Computing A2 Coursework

Imran Rahman

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Chapter 1

Analysis

1.1 Introduction

1.1.1 Client Identification

My client, Shahida Rahman, is an Author, and the Director and Secretary of Perfect Publishers Ltd, which has been a self publishing company since 2005. This means that the author pays Perfect Publishers to publish their book. She published her first book through Perfect Publishers Ltd, and this was when the company was born. She is 42 years old and is a mother of 4 children. Shahida uses computers to deal with online enquiries and to publish books from all over the world. Furthermore, she also produces the royalty statements for each book twice yearly. Aside from this, she has little experience with computers. Shahida generally uses a computer for research, social networking and reading the news. Every book is outsourced to an Editor and a Cover Designer. When the book is fully edited and formatted to the right specifications, they return the ready to print files to Shahida, who sends the books off to print. They track the books and their details manually using a database on an Excel Spreadsheet. Currently, it is difficult to keep all the data up to date and it is rather disorganised. Shahida would like to be able to look up a book/number of books in the system by using the details, such as the Author/Title/Date etc. She would also like the new system to link this database with information about the royalties of each book, and when they are needed to be paid every six months. The system could send an email to her, updating her about these.

1.1.2   Define the current system

The system that is currently being used consists of Shahida entering the book and its details into the spreadsheet. These details are taken from the enquiries that she receives via email, and include; first name, last name, email, and vague details of the book. Then, the more accurate details such as; book title, size, number of pages, hardback/paperback, mat or gloss, crème or white paper, font and font size are discussed between Shahida and the customer. She also records their details in a separate spreadsheet, which includes their email, phone number, and address, upon the customer's consent. The spreadsheets are used to track current and previous customers and their books, as the details about the book and themselves are recorded in these. Subsequently, Shahida informs the customer of the price details, waits for full payment and then sends the customer an invoice. She then contacts her editor and her illustrator to start work on the book. Shahida refers to her company's website, where the calculated prices are ready for books, in order to correctly price the book, in accordance to the book's details. An ISBN number is assigned to the book, which is bought in bulks by Shahida from the ISBN Office. Once the book is finished, the book is sent off to print, and the author receives 25 copies.

1.1.3   Describe the problems

There are numerous problems with the current system. First of all, the usage of the spreadsheet makes it harder to find a customer and their details, and their book's details. This is because the spreadsheet is much disorganised. Furthermore, it is harder to keep track of the details of each book, meaning it is difficult to update the details of the book when necessary. Because there are a large number of books in the system, it is harder to find each book and then seperately find the customer that the book was written by, as they are in seperate spreadsheets, meaning that Shahida must manually search for them in both spreadsheets. Also, if the same author makes an enquiry about another book, their details must be entered into the spreadsheet again, because it is difficult to find where the customers details currently are due to there being many customers in the spreadsheet, having incorrectly entered their data from a given enquiry, or they might have been removed after having been there for a long time This could cause inconsistencies in the data, because for instance, the customer may move house, meaning their address would need changing, and it would be difficult to find and update all entries where their address is recorded.

1.1.4   Section appendix

Interview Questions

1. What current system is in place?
   - Excel spreadsheets
   - Holds details of the books and authors/customers

2. What are the problems with this system?
   Hard to keep track of everything
   Data is duplicated for existing customers
   Very disorganised

3. What data do you record?
   Details about the authors - Name, email, Phone number, Address
   Book details - Title, author, Pages, Hard or Soft Back, matte gloss, Colour, size, ISBN

4. How much data is duplicated for existing customers who send another enquiry?
   Every time an enquiry is sent, their details are added to the database

5. What should the new system accomplish?
   To create an organised database
   To avoid duplication
   To be able to calculate royalties

6. What will stay the same?
   Details that are stored
   Storing data electronically

7. How long will the data remain in the system?
   As long as necessary due to details required for paying royalties

8. Are hard copies of the data required?
   No, everything is conducted electronically

9. What computing resources do you have available to you?
   Laptop - windows 7
           - microsoft office

10. Is security an issue?
    Very secure - Data isn't shared with other 3rd parties
                - Kept confidential

Figure 1.1: Interview Questions: Page 1

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11. Who will be using the data?

Just Shahida, and the customer it belongs to

12. Do you have a particular system in mind?

Anything that is efficient
avoids duplication of data
easy to keep track of data

I confirm that I answered these questions to help Imran Rahman investigate my current system to help with the design of his new system.

Signed: *BNRahman*

Figure 1.2: Interview Questions: Page 2

1.2   Investigation

1.2.1   The current system

Data sources and destinations

In the current system there are three key data sources that are used. These are Shahida herself, the customer and the spreadsheets. The Customer sends the enquiry which is sent via email. After the details about the book have been discussed, they are stored in one spreadsheet, and the details of the customer are stored in a seperate spreadsheet, linked to the details of the book. These details are agreed seperately from the enquiry, between Shahida and the customer. Details such as the book size, page number, hardback/softback and paper type are used to calculate the cost for the customer, which is used to create an invoice which is sent to the customer. This is the first output of the system. A copy of every invoice is stored on Shahida's computer in a special folder just for invoices. Once Shahida receives full payment, the work is conducted and completed. If the customer wishes to publish another book, they send another enquiry, and their personal data is duplicated because of the details of the new book which are added. Every six months after the book has been published, the royalties must be paid to the author. The royalties are the profit that the author makes from sales of her book from bookshops. A royalty statement is created and stored in a special folder just for royalties.

Source	Data	Example Data	Destination
Customer Enquiry	Forename	Peter	Shahida
Customer Enquiry	Surname	Parker	Shahida
Customer Enquiry	Email	mail@example.com	Shahida
Customer	Address	1 Example Road	Shahida
Customer	Postcode	AB1 2CD	Shahida
Customer	Phone Number	07123456789	Shahida
Customer	Book Title	The Hobbit	Shahida
Customer	Size	Large	Shahida
Customer	Number of Pages	395	Shahida
Customer	Hardback/Paperback	Paperback	Shahida
Customer	Mat/Gloss	Gloss	Book Database
Customer	Creme/White Paper	White Paper	Shahida
Customer	Font	Times New Roman	Shahida
Customer	Font Size	12	Shahida
Shahida	Book Title	The Hobbit	Book Database
Shahida	Size	Large	Book Database
Shahida	Number of Pages	395	Book Database
Shahida	Hardback/Paperback	Paperback	Book Database
Shahida	Mat/Gloss	Gloss	Book Database
Shahida	Creme/White Paper	White Paper	Book Database
Shahida	Font	Times New Roman	Book Database
Shahida	Font Size	12	Book Database
Shahida	Forename	Peter	Author Database
Shahida	Surname	Parker	Author Database
Shahida	Email	mail@example.com	Author Database
Shahida	Address	1 Example Road	Author Database
Shahida	Postcode	AB1 2CD	Author Database
Shahida	PhoneNumber	07123456789	Author Database
Shahida	Invoice	-	Invoice Folder
Shahida	Invoice	-	Customer
Shahida	ISBN	9780007525492	Book Database
Shahida	Date Published	23/10/2014	Book Database

Source	Data	Example Data	Destination
Shahida	Price	£12.99	Book Database
Customer	Payment	£1000	Shahida
Shahida	Cover Preferences	-	Cover Designer
Shahida	Book	-	Editor
Editor	Completed Book	-	Shahida
Cover Designer	Completed Cover	-	Shahida
Shahida	Royalty Statement	-	Royalty Statement Folder
Shahida	Royalty Statement	-	Customer
Shahida	Royalties	£211.20	Customer

Algorithms

In the current system there are two Algorithms which are being used. The first sends an invoice to the customer and checks whether Shahida has recieved full payment. Once Shahida has received full payment, she, her cover designer and her editor can begin working on the book. The second algorithm consists of completing the work that is needed to be done, and checks whether the work has been completed, so that the completed book can then be sent off for printing.

Algorithm 1 First Algorithm - Sending an invoice and Checking for Payment

1: **SET** *Payment* **TO** *false*
2:
      Check Website for Price
      Create Invoice
      Send Invoice
3: **WHILE** *Payment = false* **DO**
      Check For Payment
4:    **IF** *PaymentReceived* **THEN**
      Payment = true
5:    **END IF**
6: **END WHILE**

Algorithm 2 Second Algorithm - Completing Work and Checking If Work is Completed

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1: **SET** $WorkComplete$ **TO** $false$
2: **SET** $CoverComplete$ **TO** $false$
3: **SET** $BookComplete$ **TO** $false$
4:
5: **WHILE** $WorkComplete = false$ **DO**
        Get Completed Cover from Cover Designer
6:     **SET** $CoverComplete$ **TO** $true$
        Get Completed Book from Editor
7:     **SET** $BookComplete$ **TO** $true$
8:     **IF** $BookComplete\ and\ CoverComplete$ **THEN**
9:         **SET** $finished$ **TO** $true$
10:     **END IF**
11: **END WHILE**

Data flow diagrams

Symbols Key:

Entity   Data Flow

Process   Data Storage

Adding a new customer's details to the database:

Customer → Enquiry → Shahida → Customer Details → Spreadsheet

Customer → Book Details → Discussion And Agreement → Finalised Book Details → Shahida

Sending an Invoice, waiting for payment and completing the work:

Customer ← Invoice ← Create Invoice ← Payment Details ← Shahida → Preferred Ideas → Cover Designer

Shahida ← Cover ← Create Cover ← Ideas ← Cover Designer

Customer → Payment → Shahida

Shahida → Book Text → Editor

Shahida ← Edited Text ← Editing

Editing ← Book Text ← Editor

Figure 1.3: Data Flow Diagrams

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Input Forms, Output Forms, Report Formats

The current system has just one input form. This is the Enquiry that is sent to the company, from an author. Also, The current system has two different output forms - The Invoice and The Royalty Statement.

The enquiry is received via email, which is sent using the company's website. The email will look like this when received:

First Name:

Last Name:

Email:

Question/Comment:

The following image is an example of the first output form, an Invoice.

PERFECT PUBLISHERS Ltd.23 MAITLAND AVENUE, CAMBRIDGE, CB4 1TA, UK.
Tel: +44 (0) 1223 424422 Fax: +44 (0) 1223 424414

INVOICE   *"Fulfil your books' potential"*

Invoice Date: 27-05-14

Author Name: Svagito Liebermeister

Title of Book: Osho Therapy

ISBN: 978-1905399-9-25

Shipping details:
Pratibha de Stoppani
via Al Marcadello 2
CH-6988 Ponte Tresa
Switzerland

Order Description		PRICE
12 Osho Therapy @ 50% discount. Retail price £25.99		£155.94
Shipping	Premium	£10.06
TOTAL		**£166.00**

Account details: BIC: LOYDGB21206 IBAN: GB33 LOYD 3091 7402 3570 35

SORT CODE: 30-91-74 ACCOUNT NUMBER: 02357035

Payment within 14 days. Late payment will incur a fixed penalty of £20 for the first month and £50 per month thereafter.

Company Number 5429532. VAT Number: 857 5975 58. Registered in England.
www.perfectpublishers.co.uk

Figure 1.4: Invoice Example

The following image is an example of the second output form, a Royalty Statement.

23 Maitland Avenue
Cambridge
CB4 1TA
United Kingdom
enquiries@perfectpublishers.co.uk

ROYALTY STATEMENT

Date: 01-01-14 – 30-06-14

AUTHOR	TITLE	ISBN (13-DIGIT)
Andre Corrie	**Into The Mourning Light**	**9781905399895**

LIST PRICE	DISCOUNT	WHOLESALE PRICE	QUANTITY	NET SALES	PRINT COST	NET PUB COMP
$15.99	**40%**	**$9.59**	19	$182.21	$96.00	$91.01*
£9.99	**40%**	**£5.99**	69	£413.31	£233.10	£158.01
					TOTAL	**£211.20**

PRINT COST PER BOOK: £3.70 UK AND $4.80 US
***$91.01 = £53.19**

1 GBP = 1.71565 USD 09-07-14

Figure 1.5: Royalty Statement Example

1.2.2   The proposed system

In the proposed system the Customer's information will still be received through the online form on the company's website, which Shahida receives via email. She will then enter this into the system using a new interface that will ask her for the details. This will be placed into a database. Each Customer's book will have a primary key, the ISBN number which Shahida assigns to the book. In a seperate database, the author's details will be stored and the author will have a special ID number which is used only in the databases. Every book that is published by the same author will have an attribute which is the author's ID. The ID will just be a 3 digit number. The system's interface will have a search feature, which can search for book titles, authors, and author IDs.

Data sources and destinations

Source	Data	Data Type	Destination
Customer Enquiry	Forename	String	Shahida
Customer Enquiry	Surname	String	Shahida
Customer Enquiry	Email	String	Shahida
Customer	Address	String	Shahida
Customer	Postcode	String	Shahida
Customer	Phone Number	String	Shahida
Customer	Book Title	String	Shahida
Customer	Size	String	Shahida
Customer	Number of Pages	395	Shahida
Customer	Hardback/Paperback	Paperback	Shahida
Customer	Mat/Gloss	Gloss	Shahida
Customer	Creme/White Paper	White Paper	Shahida
Customer	Font	Times New Roman	Shahida
Customer	Font Size	12	Shahida
Shahida	Book Title	The Hobbit	Database
Shahida	Size	Large	Database
Shahida	Number of Pages	395	Database
Shahida	Hardback/Paperback	Paperback	Database
Shahida	Mat/Gloss	Gloss	Database
Shahida	Creme/White Paper	White Paper	Database
Shahida	Font	Times New Roman	Database
Shahida	Font Size	12	Database
Shahida	Forename	String	Database
Shahida	Surname	String	Database
Shahida	Email	String	Database
Shahida	Address	String	Database
Shahida	Postcode	String	Database
Shahida	PhoneNumber	String	Database
Shahida	ISBN	String	Database
Shahida	Date Published	Date	Database
Shahida	Price	Real	Book Database
Database*	Author ID	Integer	Shahida
Shahida	Invoice	String	Invoice Folder
Shahida	Invoice	String	Customer

Source	Data	Data Type	Destination
Customer	Payment	Real	Shahida
Shahida	Cover Details	String	Cover Designer
Shahida	Book	String	Editor
Editor	Completed Book	String	Shahida
Cover Designer	Completed Cover	Image	Shahida
Shahida	DatePublished	Date	Database
Shahida	Royalty Statement	-	Royalty Statement Folder
Shahida	Royalty Statement	-	Customer
Shahida	Royalties	Real	Customer

*The Database will create a number and assign that number as an Author ID

Data flow diagram
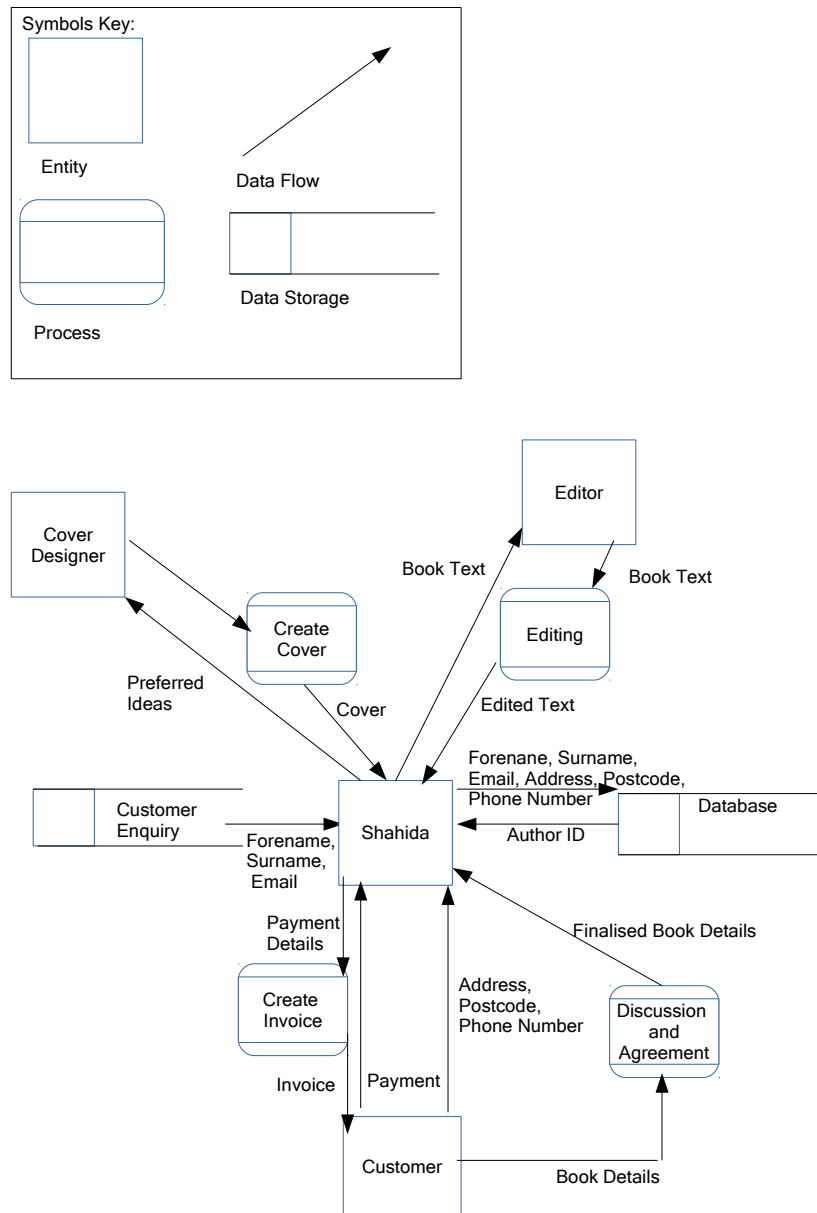
Figure 1.6: Data Flow Diagram

Data dictionary

Name	Data Type	Length	Validation	Example Data
FirstName	String	2-20 Characters	Length	Jo
LastName	String	2-20 Characters	Length	Williamson
Email	String	7-30 Characters	Length	mail@example.com
PhoneNumber	String	9-15 Characters	Format	07123456789
Address	String	5-64 Characters	Length	Example Road
Postcode	String	7 Characters	Format	AB1 2CD
Author ID	Integer	1-255	Range	17
ISBN	String	13 Characters	Length	9780007525492
BookTitle	String	1-127 Characters	Length	The Hobbit
NoOfPages	Integer	1-1023	Range	395
Size	String	5	Existence	Large
Back	String	8 or 9 Characters	Existence	Paperback
Cover	String	3 or 5 Characters	Existence	Gloss
Paper	String	11 Characters	Existence	White Paper
Font	String	1-64 Characters	Length	Arial
FontSize	Real	8-64	Numbers only	12.5
DatePublished	Date	dd/mm/yyyy	Range	23/10/2014
Price	Real	Numbers only	£12.99	

Volumetrics

I have conducted calculations to calculate the maximum possible size of 1 customer and book record, which is 275 Bytes. However, when a customer wishes to publish more than one book, more book records are required. As the most amount of books one customer has published with the company is 3, we can have 4 book records per customer record.

Each ASCII Character is 1 byte, each number up to 255 is 1 byte, and each number between 256 and 32768 is 2 bytes. Real Numbers such as 12.5 are 2 bytes, and a Date is 3 bytes.

Firstly, I have worked out the size of the customer record, which is 157 Bytes.

FirstName (20) + LastName (20) + Email (30) + PhoneNumber (15) + Address (64) + Postcode (7) + Author ID (1) = 157 Bytes.

I have then calculated the size of one book record, which is 118 Bytes. Book

Title (1), NoOfPages (2), Size (5), Back (9), Cover (5), Paper (11), Font (64), FontSize (2) + ISBN (13) + DatePublished (3) + Price (2) + Author ID (1) = 118 Bytes

If we have 4 book records per customer record, that would mean that the size for 1 customer with 4 books would be 157 + (5 * 118) = 747 Bytes.

I have chosen to use a size of 100 different customer records, which would be equivalent to 74700 bytes, and 74700 / 1024 = 72.9 Kilobytes. This is because the company rarely have more than 20 enquiries in a year. This would be a suitable number of customer records as it will last a few years before it may require resizing, which can be conducted at a later date when necessary. 72.9 KB will be not be difficult for Shahida's PC to hold, as it is a very small size.

