DIGITAL LIBRARY MANAGEMENT SYSTEM

COMP-105L: Fundamentals of ICT Lab

Semester Project Report

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TEAM CONTRIBUTIONS

1. Mahad Amjad - Project Lead & Full-Stack Developer

• Designed and implemented complete database system (MS Access)

• Created all 3 tables with relationships and referential integrity

• Developed statistical analysis models in MS Excel

• Built complete 3-page website with HTML/CSS

• Set up GitHub repository and version control

• Integrated all 6 ICT tools into cohesive system

• Wrote comprehensive project documentation

• Prepared final presentation

2. Adeel Ahmed – Excel Chart & Data Specialist

- Create visual charts in Excel, including a pie chart and bar chart
- Apply formulas such as COUNTIF and COUNTA for data analysis
- Format charts and prepare the analysis section of the project
- Ensure data visualizations are clear and support decision-making

3. Muhammad Abdullah – Excel Table & Data Entry

- Create structured tables in Excel using data exported from Access
- Perform data entry and validation to ensure accuracy
- Implement formulas in Excel to prepare data for chart creation
- Organize and prepare dataset for use by the chart specialist

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1. INTRODUCTION

1.1 Problem Statement

Traditional library systems in many educational institutions still rely on manual record-keeping methods. This leads to several challenges:

- Difficulty in tracking book availability
- Inefficient member management
- Lack of statistical analysis
- No online access for students
- Time-consuming manual processes

1.2 Proposed Solution

This project develops a Digital Library Management System that integrates multiple ICT tools to automate and streamline library operations. The system provides:

- Digital database for all books and members
- Automated borrowing tracking
- Statistical analysis and reporting
- Online book catalog accessible via web browser
- Professional documentation and presentation

1.3 Project Objectives

The primary objectives of this project are:

1. To demonstrate practical application of ICT tools learned in COMP-102L

2. To integrate multiple software applications into a cohesive system

3. To solve a real-world academic management problem

4. To develop professional documentation and presentation skills

5. To demonstrate understanding of database relationships and data analysis

2. SYSTEM DESIGN

2.1 Database Design

The system uses MS Access with three related tables:

- Books Table (7 records)
  a) BookID (Primary Key, AutoNumber)
  b) Title, Author, ISBN, Category, Available

- Members Table (5 records)
a) MemberID (Primary Key, AutoNumber)
b) Name, Email, Phone, JoinDate

- BorrowRecords Table (5 records)
a) BorrowID (Primary Key, AutoNumber)
b) MemberID (Foreign Key, Number)
c) BookID (Foreign Key, Number)
d) BorrowDate, DueDate, ReturnDate

Relationships established:

• Members (1) → (∞) BorrowRecords

• Books (1) → (∞) BorrowRecords

2.2 Tool Integration

Six ICT tools are integrated:

