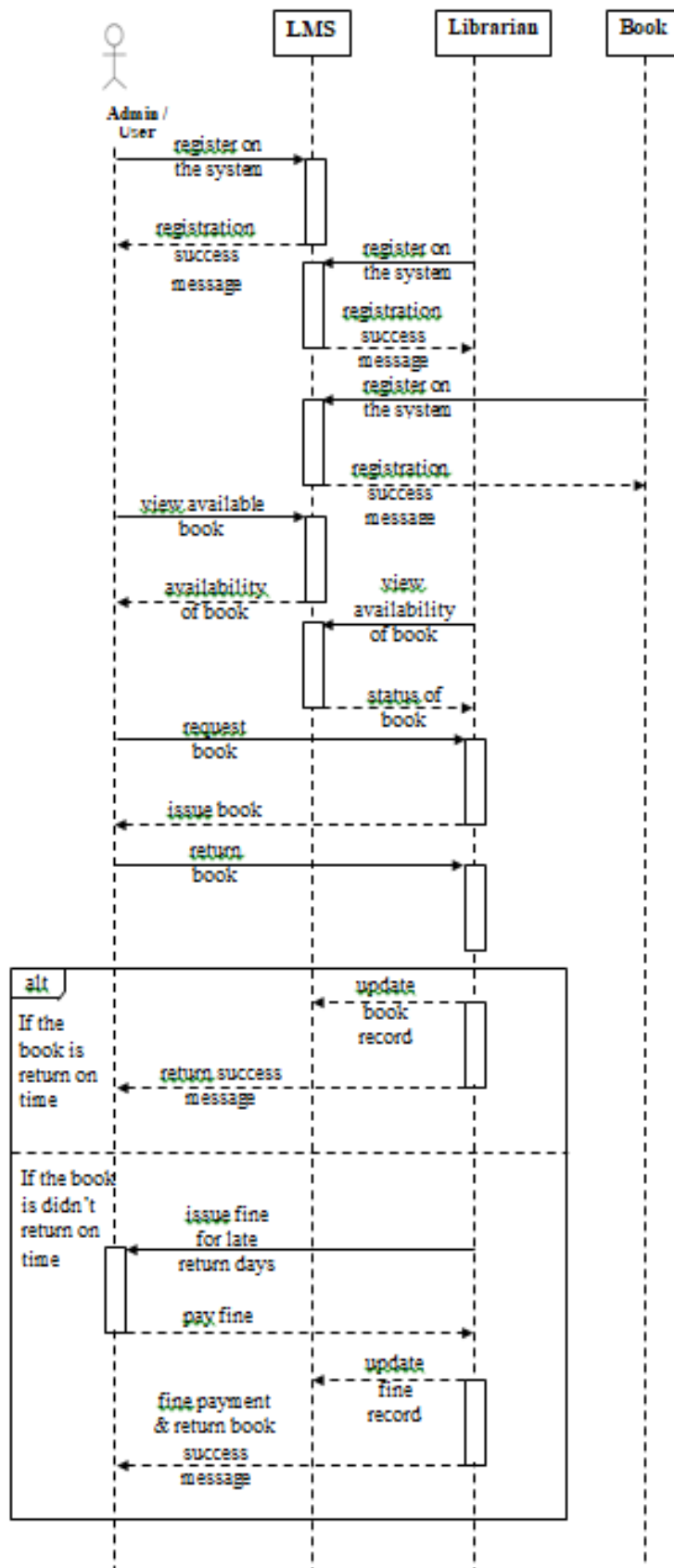
3.4. DFD Level 0 Diagram



3.5. Use Case Diagram



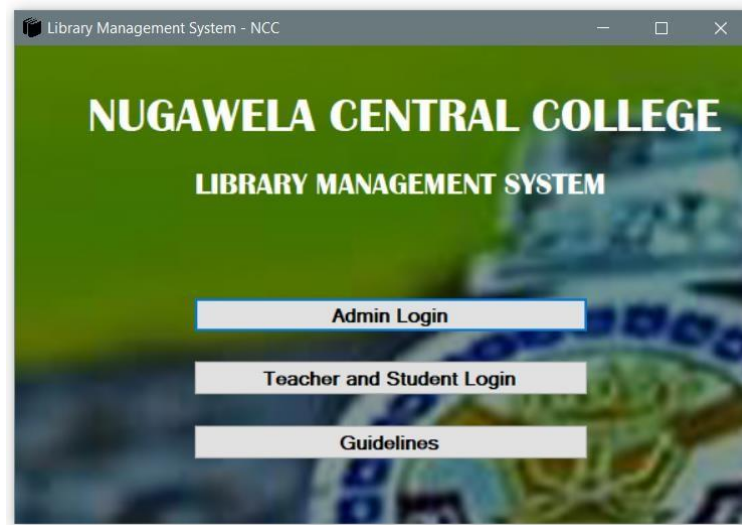
3.6. Sequence Diagram



Chapter 04 : User Interface Design

4.2. Interfaces

4.2.1. Main Form



- This is the main screen for login to Library Management System (LIBMS).
- They are two accesses to this System as Admin and Teacher / Student.
- Anyone new to use this system, he can read Guidelines for use this System.

Start

Load Main Window

If click on Admin Login button

Load Admin Login Window

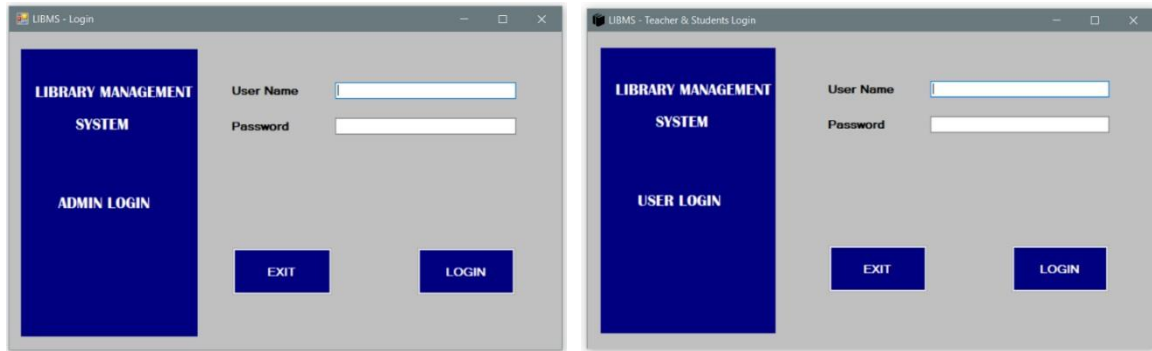
Else If click on Guidelines button

Load Guidelines Window

End If

End

4.2.2. Login Forms