1.3   Objectives

1.3.1   General Objectives

The general objectives are:

- Organised layout for the database.

- Prevention of unnecessary duplication of data.

- Simple interface for entering data, meaning it can be conducted quickly.

- Search function to find a specific customer in the database.

- Ability to edit existing data easily and quickly.

The System must be able to prevent unecessary duplication of data, and be able to organise data well, and this will be a priority.

1.3.2   Specific Objectives

Organising a new layout for the database:

- Be able to sort by date (ascending and descending)

- Clear tables and fields for each entity and attribute

Preventing Duplication:

- Checks to see if the data already exists

- Use of Author ID to ensure it will only be entered once

Simple interface for entering data:

- As little amount of boxes as possible

- Clearly label entry boxes

Search function and editing data:

- Data can be found using the Author ID, Author Name, or Book Title
- Can be edited upon finding the desired data

1.3.3   Core Objectives

- Organising the data using certain attributes
- Preventing Duplication

1.3.4   Other Objectives

- Searching for data using attributes
- Editing data in the database

1.4 ER Diagrams and Descriptions

1.4.1 ER Diagram

Figure 1.7: ER Diagram
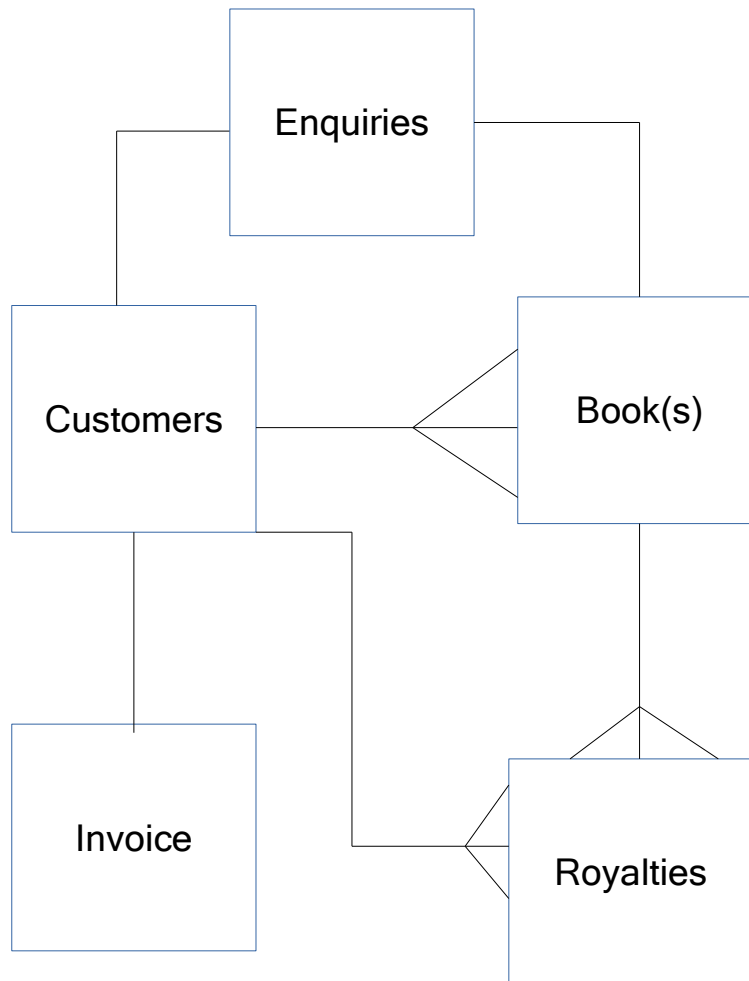
1.4.2   Entity Descriptions

Customer(<u>Author ID</u>, *Email*, Forename, Surname, Address, Postcode, Phone Number)

Enquiry(<u>Email</u>, *Author ID*, Forename, Surname)

Invoice(<u>Author ID</u>, *ISBN Number*, Book title, Price, Forename, Surname, Address, Postcode)

Royalties(<u>AuthorID</u>, *ISBN Number*, Book title, Price, Forename, Surname, Address, Postcode)

Book(<u>ISBN Number</u>, *AuthorID*, Book Title, Pages, Size, Cover type, Colour, Back Type, Paper, Font, Font size, Date published, Price)

The database will only store data about the customers and their books, as the enquiries give details about the books and customers, and the royalties and invoices are stored seperately from the database.

1.5   Object Analysis

1.5.1   Object Listing

- Shahida
- Customer
- Editor
- Cover Designer
- Spreadsheet

1.5.2   Relationship diagrams
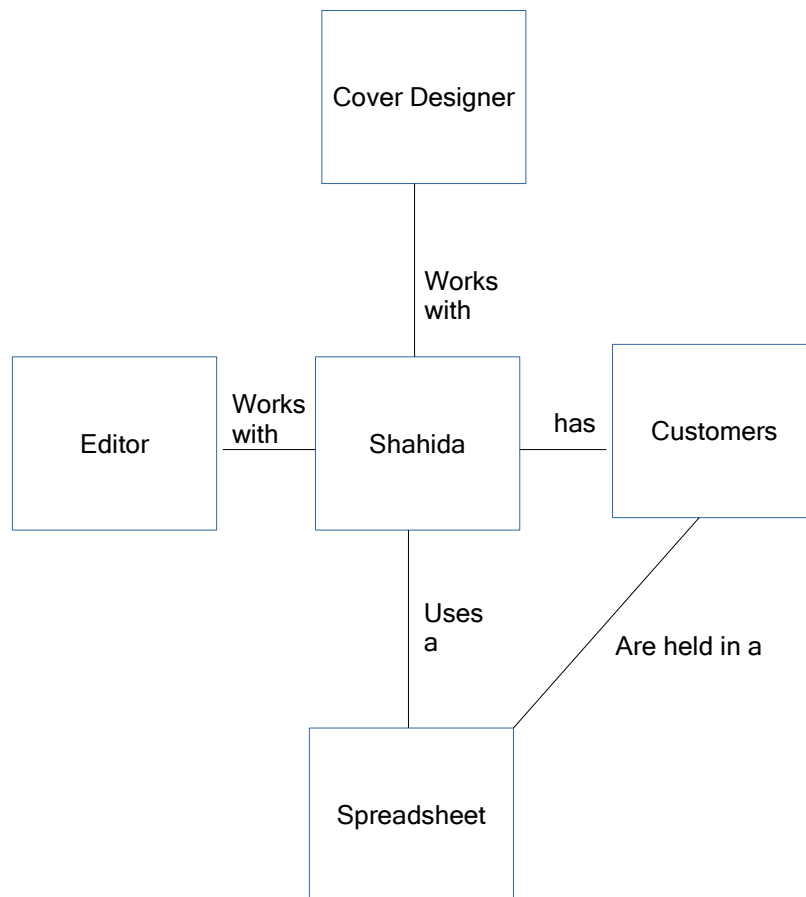
Figure 1.8: Relationship Diagram

1.5.3   Class definitions

Key:

Label
Attributes
Behaviours

Customer
Author ID
ForeName
Surname
Email
Address
Postcode
Phone Number
Add ForeName
Edit Forename
Add Surname
Edit Surname
Add Email
Edit Email
Add Address
Edit Address
Add Postcode
Edit Postcode
Add Phone Number
Edit Phone Number

Book
Title
ISBN
Pages
Size
Cover Type
Back Type
Paper
Font
Font Size
Price
Date Published
Add Title
Edit Title
Add ISBN
Edit ISBN
Add Pages
Edit Pages
Add Size
Edit Size
Add Cover Type
Edit Cover Type
Add Back Type
Edit Back Type
Add Paper
Edit Paper
Add Font
Edit Font
Add Font Size
Edit Font Size
Add Date Published
Edit Date Published
Add Price
Edit Price

1.6   Other Abstractions and Graphs

Graphs not required.

1.7   Constraints

1.7.1   Hardware

Shahida uses her laptop to run the company from home. The new system will need to be able to run on this machine.

Computer Specifications:

- 15.6" Display
- AMD Quad-Core A4-5000M APU (1.5GHz, 2MB cache)
- 4 GB DDR3 RAM
- 750 GB HDD, 5400 rpm
- AMD Radeon HD 8330 Graphics Card

The proposed system will have no problem with running on this machine, as it uses a small amount of CPU usage. A constraint would be the size of the screen. This is because the system will need to be based around the screen size of her laptop. As her laptop is portable, portability is not a constraint. The laptop will need enough RAM to hold the system. However, Shahida's laptop has more than enough memory for this, meaning this will not be a problem.

1.7.2   Software

Shahida would prefer that the system will run on Windows 7, as she uses this operating system for her laptop. Changing the operating system will cause difficulties, meaning it is best for the system to run on Windows 7, suiting her needs.

1.7.3   Time

Shahida does not need this system to be built quickly, but she would like it to be complete as soon as reasonably possible. Otherwise, the only deadline for this project is April 2015, which has been set by my teacher.

1.7.4   User Knowledge

Having worked in the publishing industry beforehand, being an author has also given Shahida the knowledge of how to run her current company. Aside from being able to perform basic tasks on a computer, browsing the internet and using social media, Shahida has small experience with computers.

1.7.5   Access restrictions

Shahida will be the only person who will have full access to all the data in the proposed system, and she will be the only one who can access it. This can be password protected for security reasons, meaning that only she can gain access to the database. This is also because she is the only necessary person to view, enter and edit data in the system, as her Editor and her Cover Designer do not need to use the database. As she is the only user of the database, it will be easier to keep secure. The authors will be able to make requests about personal data, such as having it removed, or receiving a copy of the personal data about them. The database will comply to the Data Protection Act 1998, as the company already does so with their current system.

1.8   Limitations

1.8.1   Areas which will not be included in computerisation

Generally, all actions require the use of a computer in the company. However, rarely, a customer does call Shahida about an enquiry, as this customer may not be so computer literate. In this case, Shahida will note down the details of the enquiry, and will enter it into the database.

1.8.2   Areas considered for future computerisation

The database could be used online, so that the authors can use their Author ID to log in and see just their details on the database. This would mean that the customers would not have to contact Shahida to receive the data held about them, as they can see the data by theirselves. They will also be able to access this data from anywhere where they have access to the internet. This could also enable Shahida to access the data from other machines aside from her laptop.

1.9   Solutions

1.9.1   Alternative solutions

Solution	Advantages	Disadvantages
Re-organisation of the current spreadsheet	No changes to current operating system and software required, will not cost	Current problems will still occur, Difficult to keep organised as it will require more maintenance to do so
Python Desktop Application with GUI	User Friendly, Clear and easy to interpret, Layout can be designed specificly for the client, Usage of buttons simplifies tasks, Minimal training needed for most levels of experience	Takes up more memory, Takes longer to create the application
Filing system	No electronics needed, Costs less, Minimal training needed for most levels of experience	Difficult to back up the data due to it being held on paper, data will have to be sent via post when necessary, Lots of physical space is required, more prone to damage and deteriation due to more movement

1.9.2   Justification of chosen solution

I have chosen to use the Python Desktop Application with GUI as my solution. This is because:

- I am already familiar with the Python Programming Language, whereas I have little knowledge of how to manage a Paper Filing system or with creating advance spreadsheets.

- This will keep the system using computers and software, meaning there will not be a drastic change.

- Using the application will take less time than manually entering everything into a spreadsheet.

- This will also take less time and physical space than writing details down on paper.

Chapter 2

Design

2.1 Overall System Design

2.1.1 Short description of the main parts of the system

- Log In Window
- Main Database Interface
- Adding/Removing/Editing Customers and Entries
- Calender Interface
- Changing Password
- Search Window

Log In Window

- A window is displayed which prompts the user to input their ID and password.
- Checks the entered valiues with the database to identify whether the user's credentials are correct.
- Once a correct set of values are entered, the user will be granted access to the database.
- A link will be at the bottom which says "Forgotten password?". This can be clicked on and then the user wil be prompted for the email address, and the corresponding password for the email address entered will be sent to that email.

- If there is no record of an email and password then the user will be prompted to create one for their corresponding email.

Main Database Interface

- This will be the "home" interface.

- A view of the Customer details in the database will be available.

- The user can select an author from the basic view of the database, and click view

- A user interface is presented with a set of options which are: View, Search Database, Add Entry, Remove an Entry, Edit an Entry, Change Password, and Log out.

- Clicking the Search Database Button will prompt a seperate interface to open, and shows details which can be used to search for specific items in the database.

- Customers can be searched for quickly using their first name on this screen.

View Screen

- Clicking view after having selected an customer will open a new window which will show a more in depth view of it. It will show the books that have been published with them.

- There will be buttons to expand on certain fields, including Royalties, Publishing Invoices and Book Invoices. These will show in new windows. The user can see the breakdown of various parts of the database, such as the royalties and invoices. The user will have the option to add and remove royalties and invoices.

Adding/Removing/Editing Customers and Entries

- Clicking the Add Entry Button will prompt a seperate interface to open, and contains a layout of entry boxes for required fields for entering details about the customer. After this, the user can click on the customer's new record from the menu and click edit or a book/royalties/royalty items/-book invoice/book invoice items/publication invoice, dependent on which has been selected. An existing customer can be selected using the search function.

- If a customer already exists, and details are needed to be edited or deleted, a search can be conducted to find that customer.

- Clicking the Remove Entry Button will prompt a seperate interface to open, which contains a view of the database, consisting of all the customers. Three search boxes can be used for searching for their forename,

surname or AuthorID. If an entry was selected beforehand, then upon clicking Remove Entry, The user will be prompted for confirmation, then asked to enter their password.

- Clicking the Edit Entry button will prompt a seperate interface to open, and will contain a view of the database. An entry can be searched for using the search, selected, and once the user clicks "Edit", the user will be prompted with a text box, asking for the user to enter text. Upon confirming what the user wants to enter, they are required to enter their password. This will then be saved. If a customer entry was selected before hand, a new window for adding entries will open first upon clicking Edit Entry, and the data about the customers will be in the fields already, ready for editing. Then, the data can be edited and saved, and the user will be prompted for confirmation then asked to enter their password.

Changing Password

- An interface will open, which will prompt the user to enter their Email, Old Password, and Dhen the new password twice for confirmation.

- Once this has been confirmed, the interface will close, resorting back to the log in window.

Search Window

- Clicking the Search Database Button will open a seperate interface, which contains a set options which the user can choose from in order to conduct a search.

- Once the Search Button is clicked, a list of all the data entries that match the search criteria will come up in a list in the Main Window or the Editing Window.

- The search will only use values and text strings that the user is familiar with, and will not require the user to know obscure pieces of data.

2.1.2 System flowcharts showing an overview of the complete system

The following is a flowchart representing a summary of the complete system.

Figure 2.1: Flowchart 1

Figure 2.2: Flowchart 2

See Page 38

Add Entry
Screen
Displayed

Enter
Customer
Details

Confirm and
Save Entry

Database

Option
Selection   (See
Page 38)

Figure 2.3: Flowchart 3

See Page 38, 44

Verification Screen displayed

Confirmation invalid

Confirmation

Confirmation Valid

Remove

Database

Option Selection

(See Page 38)
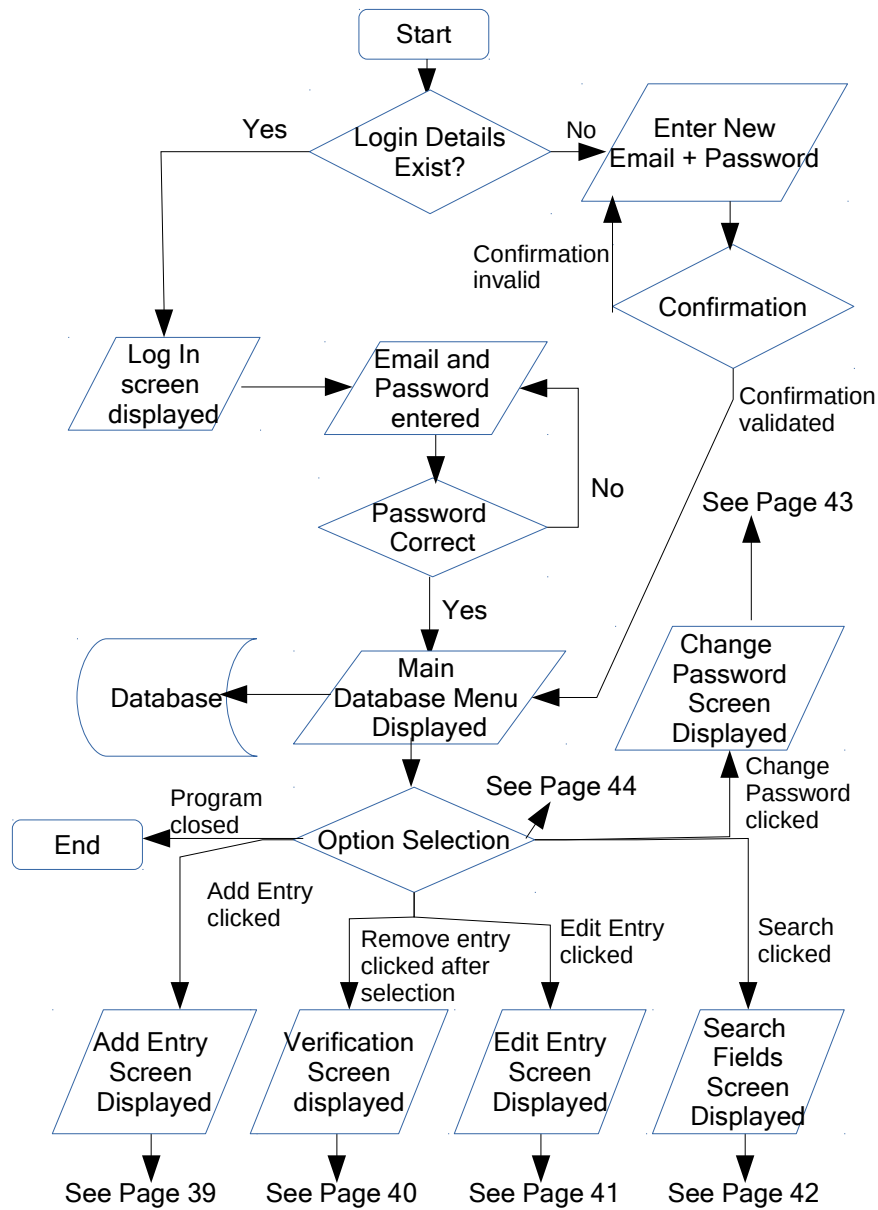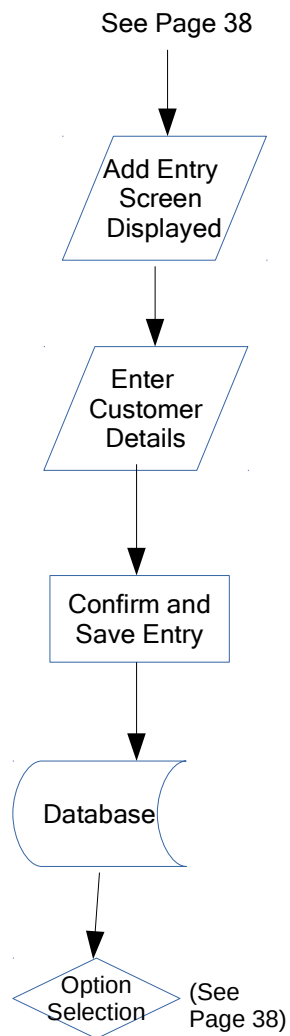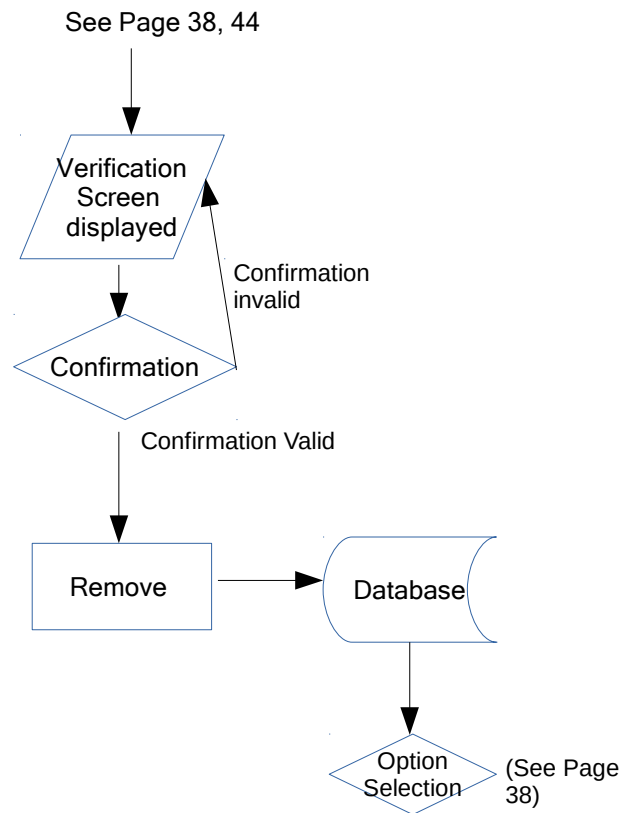
Figure 2.4: Flowchart 4
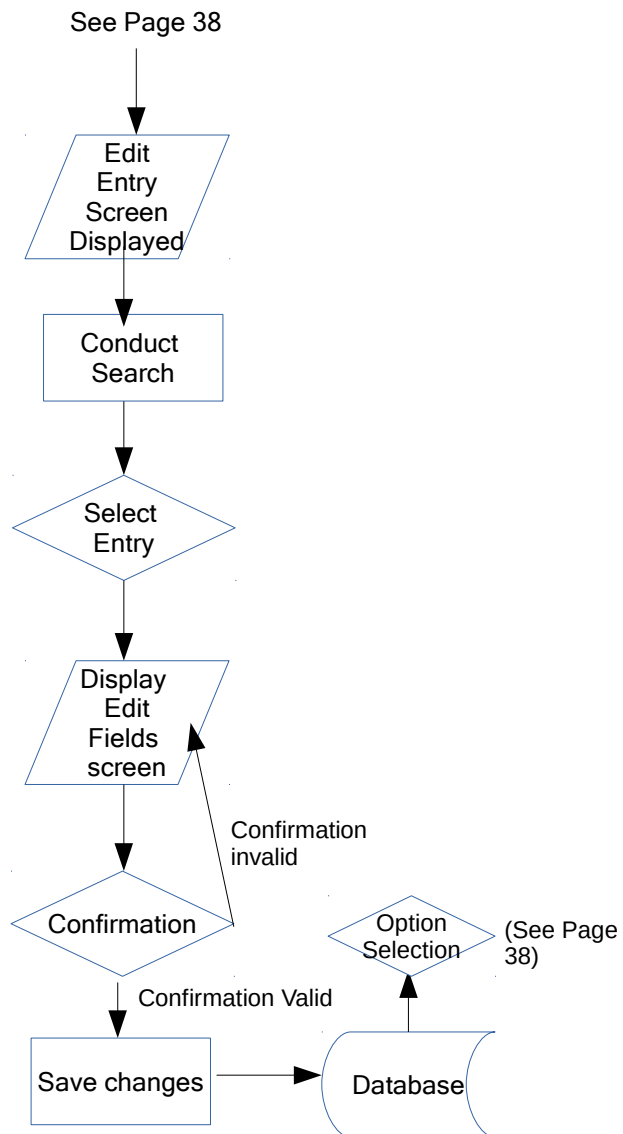
Figure 2.5: Flowchart 5