1. MS Access - Primary database management

2. MS Excel - Data analysis and visualization

3. HTML/CSS - Website interface (3 pages)

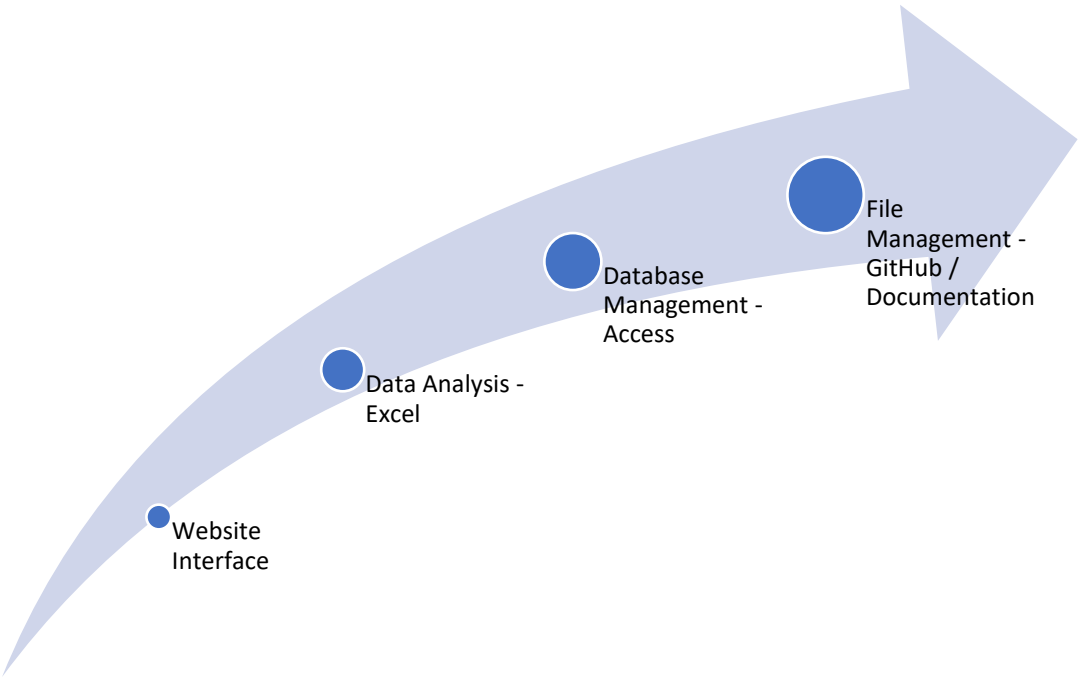
4. GitHub - Version control and file management

5. MS Word - This comprehensive documentation

6. MS PowerPoint - Final presentation

2.3 System Architecture

The system follows a layered architecture:



3. IMPLEMENTATION

3.1 MS Access Database Implementation

The database was created with careful attention to data normalization and relationships:

Step 1: Table Creation

- Created three tables with appropriate data types
- Set primary keys for each table
- Established referential integrity between tables

Step 2: Data Entry

- Entered 7 sample books with realistic data
- Added 5 library members with complete information
- Created 5 borrowing records showing current and past transactions

Step 3: Relationship Establishment

- Created one-to-many relationships between:

a) Members and BorrowRecords (via MemberID)

b) Books and BorrowRecords (via BookID)

- Enforced referential integrity to maintain data consistency

3.2 MS Excel Analysis Implementation

Data from Access was exported to Excel for analysis:

Step 1: Data Export

- Exported Books table from Access to Excel
- Formatted data for analysis

Step 2: Statistical Formulas

- Used COUNTA() to count total books: =COUNTA(BookList!B:B)-1
- Used COUNTIF() for availability: =COUNTIF(BookList!F:F, TRUE)
- Used COUNTIF() for category analysis: =COUNTIF(BookList!E:E, "Science")

Step 3: Chart Creation

- Created pie chart showing book distribution by category
- Created bar chart showing availability status
- Formatted charts for professional presentation