- Admin and Teacher / Student can login to the system by entering correct username and password.
- You can exit from the system by clicking Exit button.
- Admin can perform following functions using this system:
 - 01. Add, Delete, Update, Search new Teacher / Student, Book and Book requests.
 - 02. Add, Delete, Update, Search details of issued / returned books.
 - 03. View Teacher, Student and Book reports.
- Teacher / Student can view currently available books at the library.

Start

Load Login Window

Enter username

Enter password

If click on Login button

 If username==null

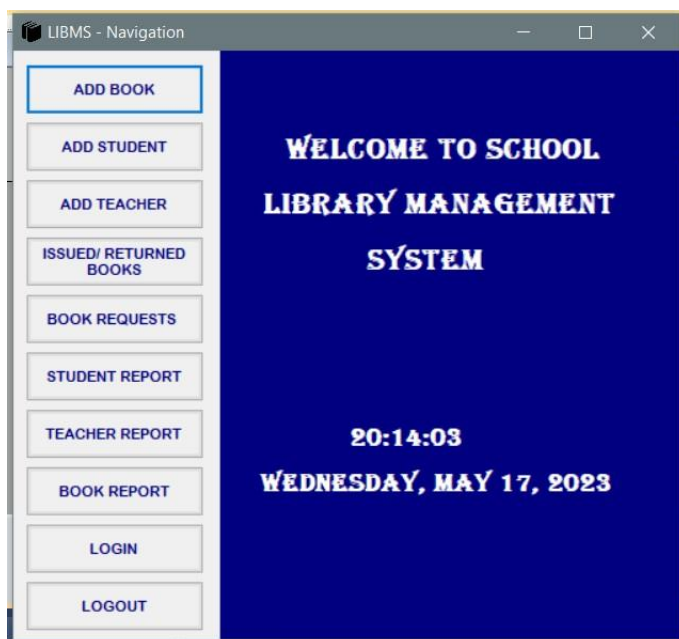
 Display "Please enter

 Username" Else If password==null

 Display "Please enter Password"