Figure 2.6: Flowchart 6

See Page 38

Change
Password
Screen
Displayed

Enter
Email
Password

Enter
old
Password

Enter
New
Password

Re-enter
New
Password

Confirmation
invalid

Confirmation

Option
Selection

(See Page
38)

Confirmation Valid

Save changes

Database
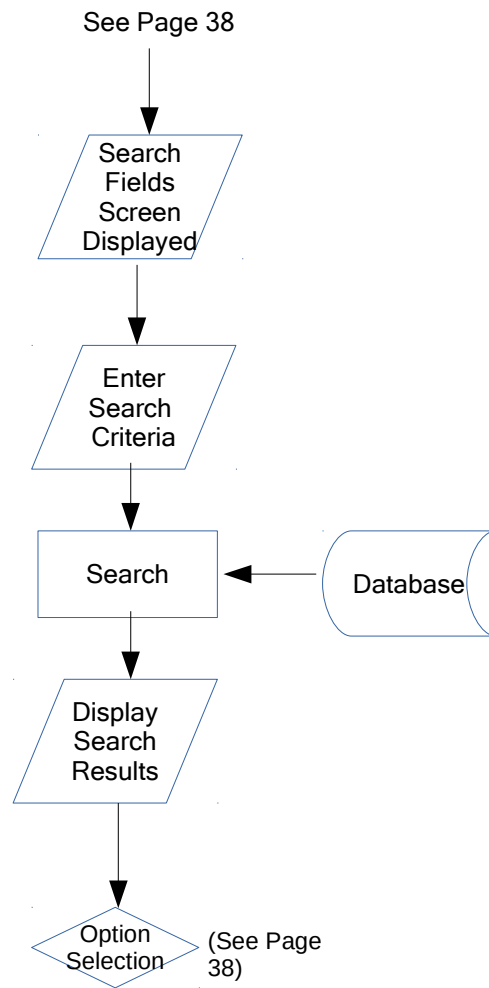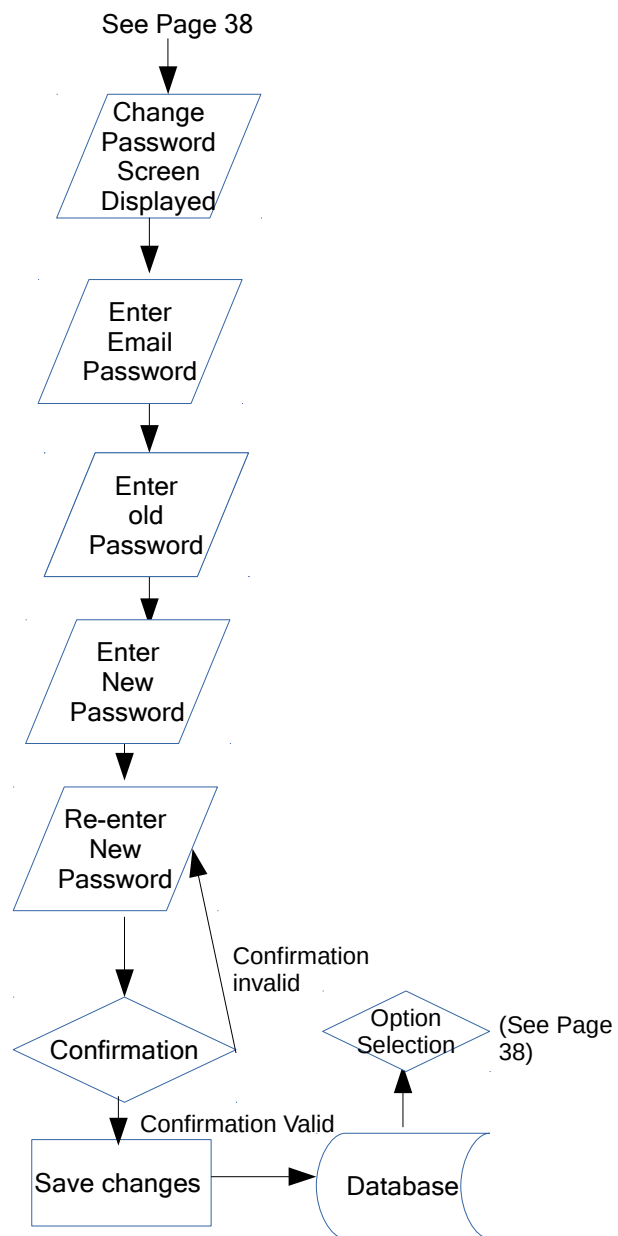
Figure 2.7: Flowchart 7
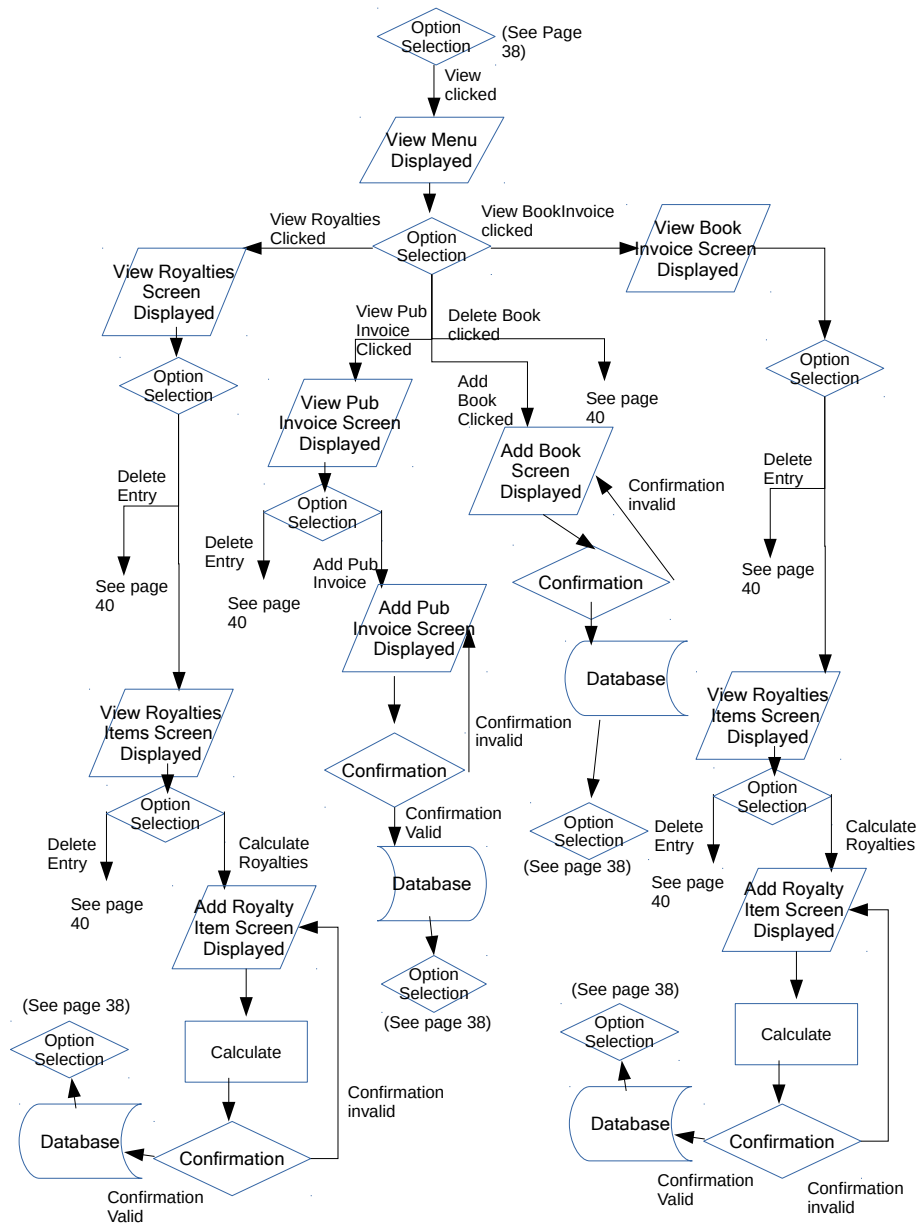
2.2   User Interface Designs

Figure 2.8: Login Screen and Main Menu

This is the Login Screen. Once the Email and password have been entered correctly, the user will be taken to the Main Database Menu.

The hyperlink underneath the input boxes opens this screen where they are required to enter their email, and then their corresponding password will be sent to that email.

Placeholder text is used to keep the interface spacious, so that it doesn't seem as if there is too much text on screen

Email will be sent containing password details.

Selected fields are highlighted to show clear indication that it has been selected.

Customers can be quick-searched for using AuthorID, and will appear in the database view below.

Buttons are big to avoid errors when distracted.

Figure 2.9: View Menu and Royalties

(From Main Menu)

A full view of each book from an author can be seen here, The user can see every detail about the books, or details about royalties and invoices as a whole. Buttons are spaced out to avoid clicking the wrong button.

View

View Menu   — ▢ ✕

Back

Back to Main Menu

AuthorID	ISBN	Book Title	NoOf Pages	Size	Back	Cover	Paper	Font	Font Size	Date Pub	Price

View Royalties	View Book Invoices	View Publishing Invoices	Add Book	Delete Book

Opens in New window

View Royalties   — ▢ ✕

Scroll bars allow lots of data to be seen without requiring large amounts of space

RoyaltiesID	AuthorID	RoyaltyPayment	RoyaltiesDate

View Royalties Items			Delete Entry

Verification Window

46

Figure 2.10: RoyaltiesItems and BookInvoice and Items

Figure 2.11: Publishing Invoice and Adding Entries

View Publishing Invoice   (From Main Menu)

Opens in New window

View Publishing Invoice   — ☐ ✕

PubInvoiceID	AuthorID	ISBN	PubInvoice Date	PubInvoice Service	PubInvoice Payment

Add Pub Invoice   Delete Entry

(From Main Menu)

Add Entry

Opens in New window

Add Entry   — ☐ ✕

AuthorID	Forename	Surname	Email	PhoneNumber	Address	Postcode
123						

Confirm

Automatically generates the first available number from the system.

Simple interface with less buttons and boxes to avoid errors when adding customers.

Back to Main Menu

48

Figure 2.12: Search

(From Main Menu/Edit window)

Search Database

Search Menu

Insert Author First Name

Insert Author Last Name

Appears if date element is selected

Select Table ▼

Search Category ▼

Add Date

Insert search here

Cancel　　Search

Back to main menu

Back to Main Menu/Editing, dependent on which was used to navigate this screen, with results in the database view.

(Royalties Selected)

Royalties Date

(Royalties Items Selected)

Quantity
Discount
Shipping Type
Currency

(Book Invoice Selected)

Book Invoice Date

(Publishing Invoice Selected)

Publishing Invoice Service
Publishing Invoice Date

(Book Invoice Items Selected)

Quantity
Discount
Shipping Type

(Book Selected)

Book title
Price
Date Published

Opens in New window

Calendar Tool

Month/Year

Selected date will be highlighted to show clear indication of selection

Author
Book
Publishing Invoice
Book Invoice
Book Invoice Item
Royalties
Royalty Item

Dropdown list is used to show a large number of options in a small space

Select

Figure 2.13: Editing Screens
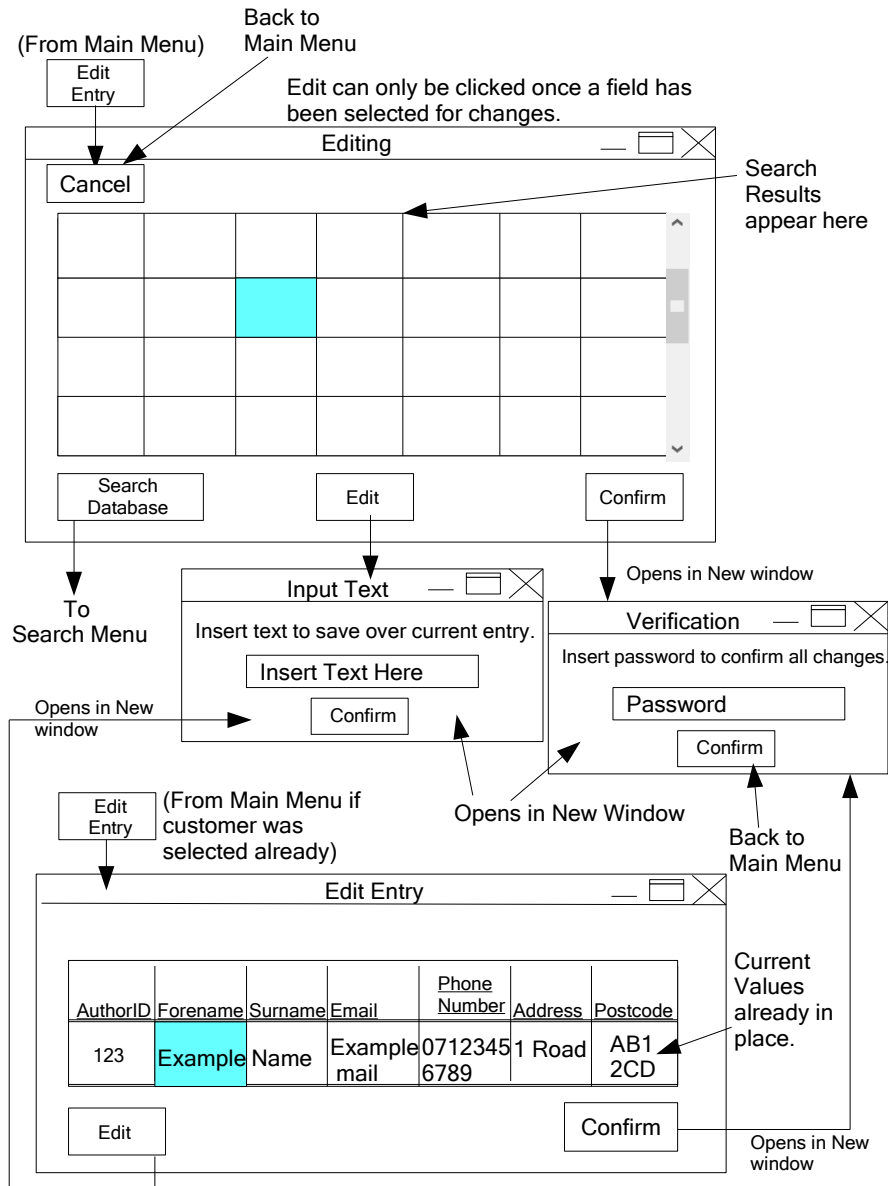
Figure 2.14: Remove Entry and Change Password

(From Main Menu)

Remove
Entry

Opens in New window

Verification — ▢ ✕

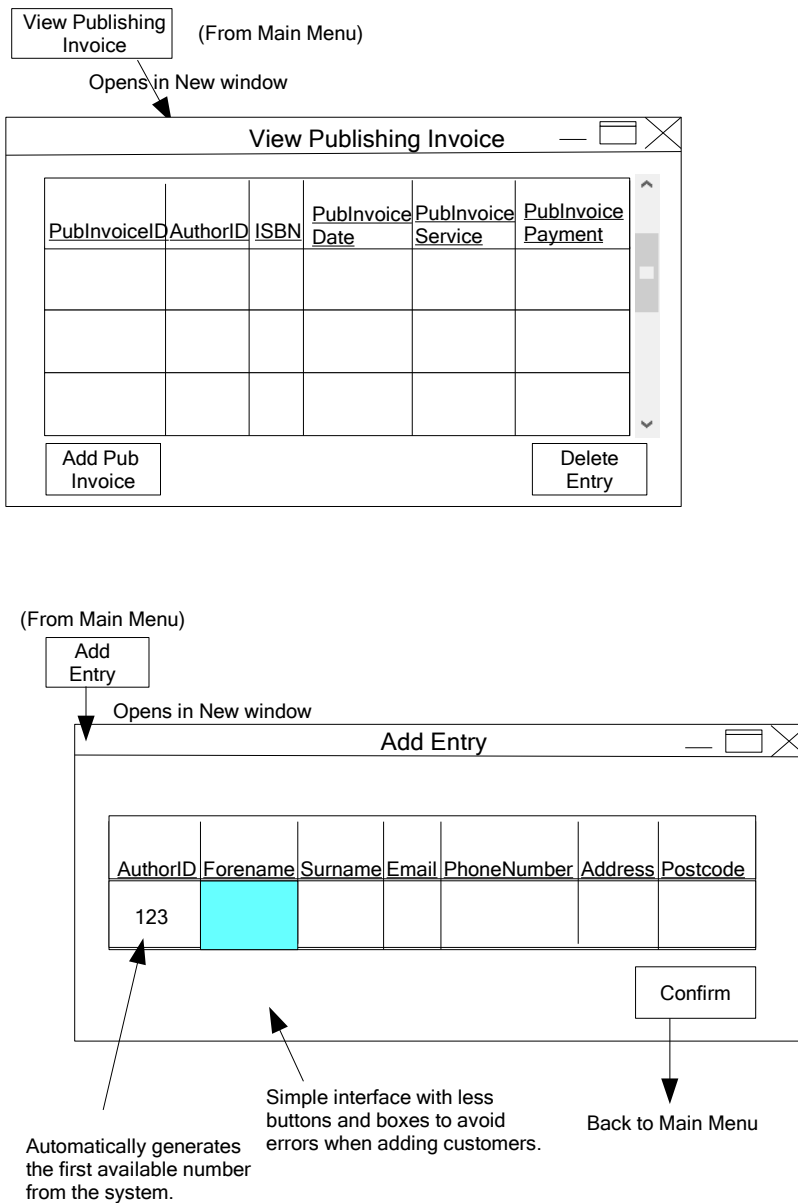Are you sure you want to delete this
customer and all records about them?