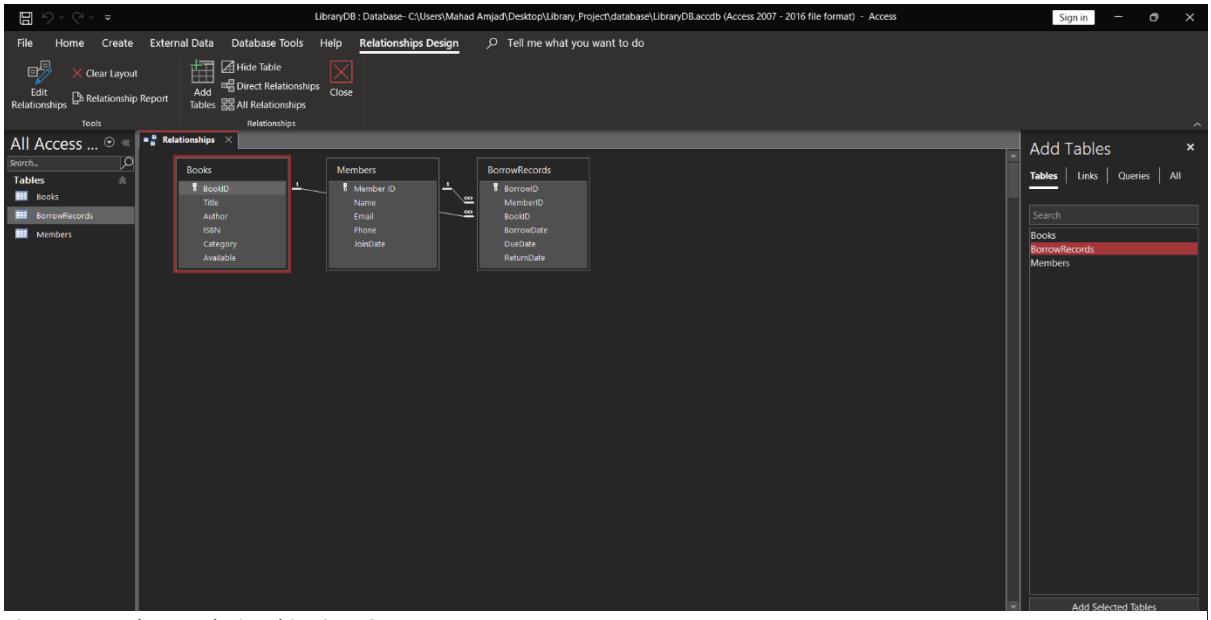


Figure 1 Database Relationships in MS Access

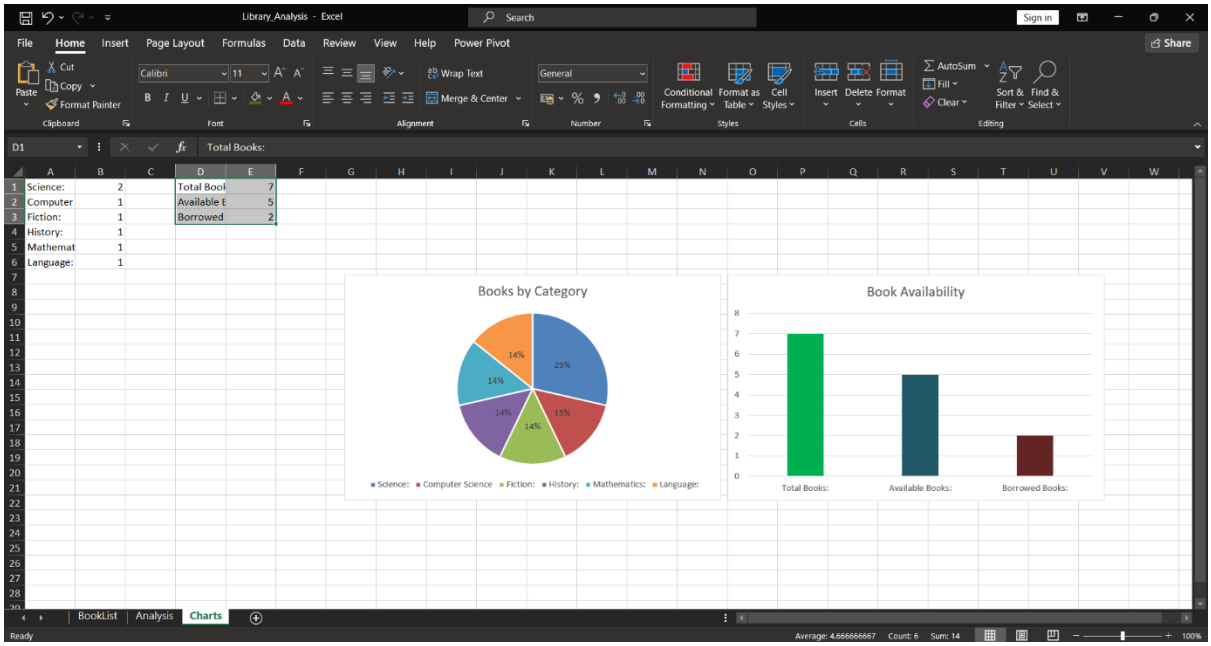


Figure 2 Excel Charts: Book Availability Analysis

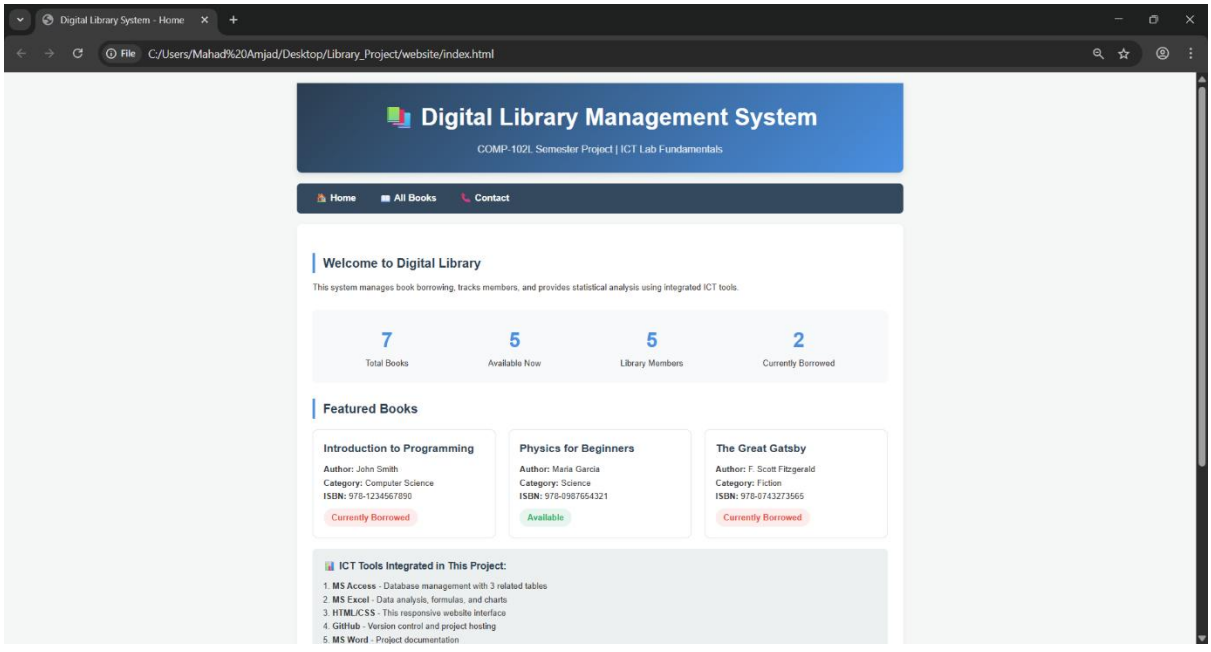


Figure 3 System Interface & ICT Tools

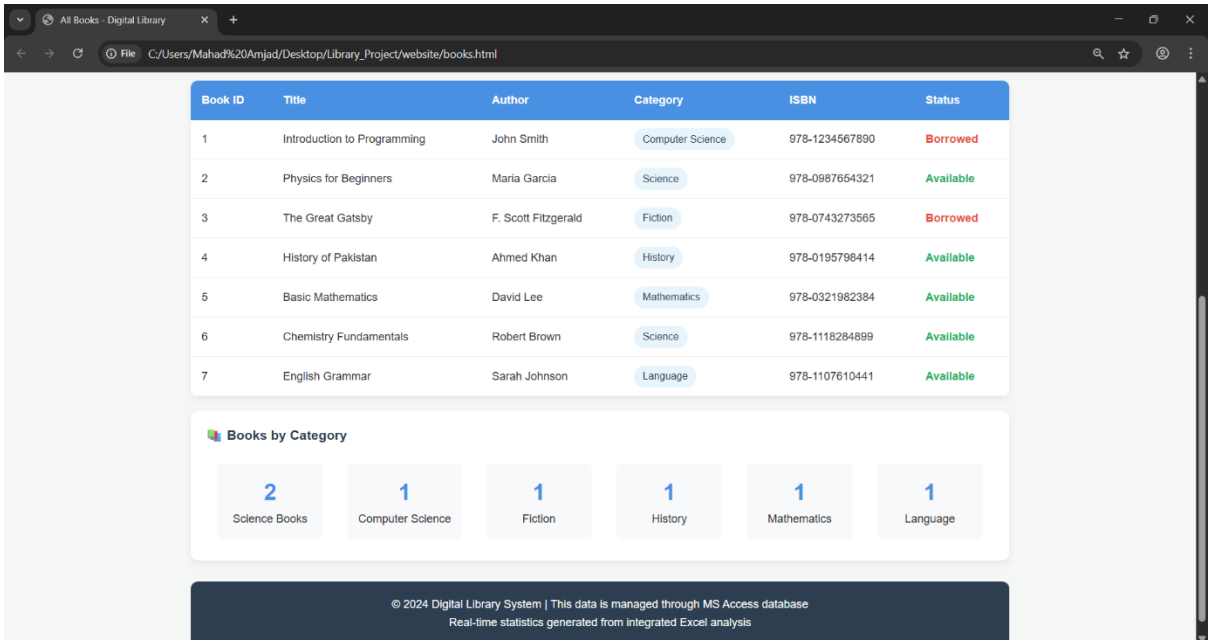


Figure 4 Digital Library Management System Dashboard

3.3 Website Development Implementation

A three-page website was created using HTML and CSS:

Page 1: index.html (Home Page)

- Header with project title and navigation
- Statistics section showing key metrics
- Featured books with availability status
- Tools integration explanation
- Professional footer

Page 2: books.html (Books Catalog)

- Complete table of all 7 books
- Color-coded availability status
- Category badges for easy identification
- Summary statistics section

Page 3: contact.html (Contact & Project Info)

- Library contact information
- Project details and objectives
- Visual display of all tools used