 Else If username incorrect

Display "Please enter correct Username"
Else If password incorrect
Display "Please enter correct Password"
End If
Else If username & password correct
Display "Successfully Login"
Else If press exit button
Exit from the application
End If
End



4.2.3. Add Book Form

LIBMS - Add Books

ADD NEW BOOK

Search by ID **Search**

Book ID

Book Name

Author

Type

Quantity

Date of Purchase

Insert **Update** **Delete** **View**

< Back **Next >** **Exit**

Book ID	Book Name	Author	Type	Quantity	Date of Purchase
---------	-----------	--------	------	----------	------------------

- Used to add a New Book to the Database.
- Book ID, Book Name, Author, Type, Quantity, Date of Purchase are required fields and Book ID should be unique for each record.
- View Button – Show currently available book details at the database.
- Insert Button – Insert record to the database.
- Update Button – Update selected record at the database.
- Delete Button – Delete selected record at the database.
- Search Button – Search records by using Book ID.
- Back Button – Move to Login Form.
- Next Button – Move to Navigation Panel.
- Exit Button – Move to Main Form.

Start

Load Add Book Window

Enter Book ID

Enter Book

Name Enter

Author

Enter Type

Enter Quantity

Enter Date of Purchase

If click on Insert button

 If Book ID==null

 Display "Please enter Book ID"

 Else If Book Name==null

 Display "Please enter Book Name"

 Else If Author==null

 Display "Please enter Author"

 Else If Type==null

 Display "Please enter Type"

 Else If Quantity==null

 Display "Please enter Quantity"

 Else If Date of Purchase==null

 Display "Please enter Date of Purchase"

 End If

Else If all are entered correctly

 Display "Record inserted successfully"

 Insert relevant record

Else If click on view button

 Display all the book records

Else If click on delete button

 Delete the relevant record

End If

End

➤ Update button process also same as above.

4.2.4. Book Report Form

LIBMS - Books Report

BOOKS REPORT

From: Tuesday , September 20, ∨

To: Tuesday , September 20, ∨

[View All Records](#) [Print All Records](#)

ADD BOOK

ADD STUDENT

ADD TEACHER

ISSUED/ RETURNED BOOKS

BOOK REQUESTS

STUDENT REPORT

TEACHER REPORT

BOOK REPORT

LOGIN

LOGOUT

- Used to get Book Reports.
- Enter required date range by using From and To fields.
- View All Records Button – Show all the records related to selected date range.
- You can see the records using below Grid View.
- Print All Records Button – Download PDF document of selected records.

4.2.5. Add Student Form

LIBMS - Add Students

ADD NEW STUDENT

Search by ID **Search**

Student ID

Student Name

NIC

Gender

Contact Number

Date of Joined

Grade

Insert **Update** **Delete** **View**

< Back **Next >** **Exit**

Student ID	Student Name	NIC	Gender	Contact Number	Date of Joined	Grade
------------	--------------	-----	--------	----------------	----------------	-------

- Used to add a New Student to the Database.
- Student ID, Student Name, NIC, Gender, Contact Number, Date of Joined, Grade are required fields and Student ID should be unique for each record.
- View Button – Show currently available Student details at the database.
- Insert Button – Insert record to the database.
- Update Button – Update selected record at the database.
- Delete Button – Delete selected record at the database.
- Search Button – Search records by using Student ID.
- Back Button – Move to Login Form.
- Next Button – Move to Navigation Panel.
- Exit Button – Move to Main Form.