Password

Confirm

Confirmation — ▢ ✕

-Customer Name-'s records
have been successfully
erased.

(From Main Menu)

Change
Password

Opens in New window

Change Password — ▢ ✕

Old Password

New Password

Retype Password

Confirm

Confirmation — ▢ ✕

Password Successfully
changed.
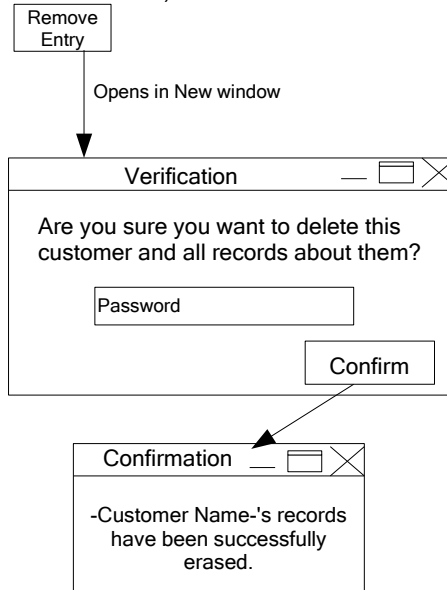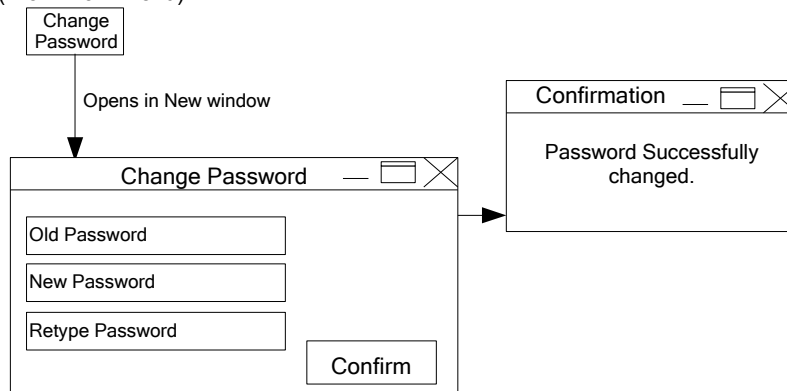
Figure 2.15: Calculations
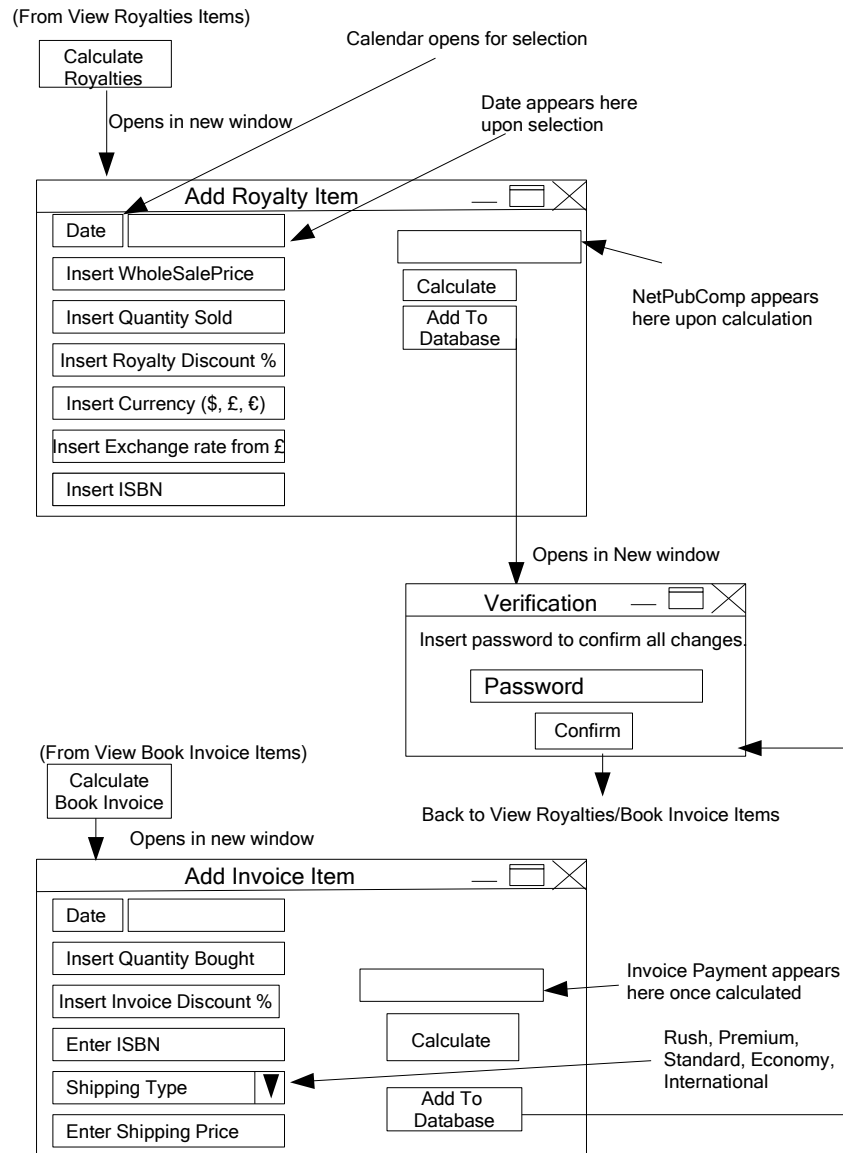
Figure 2.16: Adding Publishing Invoices

(From View Publishing Invoices)

Add Pub
Invoice

Opens in New window

Add Publishing Invoice — ▭ ⌧

Opens Calendar for selection

Date

Enter ISBN

Insert AuthorID

Service Type ▼

Standard, Enhanced,
Colour Publishing,
Reprint

Enter Invoice Payment

Add To
Database

Verification — ▭ ⌧

Insert password to confirm all changes.

Password

Confirm

Back to View Publishing Invoices

Figure 2.17: Add Book

(From View Menu)

AddBook

Opens in New window

Add Book

Date		Cover	▼
Insert AuthorID		Price	
Insert BookTitle		FontSize	
Insert NoOfPages		Paper	▼
Insert Size	▼		
Back	▼		
Insert ISBN			
Font			

Colour,
Black/White

White, Creme

Large (>6x9")
Small (<6x9")

Hard, Soft

Add To
Database

To Calender interface from Search Menu

Verification

Insert password to confirm all changes.

Password

Confirm

Back to View Menu
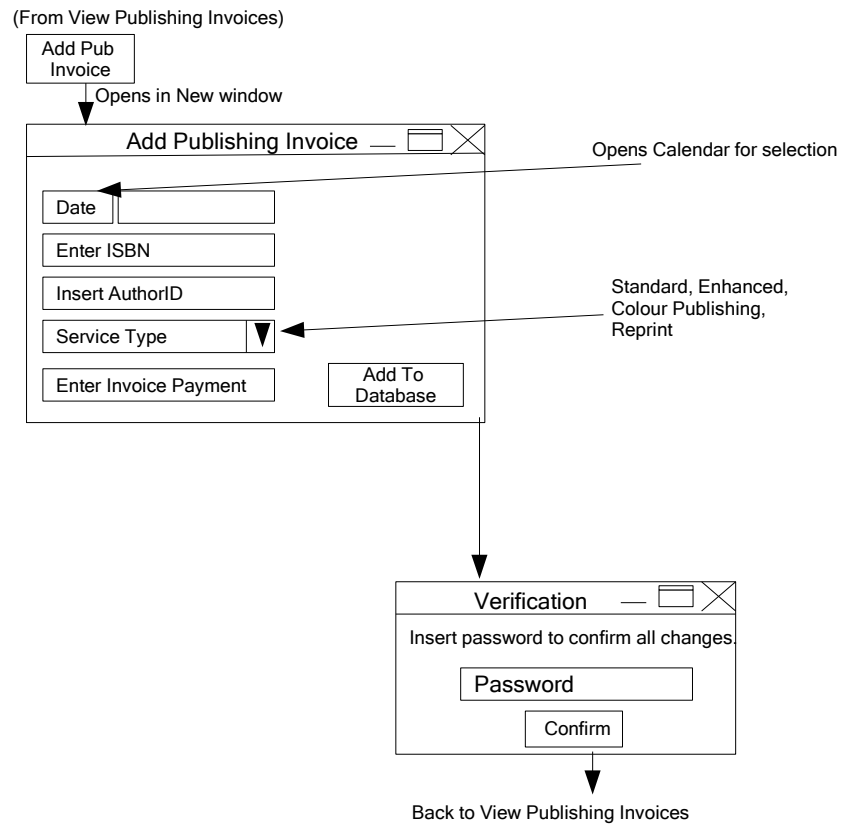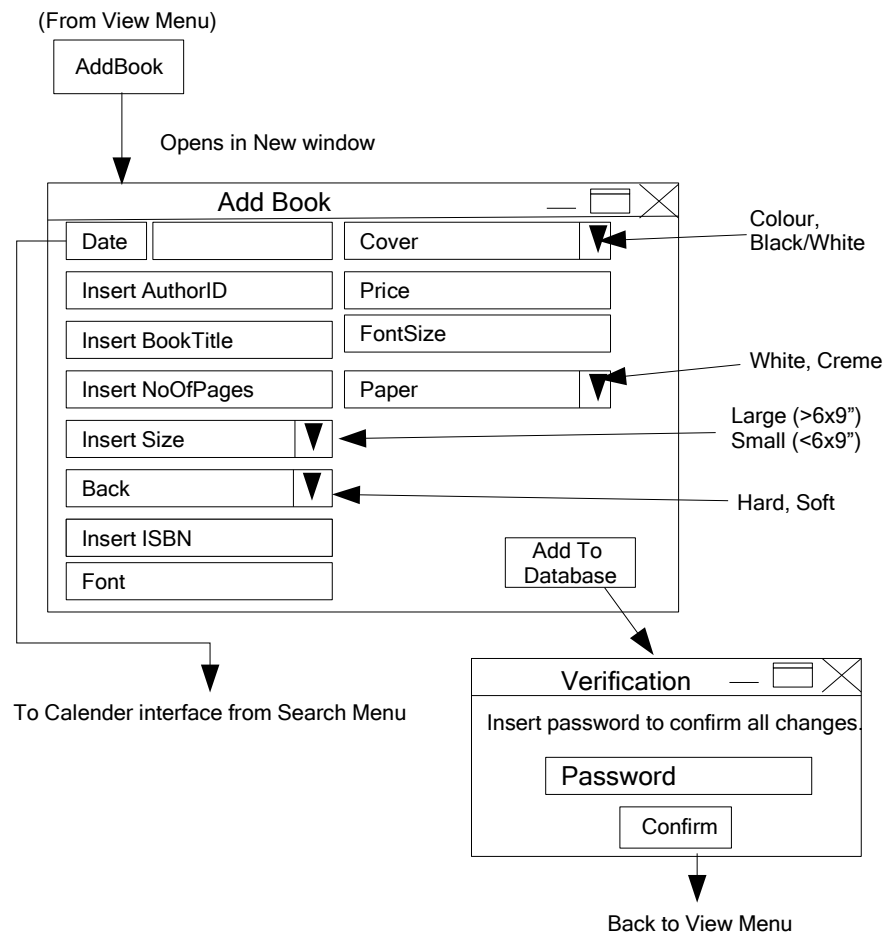
2.3   Hardware Specification

The system needs to be able to run on a laptop with a 1366 x 768, 16:9 aspect ratio screen which runs on Windows 8. This is imperative to the size of the application I will be creating because it must fit on the given screen size and can't be resizable. A mouse or touchpad will be used for navigational purposes, and for confirmation of entries. Also, a keyboard will be used for inputting information into fields for entering and editing information. All the data used by the program and its database will be held on a local hard drive, and a display is needed for the outputs of the program. These are all suitable for their purposes required, and are available to my client, as she already has all of the required input and output devices, software and hardware.

2.4   Program Structure

2.4.1   Top-down design structure charts

.

Figure 2.18: Top-down design structure chart
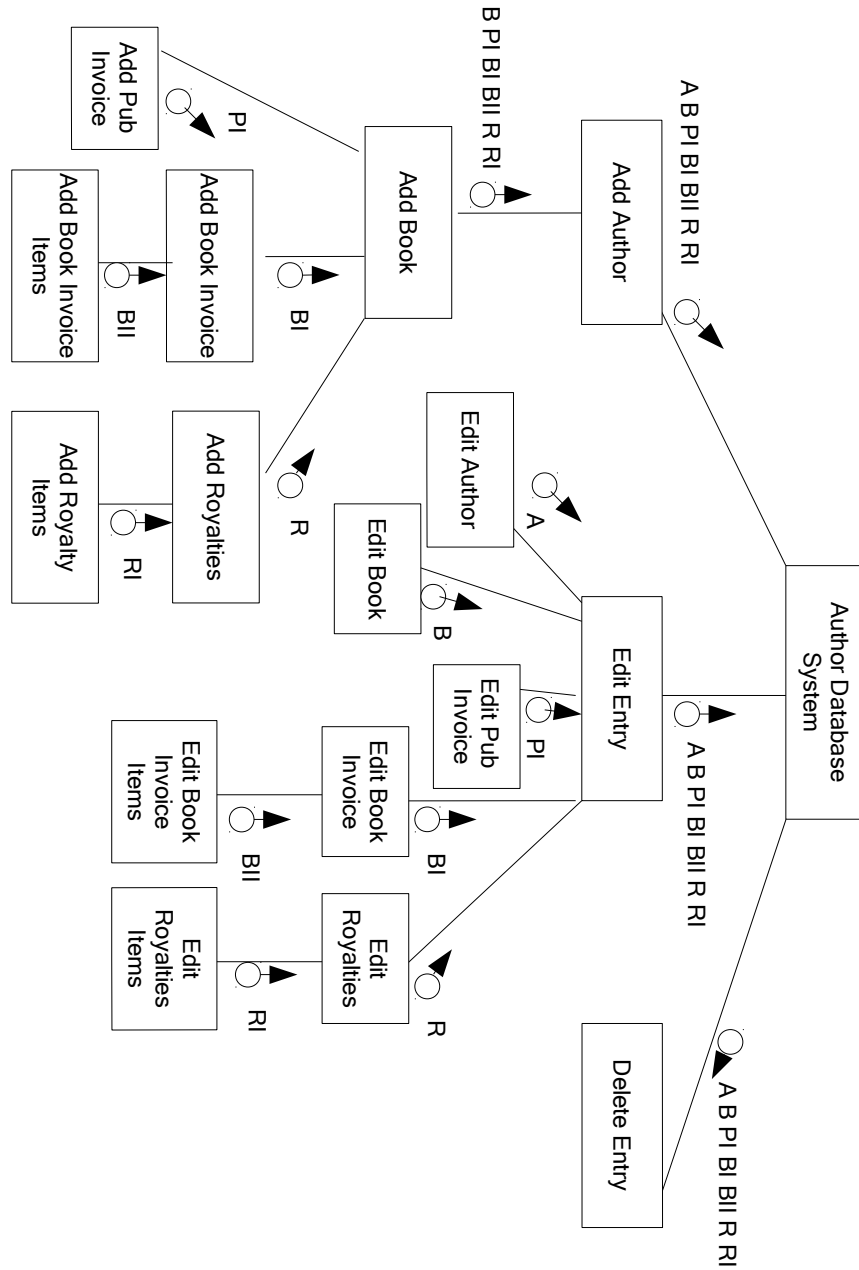
2.4.2   Algorithms in pseudo-code for each data transformation process

---

Algorithm 3 Add Customer Entry

1: **function** ADDENTRY(CustomerTable) Loop = 1
2:     **SET** $GetNewAuthorID$ **TO** $False$
3:     **SET** $ConfirmClicked$ **TO** $False$ NewAuthorID = 0
4:     **WHILE** $GetNewAuthorID = false$ **DO**
     NewAuthorID = loop Get AuthorID[loop] from CustomerTable
5:         **IF** $NewAuthorID = AuthorID[loop]$ **THEN**
     loop = loop +1
6:         **ELSE**
7:             **SET** $GetNewAuthorID$ **TO** $True$
8:         **END IF**
9:     **END WHILE**
     FirstName = null
     LastName = null
     Email = null
     PhoneNumber = null
     Address = null
     Postcode = null
10:     **WHILE** $len(FirstName) <= 0$ **DO**
     INPUT FirstName
11:     **END WHILE**
12:     **WHILE** $len(LastName) <= 0$ **DO**
     INPUT LastName
13:     **END WHILE**
14:     **WHILE** $len(Email) <= 0$ **DO**
     INPUT Email
15:     **END WHILE**
16:     **WHILE** $len(PhoneNumber) <= 0$ **DO**
     INPUT PhoneNumber
17:     **END WHILE**
18:     **WHILE** $len(Address) <= 0$ **DO**
     INPUT Address
19:     **END WHILE**
20:     **WHILE** $len(Postcode) <= 0$ **DO**
     INPUT Postcode
21:     **END WHILE**
22:     **IF** $ConfirmClicked == True$ **THEN**
     CONNECT to Customer Database
23:     **END IF**
24: **END function**

Algorithm 4 Add and Calculate Royalty Items- part 1

1: **SET** *CalculateClicked* **TO** *False*
2: **SET** *AddToDatabaseClicked* **TO** *False*
      Date = null
      WholeSalePrice = null
      QuantitySold = null
      Currency = null
      ExcRateFromGBP = null
      ISBN = null
      RoyaltyDiscount = null
3: **WHILE** $len(Date) <= 0$ **DO**
      INPUT Date
4: **END WHILE**
5: **WHILE** $len(WholeSalePrice) <= 0$ **DO**
      INPUT WholeSalePrice
6: **END WHILE**
7: **WHILE** $len(QuantitySold) <= 0$ **DO**
      INPUT LastName
8: **END WHILE**
9: **WHILE** $len(Currency) <= 0$ **DO**
      INPUT Currency
10: **END WHILE**
11: **IF** $Currency <> \$$ **THEN**
12:     **WHILE** $len(ExcRatefromGBP) <= 0$ **DO**
      INPUT ExcRateFromGBP
13:     **END WHILE**
14: **END IF**
15: **WHILE** $len(ISBN) <= 0$ **DO**
      INPUT ISBN
16: **END WHILE**
17: **WHILE** $len(RoyaltyDiscount) <= 0$ **DO**
      INPUT RoyaltyDiscount
18:     **IF** $RoyaltyDiscount > 100$ **THEN**
      RoyaltyDiscount = null
19:     **END IF**
20:     **IF** $RoyaltyDiscount < 0$ **THEN**
      RoyaltyDiscount = null
21:     **END IF**
22: **END WHILE**

Algorithm 5 Add and Calculate Royalty Items- part 2

1: **IF** $Cover\ ==\ Colour$ **THEN**
     Size = Small
     PagePrice = 0.06 * NoOfPages
2:   **IF** $Back\ ==\ Hard$ **THEN**
     CoverPrice = 5
3:   **END IF**
4:   **IF** $Back\ ==\ Soft$ **THEN**
     CoverPrice = 3
5:   **END IF**
6: **END IF**
7: **IF** $Cover\ ==\ Black/White$ **THEN**
8:   **IF** $Size\ ==\ Large$ **THEN**
     PagePrice = 0.015 * NoOfPages
9:     **IF** $Back\ ==\ Hard$ **THEN**
     CoverPrice = 5
10:     **END IF**
11:     **IF** $Back\ ==\ Soft$ **THEN**
     CoverPrice = 1
12:     **END IF**
13:   **END IF**
14:   **IF** $Size\ ==\ Small$ **THEN**
     PagePrice = 0.01 * NoOfPages
15:     **IF** $Back\ ==\ Hard$ **THEN**
     CoverPrice = 4
16:     **END IF**
17:     **IF** $Back\ ==\ Soft$ **THEN** CoverPrice = 0.7
18:     **END IF**
19:   **END IF**
20: **END IF**
     PrintCost = (PagePrice + CoverPrice) * RoyaltyQuantity
21: **IF** $CalculateClicked\ ==\ True$ **THEN**
     NetSales = WholeSalePrice * RoyaltyQuantity
     RoyaltyPayment = NetSales - PrintCost
     OUTPUT RoyaltyPayment
22: **END IF**
23: **IF** $AddToDatabaseClicked\ ==\ True$ **THEN**
     CONNECT to RoyaltyItems Database
24: **END IF**

