

SOFTWARE ENGINEERING LAB
PROJECT REPORT
On
Book-shop Automation Software

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4th APRIL, 2023

ABSTRACT

- The project report consists of 2 phases. In the first phase, the problem assigned to us has been mentioned. Second phase provides the solution for the same problem along with an insight into the development process involved.
- Introduction part gives the information regarding Bookshop Automation System. It also gives brief introduction about the project under the topic PROBLEM DEFINITION .It gives a short introduction about Bookshop and its operations. The next part is the REQUIREMENT ANALYSIS which is mainly concerned with study of various requirements such as user, System, Hardware/Software & Performance. It also includes feasibility study of system.
- The next part is on SYSTEM DESIGN, which include interface design, detailed design .It also includes DFD, and UML diagrams.
- Last part is regarding CONCLUSION about above mention problem Development of Bookshop Automation Software to replace the manual ordering process in a bookshop.

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1. LIST OF ABBREVIATIONS

BAS	Bookshop Automation Software
POS	Point-Of-Scale
CRM	customer relationship management
ISBN	International Standard Book Number
MIS	Management Information System
DFD	Data Flow Diagram
UML	Unified Modeling Language

2. INTRODUCTION

The Bookshop Automation Software is to automate all operations in a bookshop. Generally it includes the Order Processing, Stock Management and Accounts Management.

Before automating a bookshop we have to understand the concept of automation. In automation of any operation we make a system which do work automatically as the respective events occurs, for which it is meant.

There are the some common examples of the automation like that auto pilot system in the aircraft, automatic home systems (electric system, water system, fire alarm system, doors system etc). These are best examples of the automation systems.

Here we are try to develop such type system which is provide the automation on the any type of the bookshop. That means a shop which has the type system which provides the facility to the customers of the shop to purchase the books from the shop without any complexity.

2.1. Motivation

At present, the Wholesale and Retail outlets are working under manual management. All records related to Products, Sales, Suppliers, Orders, Payment are stored in registers. To manage the whole data, the person maintaining records has to take great pain. Various registers has to be maintained for each separate process

Existing system, used for the Management of sales of electronic products, is completely dependent on human actions and responses (Manual Management), which couldn't be free from errors. In each process whether it is Product Management, Maintaining Customer Records, Payment Management, Report Generation, user has to pay attention to a greater extent while performing the tasks.

Performing these operations with the help of software is efficient and less prone to errors. Time consumed, labour is reduced significantly and inventory, reports are been managed periodically.

2.2. Objectives

1. Customers can query for a book in-order to purchase instead of searching the shelf.
2. Sales clerk, Employee, Managers, Owners can perform individual tasks to maintain the bookshop (updating stock, statistics, generating bills etc.)

2.3. Problem statement

Almost every activity in the world today is controlled by computer driven software program. Every area of human interactions is invaded by various software systems, such as real time, business, simulation, embedded, web based, personal and more recently, artificial intelligence software etc.

According to the above facts, managing and maintaining a book shop could also be controlled by efficient software. This project focuses attention on designing efficient and reliable software which controls the transactions of a bookshop. BAS should help the customers query whether a book is in stock. The users can query the availability of a book either by using the book title or by using the name of the author. If the book is not currently being sold by the book-shop, then the customer is asked to enter full details of the book for procurement of the book in future. If a book is in stock, the exact number of copies available and the rack number in which the book is located should be displayed. If a book is not in stock, the query for the book is used to increment a request field for the book. The manager can periodically view the request field of the books to arrive at a rough estimate regarding the current demand for different books. BAS should maintain the price of various books. As soon as a customer selects a book for purchase, the sales clerk would enter the ISBN number of the book. BAS should update the stock, and generate the sales receipt for the book. BAS should allow employees to update the inventory whenever new supply arrives. Also upon request, BAS should generate sales statistics (viz., book name, publisher, ISBN number, number of copies sold, and the sales revenue) for any period. The sales statistics will help the owner to know the exact business done over any period of time and also to determine inventory level required for various books. The inventory level required for a book is equal to the number of copies of the book sold over a period of two weeks multiplied by the average number of days it takes to procure the book from its publisher. Every day the book shop owner would give a command for the BAS to print the books which have fallen below the threshold and the number of copies to be procured along with the full address of the publisher.