Start

Load Add Book Window

Enter Student ID

Enter Student Name

Enter NIC

Enter Gender

Enter Contact Number

Enter Date of Joined

Enter Grade

If click on Insert button

 If Student ID==null

 Display "Please enter Student ID"

 Else If Student Name==null

 Display "Please enter Student Name"

 Else If NIC==null

 Display "Please enter NIC"

 Else If Gender==null

 Display "Please enter Gender"

 Else If Contact Number==null

 Display "Please enter Contact Number"

 Else If Date of Joined==null

 Display "Please enter Date of Joined"

 Else If Grade==null

 Display "Please enter Grade"

 End If

Else If all are entered correctly

 Display "Record inserted successfully"

 Update relevant record

Else If click on view button

 Display all the book records

Else If click on delete button

 Delete the relevant record

End If

End

➤ Update button process also same as above.

4.2.6. Student Report Form

LIBMS - Students Report

STUDENTS REPORT

From: Tuesday , September 20, ▾

To: Tuesday , September 20, ▾

[View All Records](#) [Print All Records](#)

ADD BOOK

ADD STUDENT

ADD TEACHER

ISSUED/ RETURNED BOOKS

BOOK REQUESTS

STUDENT REPORT

TEACHER REPORT

BOOK REPORT

LOGIN

LOGOUT

- Used to get Student Reports.
- Enter required date range by using From and To fields.
- View All Records Button – Show all the records related to selected date range.
- You can see the records using below Grid View.
- Print All Records Button – Download PDF document of selected records.

4.2.7. Add Teacher Form

Teacher ID	Teacher Name	NIC	Title	Contact Number	Date of Joined	Section
------------	--------------	-----	-------	----------------	----------------	---------

- Used to add a New Teacher to the Database.
- Teacher ID, Teacher Name, NIC, Title, Contact Number, Date of Joined, Section are required fields and Teacher ID should be unique for each record.
- View Button – Show currently available Teacher details at the database.
- Insert Button – Insert record to the database.
- Update Button – Update selected record at the database.
- Delete Button – Delete selected record at the database.
- Search Button – Search records by using Teacher ID.
- Back Button – Move to Login Form.
- Next Button – Move to Navigation Panel.
- Exit Button – Move to Main Form.

Start

Load Add Teacher Window

Enter Teacher ID

Enter Teacher Name

Enter NIC

Enter Title

Enter Contact Number

Enter Date of Joined

Enter Section

If click on Insert button

 If Teacher ID==null

 Display "Please enter Teacher ID"

 Else If Teacher Name==null

 Display "Please enter Student Name"

 Else If NIC==null

 Display "Please enter NIC"

 Else If Title==null

 Display "Please enter Title"

 Else If Contact Number==null

 Display "Please enter Contact Number"

 Else If Date of Joined==null

 Display "Please enter Date of Joined"

 Else If Section==null

 Display "Please enter Section"

 End If

Else If all are entered correctly

 Display "Record inserted successfully"

 Insert relevant record

Else If click on view button

 Display all the book records

Else If click on delete button

 Delete the relevant record

End If

End

➤ Update button process also same as above.

4.2.8. Teacher Report Form

LIBMS - Teachers Report

TEACHERS REPORT

From: Tuesday , September 20, ▾

To: Tuesday , September 20, ▾

[View All Records](#) [Print All Records](#)

ADD BOOK

ADD STUDENT

ADD TEACHER

ISSUED/ RETURNED BOOKS

BOOK REQUESTS

STUDENT REPORT

TEACHER REPORT

BOOK REPORT

LOGIN

LOGOUT

- Used to get Teacher Reports.
- Enter required date range by using From and To fields.
- View All Records Button – Show all the records related to selected date range.
- You can see the records using below Grid View.
- Print All Records Button – Download PDF document of selected records.