Algorithm 6 Add and Calculate Invoice Items

1: **function** ADDINVOICEITEM(BookTable)
2:     **SET** $CalculateClicked$ **TO** $False$
3:     **SET** $AddToDatabaseClicked$ **TO** $False$
      Date = null
      QuantityBought = null
      InvoiceDiscount = null
      ShippingType= null
      ShippingPrice= null
      ISBN = null
4:     **WHILE** $len(Date) <= 0$ **DO**
      INPUT Date
5:     **END WHILE**
6:     **WHILE** $len(QuantityBought) <= 0$ **DO**
      INPUT QuantityBought
7:     **END WHILE**
8:     **WHILE** $len(InvoiceDiscount) <= 0$ **DO**
      INPUT InvoiceDiscount
9:       **IF** $InvoiceDiscount > 100$ **THEN**
      InvoiceDiscount = null
10:       **END IF**
11:       **IF** $InvoiceDiscount < 0$ **THEN**
      InvoiceDiscount = null
12:       **END IF**
13:     **END WHILE**
14:     **WHILE** $len(ISBN) <= 0$ **DO**
      INPUT ISBN
15:     **END WHILE**
16:     **WHILE** $len(ShippingType) <= 0$ **DO**
      INPUT ShippingType
17:     **END WHILE**
18:     **WHILE** $len(ShippingPrice) <= 0$ **DO**
      INPUT ShippingPrice
19:     **END WHILE**
20:     **IF** $CalculateClicked == True$ **THEN**
      InvoicePayment = (QuantityBought * Price * InvoiceDiscount) + Shipping Price
      OUTPUT InvoicePayment
21:     **END IF**
22:     **IF** $AddToDatabaseClicked == True$ **THEN**
      CONNECT to Invoice Database
23:     **END IF**
24: **END function**

Algorithm 7 Add Book

1: **function** ADDINVOICEITEM(CustomerTable)
2: 　　**SET** *AddToDatabaseClicked* **TO** *False*
　　　DatePublished = null
　　　ISBN = null
　　　AuthorID = null
　　　BookTitle = null
　　　NoOfPages = null
　　　Size = null
　　　Back = null
　　　Cover = null
　　　Paper = null
　　　Font = null
　　　FontSize = null
　　　Price = null
3: 　　**WHILE** $len(DatePublished) <= 0$ **DO**
　　　INPUT DatePublished
4: 　　**END WHILE**
5: 　　**WHILE** $len(ISBN) <= 0$ **DO**
　　　INPUT ISBN
6: 　　**END WHILE**
7: 　　**WHILE** $len(BookTitle) <= 0$ **DO**
　　　INPUT BookTitle
8: 　　**END WHILE**
9: 　　**WHILE** $len(Size) <= 0$ **DO**
　　　INPUT Size
10: 　　**END WHILE**
11: 　　**WHILE** $len(BackType) <= 0$ **DO**
　　　INPUT BackType
12: 　　**END WHILE**
13: 　　**WHILE** $len(NoOfPages) <= 0$ **DO**
　　　INPUT NoOfPages
14: 　　**END WHILE**
15: 　　**WHILE** $len(Paper) <= 0$ **DO**
　　　INPUT Paper
16: 　　**END WHILE**
17: 　　**WHILE** $len(Font) <= 0$ **DO**
　　　INPUT Font
18: 　　**END WHILE**
19: 　　**WHILE** $len(FontSize) <= 0$ **DO**
　　　INPUT FontSize
20: 　　**END WHILE**
21: 　　**WHILE** $len(Price) <= 0$ **DO**
　　　INPUT Price
22: 　　**END WHILE**
23: 　　**IF** *AddToDatabaseClicked* $==$ *True* **THEN**
　　　CONNECT to Book Database
24: 　　**END IF**
　　　　　　　　61
25: **END function**

Algorithm 8 Add and Publishing Invoice
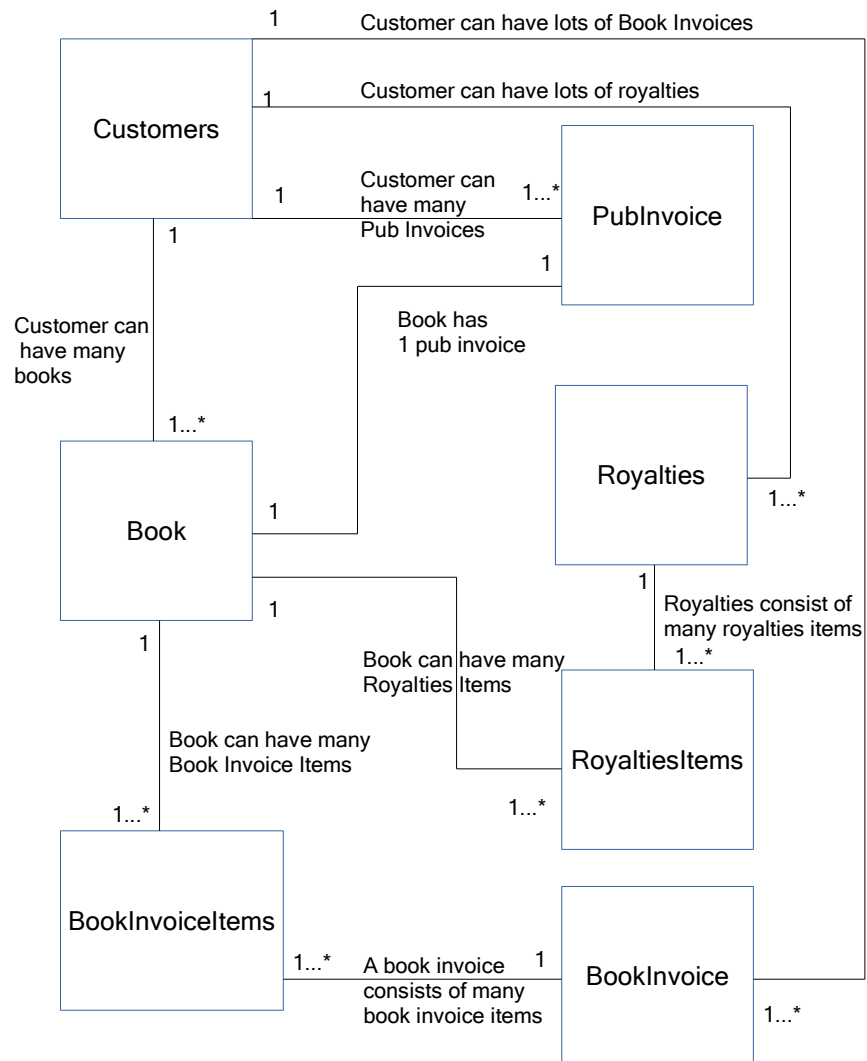

1: **function** ADDINVOICEITEM(BookTable, CustomerTable)
2:     **SET** *AddToDatabaseClicked* **TO** *False*
         Date = null
         AuthorID = null
         ServiceType = null
         InvoicePayment= null
         ISBN = null
3:     **WHILE** $len(Date) <= 0$ **DO**
         INPUT Date
4:     **END WHILE**
5:     **WHILE** $len(AuthorID) <= 0$ **DO**
         INPUT AuthorID
6:     **END WHILE**
7:     **WHILE** $len(InvoicePayment) <= 0$ **DO**
         INPUT InvoicePayment
8:     **END WHILE**
9:     **WHILE** $len(ISBN) <= 0$ **DO**
         INPUT ISBN
10:     **END WHILE**
11:     **WHILE** $len(ServiceType) <= 0$ **DO**
         INPUT ServiceType
12:     **END WHILE**
13:     **IF** *AddToDatabaseClicked* == *True* **THEN**
         CONNECT to PubInvoice Database
14:     **END IF**
15: **END function**

2.4.3   Object Diagrams

Figure 2.19: Object Diagram

2.4.4   Class Definitions

Key:

Label
Attributes
Behaviours

Customer
Author ID
ForeName
Surname
Email
Address
Postcode
Phone Number
Add ForeName
Edit Forename
Add Surname
Edit Surname
Add Email
Edit Email
Add Address
Edit Address
Add Postcode
Edit Postcode
Add Phone Number
Edit Phone Number

Book
ISBN
AuthorID
BookTitle
NoOfPages
Size
Cover
Back
Paper
Font
FontSize
Price
DatePublished
Add ISBN
Edit ISBN
Add AuthorID
Edit AuthorID
Add BookTitle
Edit BookTitle
Add NoOfPages
Edit NoOfPages
Add Size
Edit Size
Add Cover
Edit Cover
Add Back
Edit Back
Add Paper
Edit Paper
Add Font
Edit Font
Add FontSize
Edit FontSize
Add DatePublished
Edit DatePublished
Add Price
Edit Price

Royalties
RoyaltiesID
AuthorID
RoyaltyPayment
RoyaltiesDate
Add AuthorID
Edit AuthorID
Add RoyaltiesDate
Edit Royalties Date

Royalties Items
RoyaltiesItems
RoyaltiesID
ISBN
Currency
RoyaltyDiscount
WholesalePrice
RoyaltyQuantity
NetSales
PrintCost
ExcRateFromGBP
Add RoyaltiesID
Edit RoyaltiesID
Add ISBN
Edit ISBN
Add Currency
Edit Currency
Add RoyaltyDiscount
Edit RoyaltyDiscount
Add WholesalePrice
Edit WholesalePrice
Add RoyaltyQuantity
Edit RoyaltyQuantity
Add ExcRateFromGBP
Edit ExcRateFromGBP

BookInvoice
BookInvoiceID
AuthorID
BookInvoicePayment
BookInvoiceDate
Add AuthorID
Edit AuthorID
Add BookInvoiceDate
Edit BookInvoiceDaate

BookInvoiceItems
BookInvoiceItems
BookInvoiceID
ISBN
BookInvoiceQuantity
BookInvoiceDiscount
ShippingType
ShippingPrice
Add BookInvoiceID
Edit BookInvoiceID
Add ISBN
Edit ISBN
Add BookInvoiceQuantity
Edit BookInvoiceQuantity
Add BookInvoiceDiscount
Edit BookInvoiceDiscount
Add ShippingType
Edit Shipping Type
Add ShippingPrice
Edit ShippingPrice

PubInvoice
PubInvoiceID
AuthorID
ISBN
PubInvoiceDate
PubInvoiceService
PubInvoicePayment
Add AuthorID
Edit AuthorID
Add ISBN
Edit ISBN
Add PubInvoiceDate
Edit PubInvoiceDate
Add PubInvoiceService
Edit PubInvoiceService
Add PubInvoicePayment
EditPubInvoicePayment

2.5   Prototyping

It will be helpful to create a prototype of the main menu to make sure that different windows can be navigated through without any difficulty. This would give me a good idea of the flow of control between interfaces. Also, I plan to

prototype a log in screen, because this would help me identify the difficulties involved in moving to and from the main menu and log in screen.

Furthermore, I plan to prototype the adding, editing and removal of data to and from the database. I am going to prototype this in order to make sure that data can be successfully added, edited and removed to and from the database so that it can be confirmed that this can be conducted upon creation of the program.

I have already prototyped the calendar interface used for inputting the date in a box. This is just a prototype of the basic interface, which is for selecting a date and placing it in the text box. It can switch between months with a dropdown list, or using the arrows and also years.
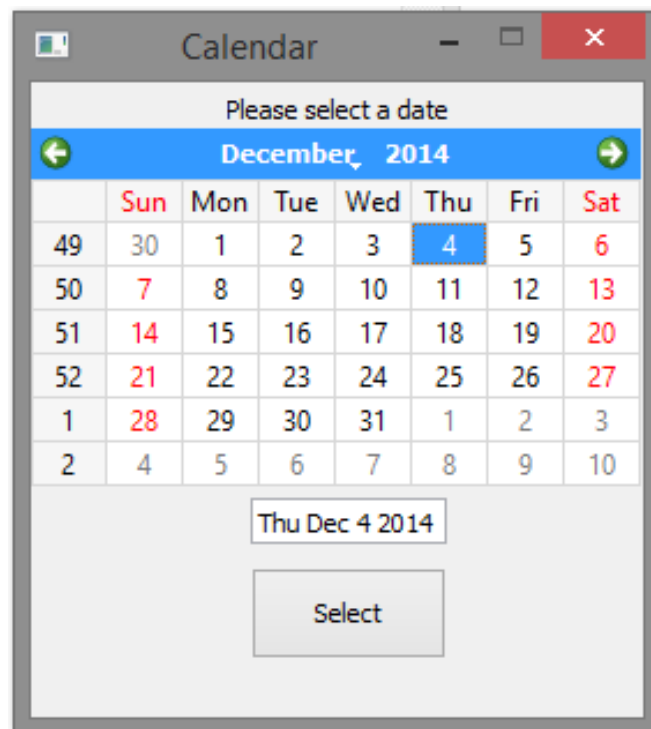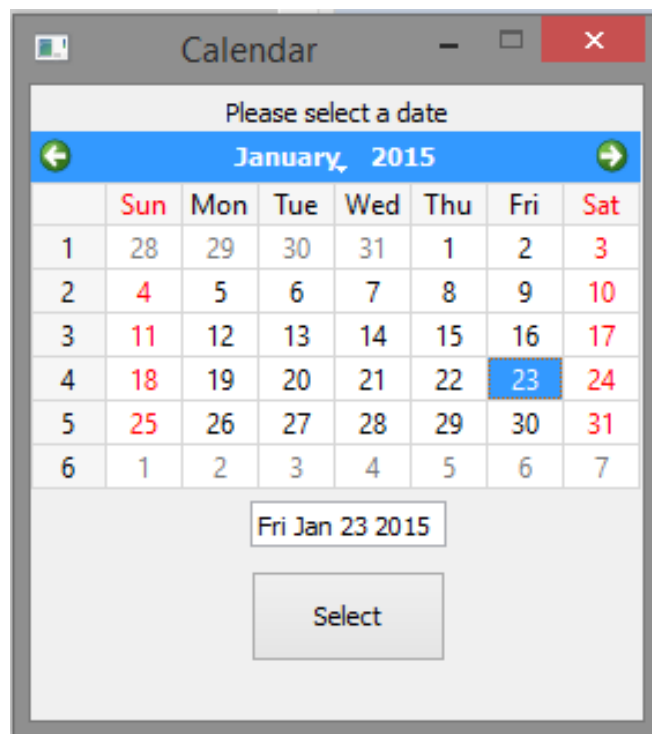
Figure 2.20: Calendar Interface

Figure 2.21: Calendar - Date Selection

2.6   Definition of Data Requirements

2.6.1   Identification of all data input items

- First Name
- Last Name
- Email
- Phone Number
- Address
- Postcode
- ISBN
- Book Title
- Number of pages
- Size
- Back type
- Cover type
- Paper type
- Font
- Font size
- Date published
- Price
- Currency
- Royalties date
- Royalty discount
- Wholesale price
- Royalty Quantity
- Exchange rate from pounds
- Publishing invoice date
- Publishing invoice service
- Publishing invoice payment
- Book invoice date

- Book invoice discount
- Book invoice quantity
- Shipping price
- Shipping type

2.6.2   Identification of all data output items

- Author ID
- Royalties ID
- Publishing Invoice ID
- Books Invoice ID
- Net Sales
- Print Cost
- Royalty Payment
- Net Publishing Compensation
- Book Invoice Payment
- Royalties Items
- Book Invoice Items

2.6.3   Explanation of how data output items are generated

Output	How it is produced	Input Items Required to Produce
Author ID	Generated by program, using first available unused number	
Royalties ID	Generated by program, using first available unused number	
Publishing Invoice ID	Generated by program, using first available unused number	
Book Invoice ID	Generated by program, using first available unused number	
Net Sales	Calculated using WholesalePrice x Quantity	Wholesale Price, Royalty Quantity
Print Cost	Calculated by program using certain criteria for some details of the book	Number of Pages, Size, Back type, Cover type, Royalty Quantity
Royalty Payment	Calculated by program using calculations of all payments under the same RoyaltiesID	
Book Invoice Payment	Calculated by program using calculations of all payments under the same BookInvoiceID	Book Invoice Quantity, Book Invoice Discount, Price, Shipping Price
Royalties Items	Generated by program, using first available unused number	
Book Invoice Items	Generated by program, using first available unused number	

2.6.4   Data Dictionary

There have been some changes to my data dictionary as a number of elements have been identified that need to be added to the system.

Name	Data Type	Length	Validation	Example Data
Firstname	String	2-20 Characters	Length	Jo
Lastname	String	2-20 Characters	Length	Williamson
Email	String	7-30 Characters	Length	jo@mail.com
Phonenumber	String	9-15 Characters	Format	07123456789
Address	String	5-64 Characters	Length	Example Road
Postcode	String	7 Characters	Format	AB1 2CD
AuthorID	Integer	1-255	Unique in table, not Null	17
ISBN	String	13 Characters	Length	9780007525492
BookTitle	String	1-127 Characters	Length	The Hobbit
NoOfPages	Integer	1-1023	Range	395
Size	String	5	Existence	Large
Back	String	8 or 9 Characters	Existence	Paperback
Cover	String	3 or 5 Characters	Existence	Gloss
Paper	String	11 Characters	Existence	White Paper
Font	String	1-64 Characters	Length	Arial
FontSize	Real	8-64	Numbers only	12.5
DatePublished	Date	dd/mm/yyyy	Range	23/10/2014
Price	Real	0.01-63.00	Numbers only	£12.99
RoyaltiesID	Integer	1-255	Unique in table, not Null	123
RoyaltiesItems	Integer	1-511	Unique in table, not Null	12
Currency	String	1 Character	Pound, Dollar or Euro sign	£
RoyaltyPayment	Real	1-32767	Numbers only	489.92
RoyaltiesDate	Date	dd/mm/yyyy	Range	03/12/2014

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Name	Data Type	Length	Validation	Example Data
RoyaltyDiscount	Real	0-100	Numbers only	40
WholeSalePrice	Real	0.01-63.00	Numbers only	7.99
RoyaltyQuantity	Integer	1- 2047	Numbers only	192
NetSales	Real	0.01-32767.00	Numbers only	900.00
PrintCost	Real	0.01-32767.00	Numbers only	800.00
ExcRateFromGBP	Real	0-1027	Numbers only	1.67
PubInvoiceID	Integer	1-511	Unique in table, not Null	123
PubInvoiceDate	Date	dd/mm/yyy	Range	23/05/2014
PubInvoiceService	String	1-127 Characters	Length	Standard
PubInvoicePayment	Real	0.01-32767.00	Numbers only	700.00
BookInvoiceID	Integer	1-255	Unique in table, not Null	99
BookInvoiceItems	Integer	1-255	Unique in table, not Null	2
BookInvoicePayment	Real	0.01-32767.00	Numbers only	600.00
BookInvoiceDate	Date	dd/mm/yyyy	Range	01/01/2014
BookInvoiceDiscount	Real	0-100	Numbers only	50
BookInvoiceQuantity	Integer	1-2047	Numbers only	777
Shipping Type	String	7-8 Characters	Range	Premium
Shipping Price	Real	0.01-64.00	Numbers only	25.00

2.6.5   Identification of appropriate storage media

A hard drive, such as the hard drive in my client's laptop, would be an example of appropriate storage media. For back up purposes, an external hard disk would be the optimal solution, because it is portable, meaning it can be kept
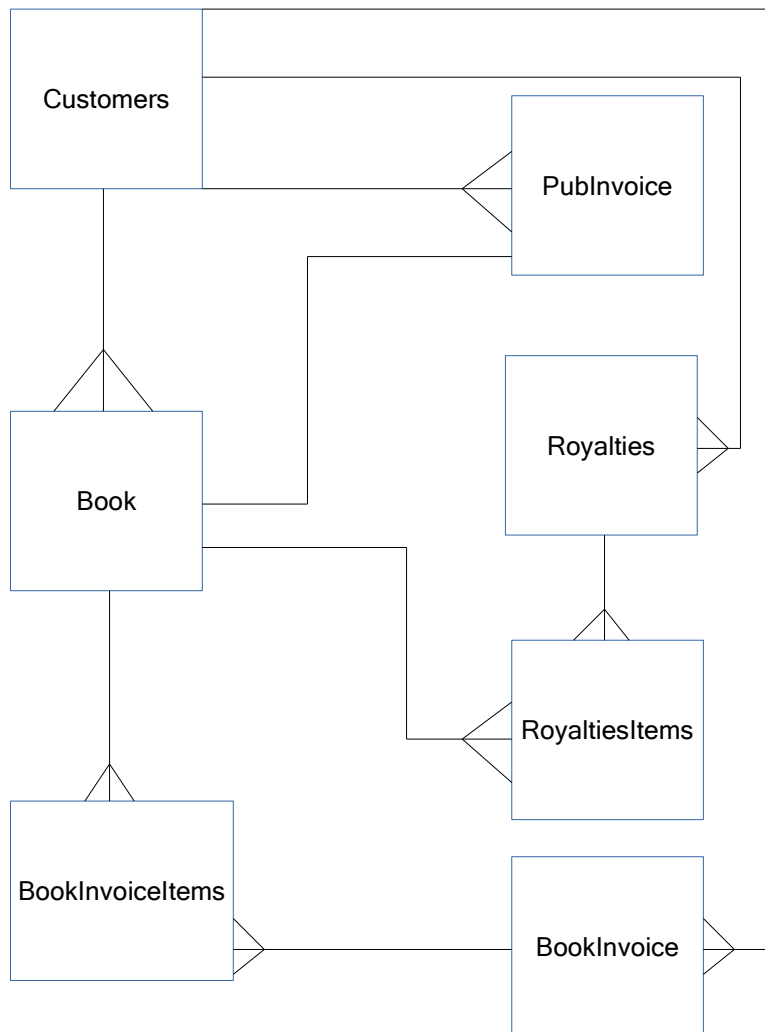
off site, as well as being able to hold all data files on it. The database will be needed to be kept for long term storage. This is the data will be required to be accessed a number of times.