- Team/course information

3.4 GitHub Repository Setup

All project files were organized and uploaded to GitHub:

- Created repository: comp105-library-system
- Organized files in logical folder structure
- Added README file with project information

- Maintained version control throughout development

4. RESULTS & ANALYSIS

4.1 Database Results

The database successfully manages:

- 7 books across 6 categories
- 5 library members with complete profiles
- 5 borrowing transactions with tracking
- Automatic relationship enforcement

4.2 Statistical Analysis Results

Excel analysis revealed:

- Total Books: 7
- Available Books: 5 (71.4%)
- Borrowed Books: 2 (28.6%)
- Category Distribution: Science (2), Others (1 each)

5. CONCLUSION

5.1 Learning Outcomes

This project successfully achieved several learning outcomes:

1. Practical ICT Skills: Demonstrated proficiency in MS Access, Excel, HTML/CSS

2. Tool Integration: Successfully integrated 6 different ICT tools

3. Problem Solving: Applied technical skills to solve library management problem

4. Documentation: Created professional report and presentation

5. Database Design: Understood and implemented relational database concepts

5.2 Challenges & Solutions

Challenge 1: Database Relationship Errors

- Issue: "Used by another process" error in Access
- Solution: Restarted computer, created fresh database, established relationships correctly

Challenge 2: Excel Formula Issues

- Issue: Available books count greater than total books
- Solution: Used exact range references instead of entire columns

5.3 Future Enhancements

The system can be enhanced with:

- User login and authentication system
- Barcode scanning for book checkout
- Email notifications for due dates
- Mobile application interface
- Advanced reporting features

6. REFERENCES

1. Microsoft Office Documentation

2. W3Schools HTML/CSS Tutorials

3. GitHub Getting Started Guide

4. COMP-105L Course Materials

5. Library Management System Research Paper