4.2.9. Issued & Returned Books Form

LIBMS - Issued & Returned Books

ISSUED / RETURNED BOOKS

Search by ID **Search**

Issued ID

Book ID

Student / Teacher ID

Issued Date

Returned Date

Insert **Update** **Delete** **View**

< Back **Next >** **Exit**

CALCULATE FINES

Issued ID	Book ID	Student/Teacher ID	Issued Date	Returned Date

- Used to add a New Issued / Return Book detail to the Database.
- Issued ID, Book ID, Student / Teacher ID, Issued Date, Returned Date are required fields and Issued ID should be unique for each record.
- View Button – Show currently available Issued / Return Book details at the database.
- Insert Button – Insert record to the database.
- Update Button – Update selected record at the database.
- Delete Button – Delete selected record at the database.
- Search Button – Search records by using Issued ID.
- Back Button – Move to Login Form.
- Next Button – Move to Navigation Panel.
- Exit Button – Move to Main Form.
- Calculate Fines Button – Move to Calculate Fines Form.

```
Start
Load Issued / Returned Books Window
Enter Issued ID
Enter Book ID
Enter Student / Teacher ID
Enter Issued Date
Enter Returned Date
If click on Insert button
    If Issued ID==null
        Display "Please enter Issued ID"
    Else If Teacher Name==null
        Display "Please enter Book ID"
    Else If Student / Teacher ID==null
        Display "Please enter Student / Teacher ID"
    Else If Issued Date==null
        Display "Please enter Issued Date"
    Else If Returned Date==null
        Display "Please enter Returned Date"
    End If
Else If all are entered correctly
    Display "Record inserted successfully"
    Insert relevant record
Else If click on view button
    Display all the book records
Else If click on delete button
    Delete the relevant record
End If
End
```

➤ Update button process also same as above.

4.2.10. Calculate Fines Form

- Used to calculate fines and add that details to the Database.
- Fine ID, Student / Teacher ID, Issued Date, Returned Date, Number of Days, Fine Per Day, Total Fine are required fields and Fine ID should be unique for each record.
- When admin enter Issued Date, Returned Date and Fine Per Day, the system automatically calculate Number of Days and Total Fine.
- Left corner Search Button – Search records by using Book ID. You can see the records using below Grid View.
- Left corner Refresh Button – Refresh searched results.
- View Button – Show currently available Fine details at the database.
- Insert Button – Insert data to the database.
- Search Button – Search records by using Fine ID.
- Delete Button – Delete selected record at the database.
- Back Button – Move to Issued & Returned Books Form.
- Next Button – Move to Navigation Panel.
- Exit Button – Move to Main Form.

Start

```
Load Calculate Fines Window
Enter Fine ID
Enter Student / Teacher ID
Enter Issued Date
Enter Returned Date
Enter Fine per Day
If click on Insert button
    If Fine ID==null
        Display "Please enter Fine ID"
    Else If Student / Teacher ID==null
        Display "Please Student / Teacher ID"
    Else If Issued Date==null
        Display "Please enter Issued Date"
    Else If Returned Date==null
        Display "Please enter Returned Date"
    Else If click Count Number of Days button
        Display Number of Days
    Else If Fine per Day==null
        Display "Please enter Fine per Day"
    End If
Else If all are entered correctly
    Display "Record inserted successfully"
    Insert relevant record
End If
End
```

Chapter 05 : Conclusion

We as a team successfully completed the School Library Management system covering all parts in the project scope that we provided in the project proposal.

We were able to develop a user friendly and interactive interface for the system. The database works as expected.

The system could work best for a client who currently carry's out the book management process manually where all the drawbacks on that manual system could be solved.

Chapter 06 : Future Enhancements

- Online book management

We hope to develop the system to do operations online and managed the operations automatically.

- Automated alert system

We plan to add an automated alert system using email or SMS directly to the user mobile number or email where he can be alerted about the updates of the system.

Chapter 07 : Requirements

7.1. *Hardware Requirements*

- Dual Core or Higher
- Processor : i3, i4th Gen or higher
- RAM : 1 GB Ram or Higher
- Speed : 1.6 GHz or Higher
- 1024 x 768 resolution or Higher
- 32-bit or 64-bit Operating System

7.2. *Software Requirements*

- Visual studio 2010
- MS Office 2010

Chapter 08 : References

01. Software Requirements specification Template
02. www.w3schools.com
03. www.google.com
04. www.wikipedia.com
05. www.youtube.com