2.7   Database Design

2.7.1   Normalisation

ER Diagrams

Figure 2.22: ER Diagram

Entity Descriptions

Customer(<u>Author ID</u>, FirstName, LastName, Email, Address, Postcode, Phone Number)

Book(<u>ISBN</u>, *AuthorID*, Book Title, NoOfPages, Size, Cover, Paper, Back, Paper, Font, FontSize, DatePublished, Price)

BookInvoice(<u>BookInvoiceID</u>, *AuthorID*, BookInvoiceDate, BookInvoicePayment)

BookInvoiceItems(<u>BookInvoiceItems</u>, *BookInvoiceID*, *ISBN*, BookInvoiceQuantity, BookInvoiceDiscount, ShippingPrice, ShippingType)

Royalties(<u>RoyaltiesID</u>, *AuthorID*, RoyaltiesDate, RoyaltyPayment)

RoyaltiesItems(<u>RoyaltiesItems</u>, *RoyaltiesID*, *ISBN*, Currency, RoyaltyDiscount, WholesalePrice, RoyaltyQuantity, NetSales, PrintCost, ExcRateFromGBP)

PubInvoice(<u>PubInvoiceID</u>, *AuthorID*, *ISBN*, PubInvoiceDate, PubInvoiceOrder, PubInvoicePayment)

UNF to 3NF

Key:

Bold Font = Primary Key

Italics = Foreign Key

Each Column represents a new group.

First of all, I have started with the data in its unnormalised form.

FirstName
LastName
Email
PhoneNumber
Address
PostCode
AuthorID
ISBN
BookTitle
NoOfPages
Size
Back
Cover
Paper
Font
FontSize
DatePublished
Price
RoyaltiesID
RoyaltiesItems
Currency
RoyaltyPayment
RoyaltiesDate
RoyaltyDiscount
WholeSalePrice
RoyaltyQuantity
NetSales
PrintCost
ExcRateFromGBP
PubInvoiceID
PubInvoicePayment
PubInvoiceDate
PubInvoiceService
BookInvoiceID
BookInvoiceItems
BookInvoicePayment
BookInvoiceDate
BookInvoiceDiscount
BookInvoiceQuantity
ShippingType
ShippingPrice

Then, I put it into the first normal form, seperating the repeating attributes
and the non-repeating attributes.

AuthorID	ISBN
FirstName	AuthorID
LastName	BookTitle
Email	NoOfPages
PhoneNumber	Size
Address	Back
PostCode	Cover
	Paper
	Font
	FontSize
	DatePublished
	Price
	RoyaltiesID
	RoyaltiesItems
	Currency
	RoyaltyPayment
	RoyaltiesDate
	RoyaltyDiscount
	WholeSalePrice
	RoyaltyQuantity
	NetSales
	PrintCost
	ExcRateFromGBP
	PubInvoiceID
	PubInvoiceDate
	PubInvoiceService
	PubInvoicePayment
	BookInvoiceID
	BookInvoiceItems
	BookInvoicePayment
	BookInvoiceDate
	BookInvoiceDiscount
	BookInvoiceQuantity
	ShippingType
	ShippingPrice

After that, I put it into the second normal form.

AuthorID	**ISBN**	**ISBN**
FirstName	**AuthorID**	BookTitle
LastName	RoyaltiesID	NoOfPages
Email	Currency	Size
PhoneNumber	RoyaltyPayment	Back
Address	RoyaltiesDate	Cover
PostCode	RoyaltyDiscount	Paper
	WholeSalePrice	Font
	RoyaltyQuantity	FontSize
	NetSales	DatePublished
	PrintCost	Price
	ExcRateFromGBP	
	PubInvoiceID	
	PubInvoiceDate	
	PubInvoiceService	
	PubInvoicePayment	
	BookInvoiceID	
	BooInvoiceItems	
	BookInvoicePayment	
	BookInvoiceDate	
	BookInvoiceDiscount	
	BookInvoiceQuantity	
	ShippingType	
	ShippingPrice	

Finally, I put the data into its third normal form.

AuthorID	**ISBN**	**RoyaltiesID**	**RoyaltiesItems**
FirstName	*AuthorID*	*AuthorID*	*RoyaltiesID*
LastName	BookTitle	RoyaltyPayment	*ISBN*
Email	NoOfPages	RoyaltiesDate	Currency
PhoneNumber	Size		RoyaltyDiscount
Address	Back		WholeSalePrice
PostCode	Cover		RoyaltyQuantity
	Paper		NetSales
	Font		PrintCost
	FontSize		ExcRateFromGBP
	DatePublished		
	Price		

PubInvoiceID	**BooksInvoiceID**	**BooksInvoiceItems**
AuthorID	*AuthorID*	*BooksInvoiceID*
ISBN	BookInvoicePayment	*ISBN*
PubInvoiceDate	BookInvoiceDate	BookInvoiceQuantity
PubInvoiceService		BookInvoiceDiscount
PubInvoicePayment		ShippingType
		ShippingPrice

2.7.2   SQL Queries

I am using Python to format the SQL query text strings.

SQL	Descriptions
"""insert into Customer(FirstName, LastName, Email, PhoneNumber, Address, Postcode) values (Ex, ample, example@mail.com, 07123456789, 1 example road, AB1 2CD) """	An example of an SQL statement which adds customer records to the database. Here, it is entering a new customer record with the attributes: Firstname, Lastname, Email, Phonenumber, Address and Postcode.
"""create table RoyaltiesItems(RoyaltiesID INTEGER, Currency REAL, RoyaltyDiscount STRING, WholeSalePrice REAL, RoyaltyQuantity INTEGER, NetSales REAL, PrintCost REAL, ExcRateFromGBP STRING PRIMARY KEY(RoyaltiesItems) FOREIGN KEY(RoyaltiesID) REFERENCES Royalties(RoyaltiesID) """	An example of an SQL statement that creates a new table for the Royalties. There is a primary key which is RoyaltiesItems, and there is one foreign key, which is RoyaltiesID.
"""select LastName, BookTitle from Customer, Book where Price = 13.00 and Back = Paperback """	This statement will return all the LastNames and the BookTitles from the Customer table and the Book table whose book is paperback and costs £13.
"""update Customer set Firstname = 'John', Lastname = 'Smith' where AuthorID = 1 """	This statement will update the Firstname to 'John' and Lastname to 'Smith' of an entry in the Customer table where the AuthorID = 1.
"""delete from Customer where AuthorID = 1 """	This statement will delete the entry in the Customer table where the AuthorID = 1
"""select * from RoyaltiesItems where Currency = '£' and Firstname from Customer = 'John'"""	This statement will fetch all the RoyaltiesItems where the Currency is in GBP, and the firstname of the corresponding author is John.

2.8 Security and Integrity of the System and Data

2.8.1 Security and Integrity of Data

The system will store personal data about the customers and will comply to the Data Protection Act. This means that the data requires sufficiently frequent checks, so there will be a way to edit and change the information using the program. All the data in the database must be kept securely, so that it can only be granted access to someone with the use of a password. To ensure that all data stored is valid, everytime the user adds data to the database, a check will be conducted to ensure that the data is valid. I need to keep referential integrity in the database so that there are never any records with missing key data upon any removals and the database will be encrypted.

2.8.2 System Security

The database will be password protected to make sure that only users who know the password can access the database. This will keep the number of users of the database to a minimum. This can prevent the data from being tampered with or stolen. The database will be encrypted in order to avoid unwanted people having access to the data without the use of the system, therefore the number of people who can access the data can be determined beforehand.

2.9 Validation

The system will check to make sure each entry is valid, in order to avoid any invalid entries into the database.

Item	Example	Validation	Comments
FirstName	John	Presence Check, Type Check	Makes sure that a name is entered, and that the name is just letters.
LastName	Smith	Presence Check, Type Check	Makes sure that a name is entered, and that the name is just letters.
Email	test@mail.com	Presence Check, Type Check	Makes sure that an email is entered and that the @ symbol comes before the '.' in the email.
PhoneNumber	07123456789	Presence Check	Makes sure that a phone number is entered.
Address	1 Example Road	Presence Check	Makes sure that an address is entered.
Postcode	AB1 2CD	Presence Check	Makes sure that a Postcode is entered.
ISBN	9780748782987	Presence Check, Length Check	Makes sure that an ISBN is entered and is not longer than 13 digits.
BookTitle	Computing A2 Text Book	Presence Check	Makes sure that a Book Title has been entered.
NoOfPages	395	Presence Check, Type Check	Makes sure that a positive integer has been entered.
Size	Large	Presence Check	Makes sure that a Size has been entered.
Back	Hard	Presence Check	Makes sure that a Back type has been entered.
Cover	Colour	Presence Check	Makes sure that a Cover type has been entered.
Paper	White	Presence Check	Makes sure that a Paper type has been entered.
Font	Microsoft Sans Serif	Presence Check	Makes sure that a Font has been entered.

Item	Example	Validation	Comments
FontSize	12	Presence Check, Type Check	Makes sure that a positive value has been entered, and just digits.
DatePublished	25 Dec 2014	Presence Check, Type Check	Makes sure that a Date has been entered.
Price	8.99	Presence Check, Type Check	Makes sure that a positive value has been entered, and just digits.
Currency	£	Presence Check, Type Check	Makes sure that the correct symbol has been entered.
RoyaltiesDate	25 Dec 2014	Presence Check, Type Check	Makes sure that a Date has been entered.
RoyaltyDiscount	50	Presence Check, Type Check, Range Check	Makes sure that a positive value has been entered, just digits, and it must be between 0 and 100.
WholesalePrice	5.99	Presence Check, Type Check	Makes sure that a positive value has been entered, and just digits.
RoyaltyQuantity	150	Presence Check, Type Check	Makes sure that a positive integer has been entered.
ExcRate FromGBP	1.67	Presence Check, Type Check	Makes sure that a value has been entered.
Pub Invoice Date	25 Dec 2014	Presence Check, Type Check	Makes sure that a Date has been entered.
Pub Invoice Service	Standard	Presence Check	Makes sure that a Service has been entered.
Pub Invoice Payment	£1659.99	Presence Check, Type Check	Makes sure that a positive value has been entered.

Item	Example	Validation	Comments
Book Invoice Date	25 Dec 2014	Presence Check, Type Check	Makes sure that a Date has been entered.
Book Invoice Discount	50	Presence Check, Type Check, Range Check	Makes sure that a positive value has been entered, just digits, and it must be between 0 and 100.
Book Invoice Quantity	25	PresenceCheck, Type Check	Makes sure that a positive integer has been entered.
Shipping Type	Premium	Lookup check	Makes sure that a Shipping type has been entered.
Shipping Price	4.00	Presence Check, Type Check	Makes sure that a positive value has been entered, and just digits.
AuthorID	21	Presence Check, Type Check, Look up Check	Makes sure that an integer has been entered, and will check the Customer Table to find the entry to confirm that it is valid.
RoyaltiesID	21	Presence Check, Type Check, Look up Check	Makes sure that an integer has been entered, and will check the Royalties Table to find the entry to confirm that it is valid.
PubInvoiceID	21	Presence Check, Type Check, Look up Check	Makes sure that an integer has been entered, and will check the PubInvoice Table to find the entry to confirm that it is valid.
BookInvoiceID	21	Presence Check, Type Check, Look up Check	Makes sure that an integer has been entered, and will check the Book Invoice Table to find the entry to confirm that it is valid.

2.10 Testing

2.10.1 Outline Plan

Test Series	Purpose of Test Series	Testing Strategy	Strategy Rationale
1	Testing the flow of control between user interfaces	Top-down Testing	
2	Testing the validation of input data	Bottom-up testing	All components are to be tested after development
3	Testing the algorithms' functionality	White box testing	
4	Testing that the information has been successfully stored, and in the right places	Black box testing	
5	Testing the system and whether it meets the requirements	System testing	

2.10.2 Detailed Plan

Test Series	Purpose of Test	Test Description	Test Data	Test Data Type (Normal/ Erroneous/ Boundary)	Expected Result	Actual Result	Evidence

1.1	Test the Log in button on the log in sreen	This should check whether the password and email match and exist in a record	Click the log in button	Normal	If the email and pass-word match, the main menu should open, else the pro-gram should prompt the user with an error		
1.2	Test the View button on the main menu	This button links the main menu to the view menu.	Click the View Button	Normal	The program should open the View Menu in a new window		
1.3	Testing the Log Out button on the Main Menu	This button links to the Login screen, where the user is required to log in again	Click the Log out button	Normal	The screen should switch to the log out screen		

1.4	Testing the Search Database button on the Main Menu	This button should prompt a seperate interface to open, and show details which can be used to search for specific items in the database	Click the Search Database button	Normal	The program should open a new window consisting of the Search Database screen		
1.5	Testing the Add Entry button on the Main Menu	This button should prompt a seperate interface to open and show the Add Entry screen	Click the Add Entry button	Normal	The program should open the Add Entry screen in a new window		
1.6	Testing the Edit Entry button from the Main Menu	This button links to the Editing screen	Click the Edit Entry button	Normal	The program should switch to the Editing screen from the Main Menu		

1.7	Testing the Edit Entry button after an entry has been selected beforehand	These conditions should open the Edit Entry screen upon clicking Edit Entry, with data on the selected entry already filled in on the grid	Click on an entry, and then click Edit Entry	Normal	The program should open the Edit Entry screen in a new window		
1.8	Testing the Remove Entry Button after an entry has been selected beforehand	These conditions should prompt the user for verification on deleting a selected customer record	Click on an entry and then click Remove Entry	Normal	The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record		

1.9	Testing the Change Password Button on the Main Menu	This button prompts the Change Password window to open	Click the Change Password button	Normal	The program should open the Change Password window, with fields required to be filled in in order to change the password		
1.10	Testing the Quick Search button on the Main Menu	This button returns the customer that matches the entered AuthorID	Type in a Lastname and click QuickSearch	Normal	The program should return the customer that matches the entered Lastname and show it in the grid		
1.11	Testing the back button on the View Menu	This button returns back to the main menu	Click Back	Normal	The program should return back to the main menu		

1.12	Testing the Add Book Button on the View Menu	This button opens up a new window for adding a book	Click Add Book	Normal	The program should open a new window for adding a book		
1.13	Testing the View Publishing Invoice button on the View Menu	This button opens up a new window displaying details about the selected book's publishing invoice	Click View Publishing invoice	Normal	The program should open a new window containing details about the selected book's publishing invoice		
1.14	Testing the View Royalties button on the View Menu	This button opens up a new window displaying details about the selected book's royalties	Click View Royalties	Normal	The program should open a new window containing details about the selected book's royalties		

1.15	Testing the View Book Invoice button on the View Menu	This button opens up a new window displaying details about the selected book's book invoices	Click View Book Invoices	Normal	The program should open a new window containing details about the selected book's book invoices		
1.16	Testing the Delete book button on the View Menu	This button opens up a new window asking for verification on deleting a selected book record	Click Delete book	Normal	The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record		

2.1	Verify that some criteria has been entered when using the search	At least one set of the input boxes and drop-down lists must have been filled in or selected from, else the program will prompt the user about the error	Selected from list with names and values entered Selected from list, values entered and no names entered Just values entered Nothing	Normal Normal Erroneous Erroneous	Accept Accept Error Error		
2.2	Verify that a valid email has been entered on the log in screen	The program will prompt the user telling them they have inputted an error	test@testmail.com helloworld test @test-mail.com test.com@testmail	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.3	Verify that a valid First-name has been entered when adding an entry	The user will be prompted with an error	John Jo hn Jo?hn Jo2n	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		

2.4	Verify that a valid Lastname has been entered when adding an entry	The user will be prompted with an error	Smith Sm ith Smi!th Smi1th	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.5	Verify that a valid Phonenumber has been entered when adding an entry	The user will be prompted with an error	07123456789 07123123.3 071CO2	Normal Erroneous Erroneous	Accept Error Error		
2.7	Verify that a valid Address has been entered when adding an entry	The user will be prompted with an error	1 Example road @@ £! 1231231	Normal Erroneous Erroneous	Accept Error Error		
2.8	Verify that a valid ISBN has been entered when adding a book	The user will be prompted with an error	1234567890123 @@ £! 123 HelloWorld	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.9	Verify that a valid NoOfPages has been entered when adding a book	The user will be prompted with an error	123 123456789 2.3 @! HelloWorld	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		

2.10	Verify that a valid ISBN has been entered when adding a book	The user will be prompted with an error	1234567890123 @@ £! 123 HelloWorld	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
3.1	Verify that all fields required are entered when adding a book	If all fields are filled in correctly, a book will be successfully added to the database	Fill all Fields Correctly and then click Add to Database Leave Fields Blank and then click Add to Database	Normal Erroneous	Verification screen should open User will be prompted with an error		

3.2	Verify that all fields required are entered and calculations are complete when adding an Invoice Item	If all fields are filled in correctly and the calculations are complete, then the invoice item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneuos Erroneous	Verification screen should open User will be prompted with an error User will be prompted with an error		

3.3	Verify that all fields required are entered and calculations are complete when adding a Royalty Item	If all fields are filled in correctly and the calculations are complete, then the royalty item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneous Erroneous	Verification screen should open User will be prompted with an error User will be prompted to click Calculate		
4.1	Verify that all author data has been added to the author database	All the information should be added to the correct fields in the author table	Author Information	Normal	Added to the Author Table		
4.2	Verify that all book data has been added to the book database	All the information should be added to the correct fields in the book table	Book Information	Normal	Added to the Book Table		

4.3	Verify that all royalty item data has been added to the book database	All the information should be added to the correct fields in the royalty item table	Royalty Items Information	Normal	Added to the Royalty Items Table		
4.4	Verify that all invoice items data has been added to the Invoice Items database	All the information should be added to the correct fields in the Book Invoice Items table	Invoice Items Information	Normal	Added to the Invoice Items Table		
4.5	Verify that all publishing invoice data has been added to the publishing invoice database	All the information should be added to the correct fields in the Publishing Invoice table	Publishing Invoice Information	Normal	Added to the Publishing Invoice Table		
4.6	Verify that all Royalties data has been added to the Royalties database	All the information should be added to the correct fields in the Royalties table	Royalties Information	Normal	Added to the Royalties Table		

4.7	Verify that all Book Invoice data has been added to the Book Invoice database	All the information should be added to the correct fields in the Book Invoice table	Book Invoice Information	Normal	Added to the Book Invoice Table		
5	Verify that the program meets the requirements given	Run the program testing all parts to make sure they meet all of the requirements	Add entries for all possible inputs in order to test them all, update all entries, remove the entries, conduct a search, view all windows, change password and log out.	Normal	Program is up to the required standards		

Chapter 3

Testing

3.1 Test Plan

3.1.1 Original Outline Plan

Test Series	Purpose of Test Series	Testing Strategy	Strategy Rationale
1	Testing the flow of control between user interfaces	Top-down Testing	
2	Testing the validation of input data	Bottom-up testing	All components are to be tested after development
3	Testing the algorithms' functionality	White box testing	
4	Testing that the information has been successfully stored, and in the right places	Black box testing	
5	Testing the system and whether it meets the requirements	System testing	

3.1.2 Changes to Outline Plan

Test Series	Purpose of Test Series	Testing Strategy	Strategy Rationale
1	Testing the flow of control between user interfaces	Top-down Testing	
2	Testing the validation of input data	Bottom-up testing	All components are to be tested after development
3	Testing the algorithms' functionality	White box testing	
4	Testing that the information has been successfully stored, and in the right places	Black box testing	
5	Testing the system and whether it meets the requirements	System testing	

3.1.3 Original Detailed Plan

Test Series	Purpose of Test	Test Description	Test Data	Test Data Type (Normal/ Erroneous/ Boundary)	Expected Result	Actual Result	Evidence

1.1	Test the Log in button on the log in screen	This should check whether the password and email match and exist in a record	Click the log in button	Normal	If the email and password match, the main menu should open, else the program should prompt the user with an error		
1.2	Test the View button on the main menu	This button links the main menu to the view menu.	Click the View Button	Normal	The program should open the View Menu in a new window		
1.3	Testing the Log Out button on the Main Menu	This button links to the Login screen, where the user is required to log in again	Click the Log out button	Normal	The screen should switch to the log out screen		

1.4	Testing the Search Database button on the Main Menu	This button should prompt a seperate interface to open, and show details which can be used to search for specific items in the database	Click the Search Database button	Normal	The program should open a new window consisting of the Search Database screen		
1.5	Testing the Add Entry button on the Main Menu	This button should prompt a seperate interface to open and show the Add Entry screen	Click the Add Entry button	Normal	The program should open the Add Entry screen in a new window		
1.6 (removed)	Testing the Edit Entry button from the Main Menu	This button links to the Editing screen	Click the Edit Entry button	Normal	The program should switch to the Editing screen from the Main Menu		

1.7	Testing the Edit Entry button after an entry has been selected beforehand	These conditions should open the Edit Entry screen upon clicking Edit Entry, with data on the selected entry already filled in on the grid	Click on an entry, and then click Edit Entry	Normal	The program should open the Edit Entry screen in a new window		
1.8	Testing the Remove Entry Button after an entry has been selected beforehand	These conditions should prompt the user for verification on deleting a selected customer record	Click on an entry and then click Remove Entry	Normal	The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record		

1.9	Testing the Change Password Button on the Main Menu	This button prompts the Change Password window to open	Click the Change Password button	Normal	The program should open the Change Password window, with fields required to be filled in in order to change the password		
1.10	Testing the Quick Search button on the Main Menu	This button returns the customer that matches the entered AuthorID	Type in a Lastname and click QuickSearch	Normal	The program should return the customer that matches the entered Lastname and show it in the grid		
1.11	Testing the back button on the View Menu	This button returns back to the main menu	Click Back	Normal	The program should return back to the main menu		

1.12	Testing the Add Book Button on the View Menu	This button opens up a new window for adding a book	Click Add Book	Normal	The program should open a new window for adding a book		
1.13	Testing the View Publishing Invoice button on the View Menu	This button opens up a new window displaying details about the selected book's publishing invoice	Click View Publishing invoice	Normal	The program should open a new window containing details about the selected book's publishing invoice		
1.14	Testing the View Royalties button on the View Menu	This button opens up a new window displaying details about the selected book's royalties	Click View Royalties	Normal	The program should open a new window containing details about the selected book's royalties		

| 1.15 | Testing the View Book Invoice button on the View Menu | This button opens up a new window displaying details about the selected book's book invoices | Click View Book Invoices | Normal | The program should open a new window containing details about the selected book's book invoices | | |
| 1.16 | Testing the Delete book button on the View Menu | This button opens up a new window asking for verification on deleting a selected book record | Click Delete book | Normal | The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record | | |

2.1	Verify that some criteria has been entered when using the search	At least one set of the input boxes and drop-down lists must have been filled in or selected from, else the program will prompt the user about the error	Selected from list with names and values entered Selected from list, values enteredand no names entered Just values entered Nothing	Normal Normal Erroneous Erroneous	Accept Accept Error Error		
2.2	Verify that a valid email has been entered on the log in screen	The program will prompt the user telling them they have inputted an error	test@testmail.com helloworld test @test-mail.com test.com@testmail	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.3	Verify that a valid First-name has been entered when adding an entry	The user will be prompted with an error	John Jo hn Jo?hn Jo2n	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		

2.4	Verify that a valid Last-name has been entered when adding an entry	The user will be prompted with an error	Smith Sm ith Smi!th Smi1th	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.5	Verify that a valid Phonenumber has been entered when adding an entry	The user will be prompted with an error	07123456789 07123123.3 071CO2	Normal Erroneous Erroneous	Accept Error Error		
2.7	Verify that a valid Address has been entered when adding an entry	The user will be prompted with an error	1 Example road @@ £! 1231231	Normal Erroneous Erroneous	Accept Error Error		
2.8	Verify that a valid ISBN has been entered when adding a book	The user will be prompted with an error	1234567890123 @@ £! 123 HelloWorld	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		

2.9	Verify that a valid NoOf-Pages has been entered when adding a book	The user will be prompted with an error	123 123456789 2.3 @! HelloWorld	Normal Erroneous Erroneous Erroneous	Accept Error Error		
3.1	Verify that all fields required are entered when adding a book	If all fields are filled in correctly, a book will be successfully added to the database	Fill all Fields Correctly and then click Add to Database Leave Fields Blank and then click Add to Database	Normal Erroneous	Verification screen should open User will be prompted with an error		
3.2	Verify that all fields required are entered and calculations are complete when adding an Invoice Item	If all fields are filled in correctly and the calculations are complete, then the invoice item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneuos Erroneous	Verification screen should open User will be prompted with an error User will be prompted with an error		

3.3	Verify that all fields required are entered and calculations are complete when adding a Royalty Item	If all fields are filled in correctly and the calculations are complete, then the royalty item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneous Erroneous	Verification screen should open User will be prompted with an error User will be prompted to click Calculate		
4.1	Verify that all author data has been added to the author database	All the information should be added to the correct fields in the author table	Author Information	Normal	Added to the Author Table		
4.2	Verify that all book data has been added to the book database	All the information should be added to the correct fields in the book table	Book Information	Normal	Added to the Book Table		

4.3	Verify that all royalty item data has been added to the book database	All the information should be added to the correct fields in the royalty item table	Royalty Items Information	Normal	Added to the Royalty Items Table		
4.4	Verify that all invoice items data has been added to the Invoice Items database	All the information should be added to the correct fields in the Book Invoice Items table	Invoice Items Information	Normal	Added to the Invoice Items Table		
4.5	Verify that all publishing invoice data has been added to the publishing invoice database	All the information should be added to the correct fields in the Publishing Invoice table	Publishing Invoice Information	Normal	Added to the Publishing Invoice Table		

4.6	Verify that all Royalties data has been added to the Royalties database	All the information should be added to the correct fields in the Royalties table	Royalties Information	Normal	Added to the Royalties Table		
4.7	Verify that all Book Invoice data has been added to the Book Invoice database	All the information should be added to the correct fields in the Book Invoice table	Book Invoice Information	Normal	Added to the Book Invoice Table		
5	Verify that the program meets the requirements given	Run the program testing all parts to make sure they meet all of the requirements	Add entries for all possible inputs in order to test them all, update all entries, remove the entries, conduct a search, view all windows, change password and log out.	Normal	Program is up to the required standards		

3.1.4 Changes to Detailed Plan

Test Series	Purpose of Test	Test Description	Test Data	Test Data Type (Normal/ Erroneous/ Boundary)	Expected Result	Actual Result	Evidence
1.1	Test the Log in button on the log in screen	This should check whether the password and email match and exist in a record	Click the log in button	Normal	If the email and password match, the main menu should open, else the program should prompt the user with an error	Works as expected	Figure 3.1 on page 144, and Figure ?? on page ??.

1.2	Test the View button on the main menu	This button links the main menu to the view menu.	Click the View Button after selecting an author.	Normal	The program should open the View Menu in a new window, displaying the selected Customer's Books.	Works as expected	Figure 3.4 on page 147
1.3	Testing the Log Out button on the Main Menu	This button links to the Login screen, where the user is required to log in again	Click the Log out button	Normal	The screen should switch to the log out screen	Works as expected	
1.4	Testing the Search Database button on the Main Menu	This button should prompt a seperate interface to open, and show details which can be used to search for specific items in the database	Click the Search Database button	Normal	The program should open a new window consisting of the Search Database screen	Works as expected	Figure ?? on page ??

1.5	Testing the Add Entry button on the Main Menu	This button should prompt a seperate interface to open and show the Add Entry screen	Click the Add Entry button	Normal	The program should open the Add Entry screen in a new window	Works as expected	Figure 3.6 on page 149
1.7	Testing the Update Entry button after an entry has been selected beforehand	These conditions should open the Update Entry screen upon clicking Update Entry, with data on the selected entry already filled in on the grid	Click on an entry, and then click Update Entry	Normal	The program should open the Update Entry screen in a new window	Works as expected	Figure 3.7 on page 150

1.8	Testing the Remove Entry Button after an entry has been selected beforehand	These conditions should prompt the user for verification on deleting a selected customer record	Click on an entry and then click Remove Entry	Normal	The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record	Works as expected	Figure 3.8 on page 151
1.9	Testing the Change Password/Username Button on the Main Menu	This button prompts a window to open, with a set of buttons asking what the user wishes to changes	Click the Change Password/Username button	Normal	The program should open the Change Password/Username window, with buttons giving options of what is needed to be changed.	Works as expected	Figure 3.9 on page 152

1.10	Testing the Quick Search button on the Main Menu	This button returns the customer that matches the entered Name	Type in a Firstname, Lastname or both and click QuickSearch	Normal	The program should return any customers that match the entered name(s) and show it in the grid	Works as expected	Figure 3.10 on page 153
1.11	Testing the back button on the View Menu	This button returns back to the main menu	Click Back	Normal	The program should return back to the main menu	Works as expected	
1.12	Testing the Add Book Button on the View Menu	This button opens up a new window for adding a book	Click Add Book	Normal	The program should open a new window for adding a book	Works as expected	Figure 3.11 on page 154

| 1.13 | Testing the View Publishing Invoice button on the View Menu | This button opens up a new window displaying details about the selected book's publishing invoice | Click View Publishing invoice | Normal | The program should open a new window containing details about the selected book's publishing invoice | Works as expected | Figure 3.12 on page 155 |
| 1.14 | Testing the View Royalties button on the View Menu | This button opens up a new window displaying details about the selected book's royalties | Click View Royalties | Normal | The program should open a new window containing details about the selected book's royalties | Works as expected | Figure 3.13 on page 156 |

1.15	Testing the View Book Invoice button on the View Menu	This button opens up a new window displaying details about the selected book's book invoices	Click View Book Invoices	Normal	The program should open a new window containing details about the selected book's book invoices	Works as expected	Figure 3.14 on page 157
1.16	Testing the Delete book button on the View Menu	This button opens up a new window asking for verification on deleting a selected book record	Click Delete book	Normal	The program should open a Verification window, asking the user for confirmation and verification on removing the selected customer record	Works as expected	Figure 3.15 on page 158

1.17	Testing the 'Forgotten Password' label on the log in screen	This opens a window, giving the user the default username and password if it's the first time of usage, or it opens an input box where an email is asked for, if the default credentials have been changed.	Click 'Forgotten Password'	Normal	This should open a window, giving the user the default username and password if it's the first time of usage, or it will open a input box where an email is asked for, if the default credentials have been changed	Works as expected	Figure 3.16 on page 159
1.18	Testing the Change Password Button	This button opens a new window, where the user is presented with fields required for changing their password	Click Change Password	Normal	The program should open the Change Password window and present the necessary fields to the user	Works as expected	Figure 3.17 on page 160

1.19	Testing the Confirm button for changing passwords	This button should accept the entries the user has entered if the old password matches, and the new and retyped passwords matches otherwise the user will be prompted with an error.	Fill the necessary fields and click Confirm	Normal	This should accept the user's input, successfully changing the password if the criteria is met, else the user is prompted with an error	Works as expected	Figure 3.18 on page 161
1.20	Testing the View Royalty Items button on the Royalties Menu	This button opens up a new window displaying details about the selected Royalty's items	Select a Royalty and click View Royalty Items	Normal	The program should open a new window containing details about the selected Royalty's Items	Works as expected	Figure 3.19 on page 162

1.21	Testing the View Book Invoice Items button on the Book Invoice Menu	This button opens up a new window displaying details about the selected Book Invoice's items	Select a Book Invoice and click View Book Invoice Items	Normal	The program should open a new window containing details about the selected Book Invoice's Items	Works as expected	Figure 3.20 on page 162
1.22	Testing the Log Out button on the Menubar	This button links to the Login screen, where the user is required to log in again	Click the Log out button on the Menubar	Normal	The screen should switch to the log out screen		
1.23	Testing the Search Database button on the Menubar	This button should prompt a seperate interface to open, and show details which can be used to search for specific items in the database	Click the Search Database button on the Menubar	Normal	The program should open a new window consisting of the Search Database screen		

1.24	Testing the Add Entry button on the Menubar	This button should prompt a seperate interface to open and show the Add Entry screen	Click the Add Entry button on the Menubar	Normal	The program should open the Add Entry screen in a new window		
1.25	Testing the Confirm button on the Search window	This button checks whether the entries are valid then conducts the search if they are, presenting results in the main window	Click the Confirm button on the search window	Normal	The program should validate the entries then conduct the search and present search results in the main menu, or prompt the user with an error.		
1.26	Testing the Cancel button on the Add Entry window	This button should reject and close the window	Click the cancel button on the add entry window	Normal	The program should reject the window and close it		

1.27	Testing the Cancel button on the Search window	This button should reject and close the window	Click the cancel button on the Search window	Normal	The program should reject the window and close it		
1.28	Testing the Update book button on the View Menu	This button opens up a new window with entries already filled in with the selected book's data.	Select an entry then click Update book	Normal	The program should open a window for updating the entry, with the selected data already filled in the entry boxes	Works as expected	Figure ?? on page ??
2.1	Verify that some criteria has been entered when using the search	At least one set of the input boxes and drop-down lists must have been filled in or selected from, else the program will prompt the user about the error	Selected from list with names and values entered Selected from list, values enteredand no names entered Just values entered Nothing	Normal Normal Erroneous Erroneous	Accept Accept Error Error		

2.2	Verify that a valid email has been entered on the log in screen	The program will prompt the user telling them they have inputted an error	test@testmail.com helloworld test @testmail.com test.com@testmail	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.3	Verify that a valid First-name has been entered when adding an entry	The user will be prompted with an error	John Jo hn Jo?hn Jo2n	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.4	Verify that a valid Last-name has been entered when adding an entry	The user will be prompted with an error	Smith Sm ith Smi!th Smi1th	Normal Erroneous Erroneous Erroneous	Accept Error Error Error		
2.5	Verify that a valid Pho-nenumber has been entered when adding an entry	The user will be prompted with an error	07123456789 07123123.3 071CO2	Normal Erroneous Erroneous	Accept Error Error		

2.6	Verify that a valid Address has been entered when adding an entry	The user will be prompted with an error	1 Example road @@ £! 1231231	Normal Erroneous Erroneous	Accept Error Error		
2.7	Verify that a valid ISBN has been entered when adding a book	The user will be prompted with an error	1234567890123 @@ £! 1234567890123456	Normal Erroneous Erroneous	Accept Error Error		
2.8	Verify that a valid NoOf-Pages has been entered when adding a book	The user will be prompted with an error	123 123456789 2.3 @! HelloWorld	Normal Erroneous Erroneous Erroneous Erroneous	Accept Error Error		
2.9	Verify that a valid Discount has been entered when adding Book Invoice items	The user will be prompted with an error	50 5.5 0 -1 100 101 abc	Normal Erroneous Boundary Erroneous Boundary Erroneous Erroneous			

2.10	Verify that a valid Discount has been entered when adding Royalty items	The user will be prompted with an error	50 5.5 0 -1 100 101 abc	Normal Erroneous Boundary Erroneous Boundary Erroneous Erroneous			
3.1	Verify that all fields required are entered when adding a book	If all fields are filled in correctly, a book will be successfully added to the database	Fill all Fields Correctly and then click Add to Database Leave Fields Blank and then click Add to Database	Normal Erroneous	Verification screen should open User will be prompted with an error		

3.2	Verify that all fields required are entered and calculations are complete when adding an Invoice Item	If all fields are filled in correctly and the calculations are complete, then the invoice item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneous Erroneous	Verification screen should open User will be prompted with an error User will be prompted with an error		
3.3	Verify that all fields required are entered and calculations are complete when adding a Royalty Item	If all fields are filled in correctly and the calculations are complete, then the royalty item will be added to the database	Fill all fields correctly and click calculate and then click Add to Database Leave Fields Blank and click Calculate Fill all fields correctly and click add to database	Normal Erroneous Erroneous	Verification screen should open User will be prompted with an error User will be prompted to click Calculate		

3.4	Verify that the calculations function for working out the print cost	The calculations should be conducted and the result should be displayed	Enter values for the Royalty Items Leave fields blank Enter negative numbers into the required fields.	Normal Erroneous Erroneous	Accept Error Error		
3.5	Verify that the calculations function for working out the total Royalty Payment for a set of payments.	The calculations should be conducted and the result should be displayed in the Royalties table	Enter values for the Royalty Items and add it to the database Leave fields blank Enter negative numbers into the required fields.	Normal Erroneous Erroneous	Accept Error Error		

3.6	Verify that the calculations function for working out the total Book Invoice Payment	The calculations should be conducted and the result should be displayed in the Book Invoice table	Enter values for the Book Invoice Items and add them to the database Leave fields blank Enter negative numbers into the required fields.	Normal Erroneous Erroneous	Accept Error Error		
4.1	Verify that all author data has been added to the author database	All the information should be added to the correct fields in the author table	Author Information	Normal	Added to the Author Table		
4.2	Verify that all book data has been added to the book database	All the information should be added to the correct fields in the book table	Book Information	Normal	Added to the Book Table		

4.3	Verify that all royalty item data has been added to the book database	All the information should be added to the correct fields in the royalty item table	Royalty Items Information	Normal	Added to the Royalty Items Table		
4.4	Verify that all invoice items data has been added to the Invoice Items database	All the information should be added to the correct fields in the Book Invoice Items table	Invoice Items Information	Normal	Added to the Invoice Items Table		
4.5	Verify that all publishing invoice data has been added to the publishing invoice database	All the information should be added to the correct fields in the Publishing Invoice table	Publishing Invoice Information	Normal	Added to the Publishing Invoice Table		

4.6	Verify that all Royalties data has been added to the Royalties database	All the information should be added to the correct fields in the Royalties table	Royalties Information	Normal	Added to the Royalties Table		
4.7	Verify that all Book Invoice data has been added to the Book Invoice database	All the information should be added to the correct fields in the Book Invoice table	Book Invoice Information	Normal	Added to the Book Invoice Table		
4.8	Verify that all author data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Author Table	Author Information	Normal	Changes made to the Author Table		

4.8	Verify that all author data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Author Table	Author Information	Normal	Changes made to the Author Table		
4.9	Verify that all book data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Book Table	Book Information	Normal	Changes made to the Book Table		
4.10	Verify that all Royalties data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Royalties Table	Royalties Information	Normal	Changes made to the Royalties Table		

4.11	Verify that all Royalty Items data has been success-fully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Royalty Items Table	Royalty Items Information	Normal	Changes made to the Royalty Items Table		
4.12	Verify that all Publish-ing Invoice data has suc-cessfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Publishing Invoice Table	Publishing Invoice Infor-mation	Normal	Changes made to the Publish-ing Invoice Table		

4.13	Verify that all Book Invoice data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Book Invoice Table	Book Invoice Information	Normal	Changes made to the Book Invoice Table		
4.14	Verify that all Book Invoice Items data has been successfully edited afted editing and saving changes	All the data should be changed to what the user's inputs were, and should still be in the correct fields in the Book Invoice Items Table	Book Invoice Items Information	Normal	Changes made to the Book Invoice Items Table		

4.15	Verify that all data linked with an author is deleted when a deletion is requested by the user	All data linked with the user is deleted, and should no longer be in the table	Deleting the data	Normal	The data linked with that athor shoiuld no longer be in their respective tables		
4.16	Verify that a book is deleted when a deletion is requested by the user	The book is deleted, and should no longer be in the table	Deleting the data	Normal	The book should no longer exist in the database		
4.17	Verify that a publishing invoice is deleted when a deletion is requested by the user	The publishing invoice is deleted, and should no longer be in the table	Deleting the data	Normal	The publishing invoice should no longer exist in the database		

4.18	Verify that a book invoice is deleted when a deletion is requested by the user	The book invoice is deleted, and should no longer be in the table	Deleting the data	Normal	The book invoice should no longer exist in the database		
4.19	Verify that a set of book invoice items is deleted when a deletion is requested by the user	The book invoice items are deleted, and should no longer be in the table	Deleting the data	Normal	The book invoice items should no longer exist in the database		
4.20	Verify that a royalty payment is deleted when a deletion is requested by the user	The royalty payment is deleted, and should no longer be in the table	Deleting the data	Normal	The royalty payment should no longer exist in the database		

4.21	Verify that a set of royalty item is deleted when a deletion is requested by the user	The royalty items are deleted, and should no longer be in the table	Deleting the data	Normal	The royalty items should no longer exist in the database		
5	Verify that the program meets the requirements given	Run the program testing all parts to make sure they meet all of the requirements	Add entries for all possible inputs in order to test them all, update all entries, remove the entries, conduct a search, view all windows, change password and log out.	Normal	Program is up to the required standards		

3.2 Test Data

3.2.1 Original Test Data

The data is shown in the previous table.

3.2.2 Changes to Test Data
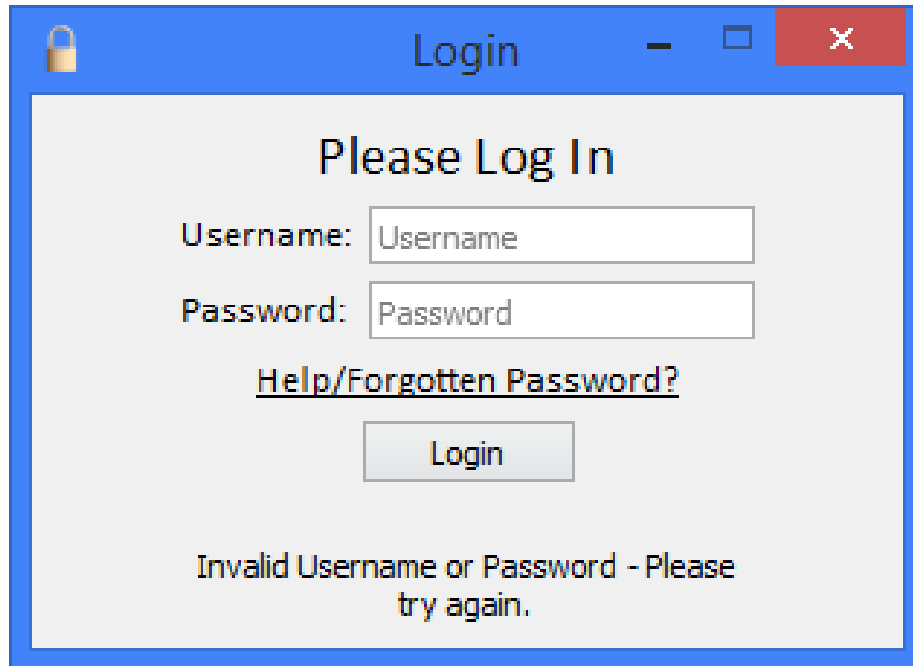
The data is shown in the previous table.

3.3 Annotated Samples

3.3.1 Actual Results
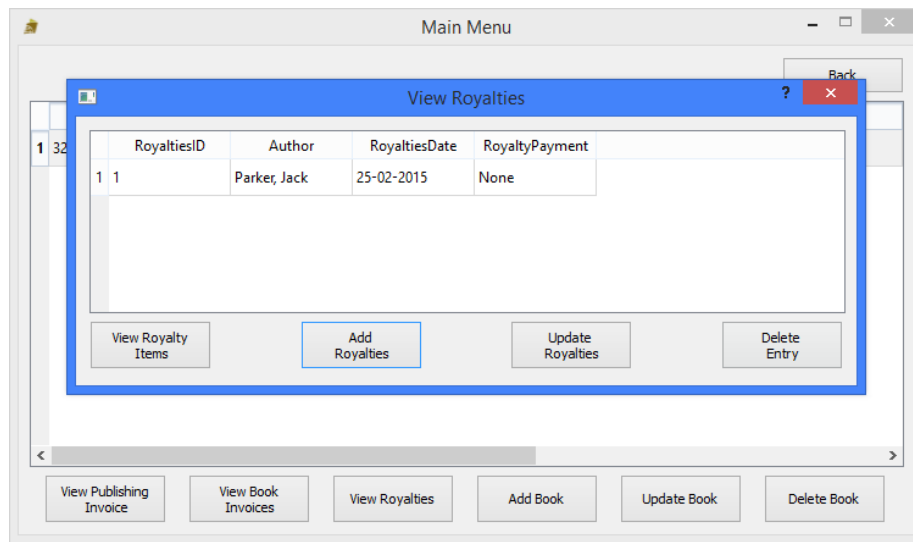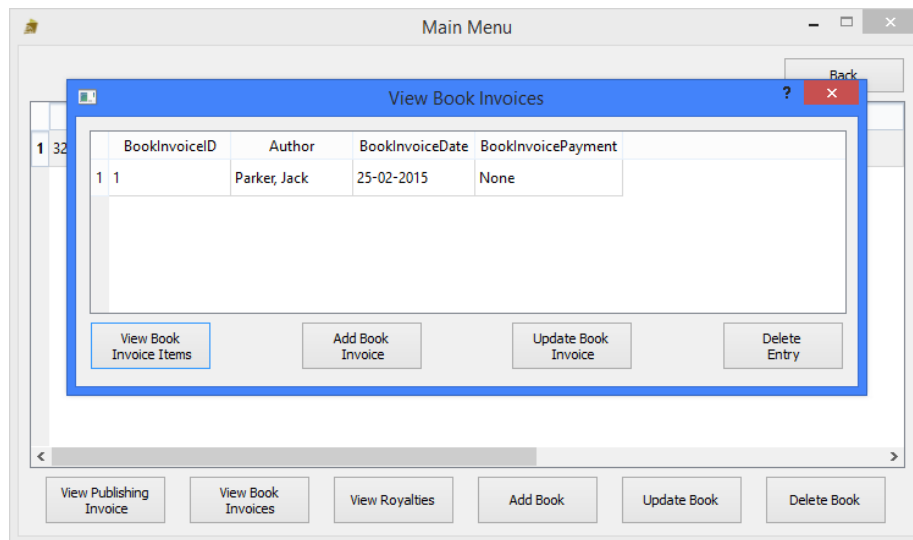
The data is shown in the previous table.

3.3.2 Evidence

Figure 3.1: Test 1.1

Figure 3.2: Test 1.1

Figure 3.3: Test 1.1

Figure 3.4: Test 1.2

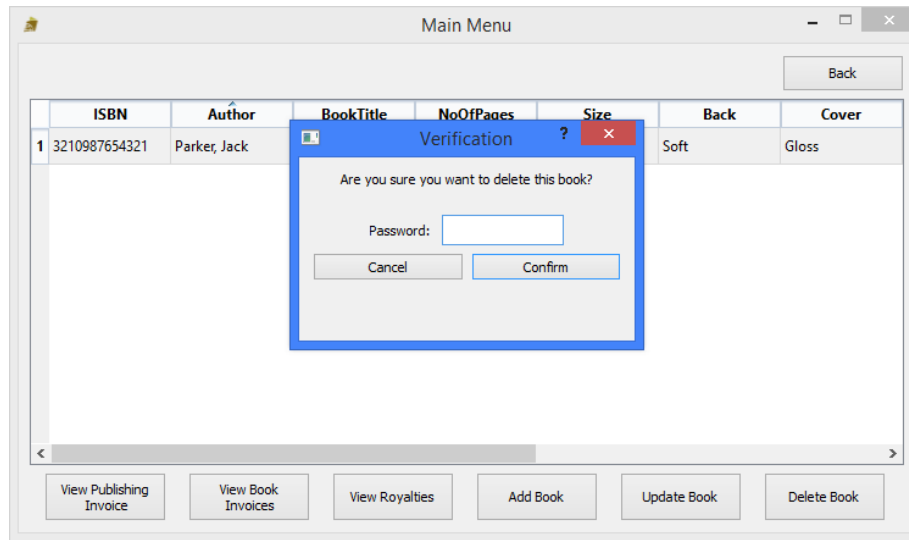Figure 3.5: Test 1.4

Figure 3.6: Test 1.5

Figure 3.7: Test 1.7
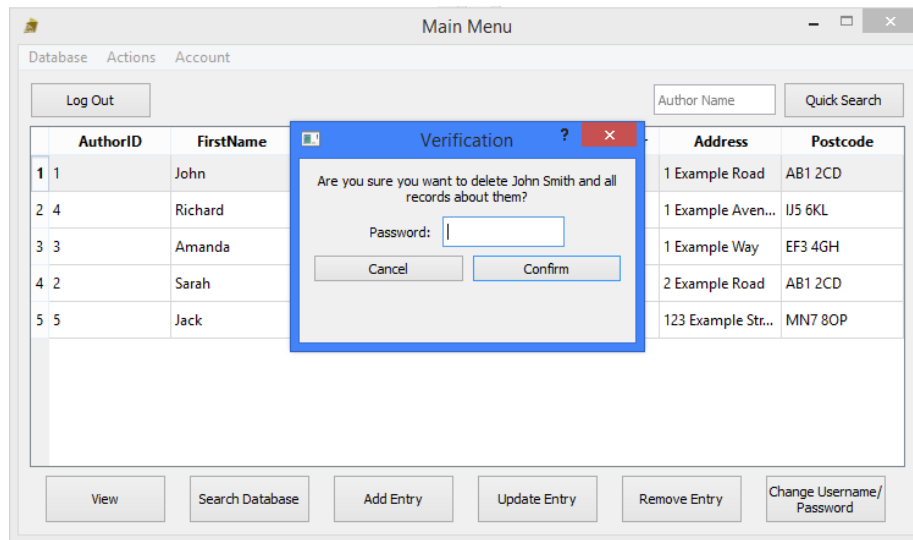
Figure 3.8: Test 1.8
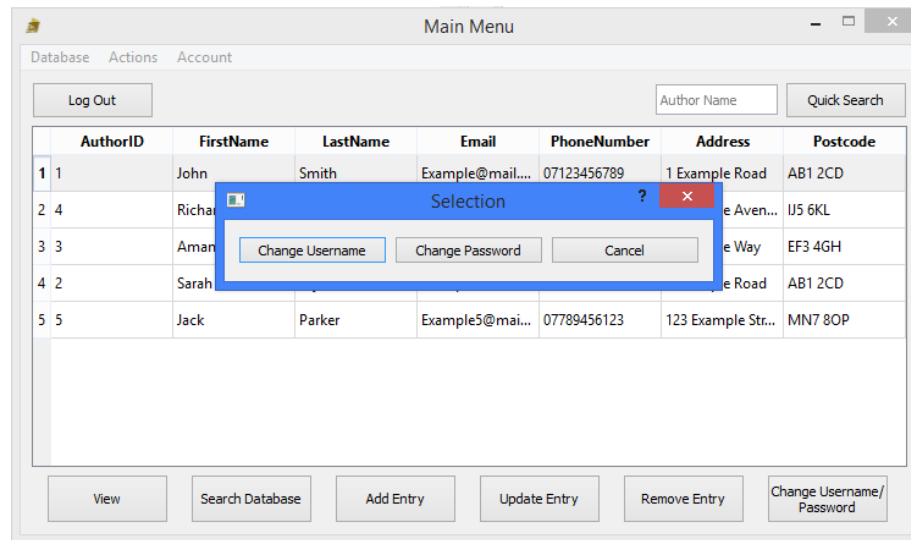
Figure 3.9: Test 1.9

Figure 3.10: Test 1.10

Figure 3.11: Test 1.12

Figure 3.12: Test 1.13

Figure 3.13: Test 1.14
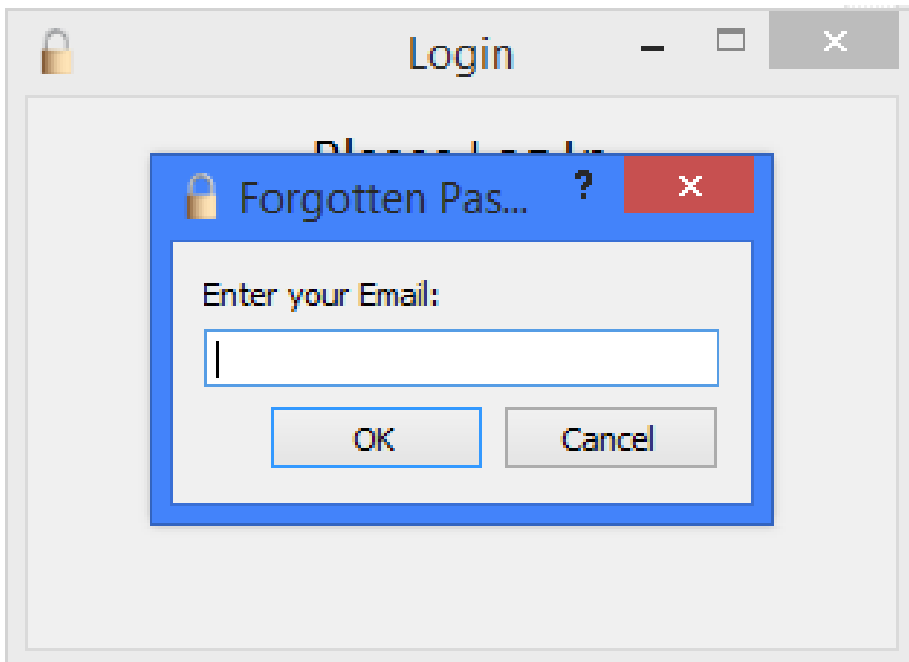
Figure 3.14: Test 1.15
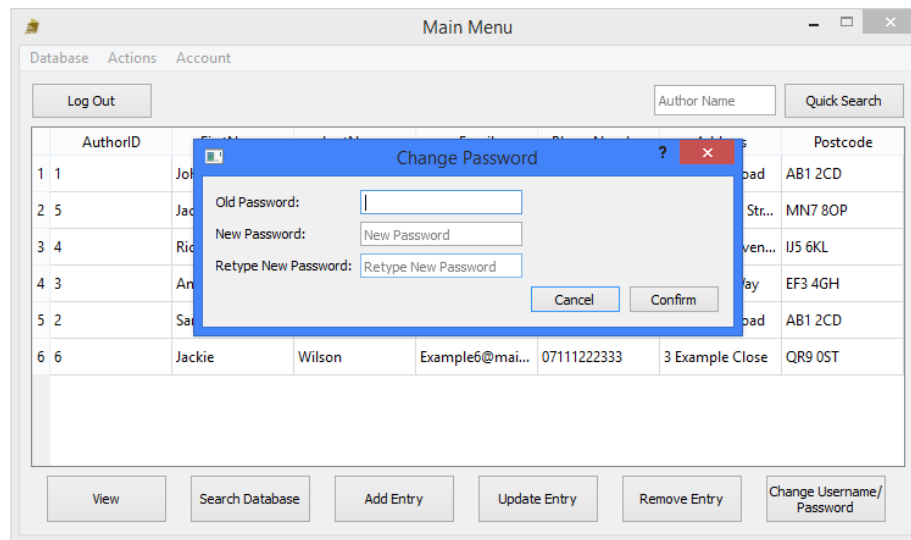
Figure 3.15: Test 1.16

Figure 3.16: Test 1.17

Figure 3.17: Test 1.18
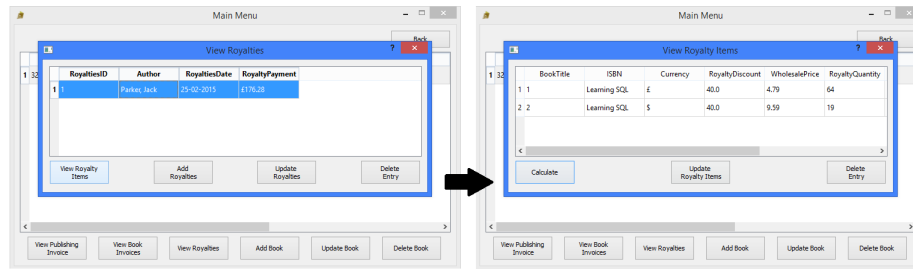
Figure 3.18: Test 1.19
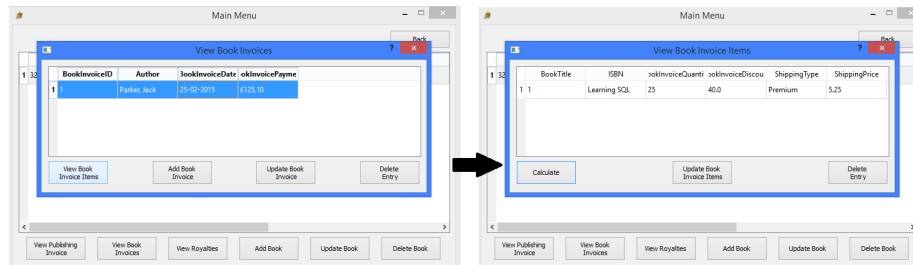
Figure 3.19: Test 1.20

Figure 3.20: Test 1.21

3.4   Evaluation

3.4.1   Approach to Testing

3.4.2   Problems Encountered

3.4.3   Strengths of Testing

3.4.4   Weaknesses of Testing

3.4.5   Reliability of Application

3.4.6   Robustness of Application

Chapter 4

System Maintenance

4.1 Environment

4.1.1 Software

4.1.2 Usage Explanation

4.1.3 Features Used

4.2 System Overview

4.2.1 System Component

4.3 Code Structure

4.3.1 Particular Code Section

4.4 Variable Listing

4.5 System Evidence

4.5.1 User Interface

4.5.2 ER Diagram

4.5.3 Database Table Views

4.5.4 Database SQL

4.5.5 SQL Queries

4.6 Testing

4.10.1 Module 1

Chapter 5

User Manual

5.1 Introduction

5.2 Installation

5.2.1 Prerequisite Installation

Installing Python

Installing PyQt

Etc.

5.2.2 System Installation

5.2.3 Running the System

5.3 Tutorial

5.3.1 Introduction

5.3.2 Assumptions

5.3.3 Tutorial Questions

Question 1

Question 2

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5.3.4 Saving

5.3.5 Limitations

5.4 Error Recovery

Chapter 6

Evaluation

6.1   Customer Requirements

6.1.1   Objective Evaluation

6.2   Effectiveness

6.2.1   Objective Evaluation

6.3   Learnability

6.4   Usability

6.5   Maintainability

6.6   Suggestions for Improvement

6.7   End User Evidence

6.7.1   Questionnaires

6.7.2   Graphs

6.7.3   Written Statements