2.4. Scope of Project

The scope of this project Book-Shop Automation Software is to develop a software to automate the entire book purchasing process and the management and maintenance of records like transaction records, calculating the demand of various books, generating sales statistics and other basic tasks that are required by the manager. Generally it includes Order Processing, Stock Management and Accounts Management. Also BAS will provide the ability to search any book using the book title or the name of the author that are available in the shop and in case where the book is not available in the stock, it will ask the customer to enter full details of the book for procurement of the book in future and increment a request field for the book. This software will be very useful to the large book-shops as well as the customers. The system will save lots of time as it will perform all the necessary tasks for purchasing books and maintaining the records in much less time. As a result both the customer and the shop owner will be benefited. Therefore, this software will be very economical in every respect.

2.5. Approach to Problem Solving

Analysis:

Features	Analysis
1. Requirement Specification	Beginning
2. Understanding requirements	Well Understood
3. Cost	Low
4. Availability of reusable components	No
5. Complexity of system	Simple
6. Risk Analysis	No Risk Analysis
7. User involvement in all phases of SDLC	Intermediate
8. Guarantee of Success	Good
9. Overlapping Phases	Less
10. Implementation time	Less
11. Flexibility	Flexible
12. Changes Incorporated	Easy
13. Expertise Required	Medium
14. Cost Control	No
15. Resource Control	No

Assuming that the development team has experience with similar projects it's safe to choose Waterfall Model for development of the project.

Classical Waterfall Model

1. Feasibility study:

➤ Financial Feasibility

The cost and benefit of the project is analysed. Means under this feasibility study a detailed analysis is carried out of what will be the cost of the project

for development which includes all required cost for final development like hardware(monitors, hardware, external storage, keyboards, mouse, printers etc) and software resource(database services etc) required, design and development cost and operational cost and so on. After that it is analysed whether the project will be beneficial in terms of finance for the organisation or not.Cost estimation is performed using Cocommo model

➤ **Technical Feasibility**

In Technical Feasibility current resources both hardware software along with required technology are analysed/assessed to develop Book-shop automation software(BAS). This technical feasibility study reports that there exists correct required resources and technologies which will be used for BAS development. Along with this, the feasibility study also analyses technical skills and capabilities of the technical team, whether existing technology can be used or not, maintenance and up-gradation is easy or not for chosen technology etc.

➤ **Schedule Feasibility**

In Schedule Feasibility Study, timelines/deadlines are analysed for BAS which includes how many times teams will take to complete the final project which has a great impact on the organisation as the purpose of the project may fail if it can't be completed on time.

We can conclude that BAS is feasible to do and generate a feasibility report.

2. Requirements Analysis:

➤ **Eliciting Requirements**

- **Step 1: Identify the stakeholders**
 1. Anyone who operates the system
 2. Anyone who benefits from the system
 3. Anyone involved in purchasing or procuring the system.
 4. Organisations which regulate aspects of the system
 5. People or organisations opposed to the system

Based on this we can classify the users as:

- a. Key Stakeholder: Book-shop Owner, Manager
- b. Primary Stakeholder: Employees, Sales Clerk
- c. Tertiary Stakeholder: Customers
- **Step 2: Requirement Gathering**
 - a. Meetings with project managers, stakeholders and users are held in order to determine the requirements like; who is going to use the system? How will they use the system? What data should be input into the system? What data should be output by the system? These are

- general questions that get answered during a requirements gathering phase.
- b. Additionally,
- A formal interview with the Book-shop Owner, Manager, Employee, Clerk is sufficient to know all the problems faced and the individual requirements/functionalities for each user.
- Questions asked in the interview of around 10-15 min:
- i. Problems facing in manual process
 - ii. Additional features
 - iii. Expectation of the software based on representation and performance
 - iv. Statistics on No. of purchases, books, employees etc. (For scaling purpose)

➤ **Analysing Requirements**

Based on the requirements provided by the stakeholders we can determine that the stated requirements are clear, complete, consistent and unambiguous. Requirements are analysed for their validity and the possibility of incorporating the requirements in the system to be developed is also studied.

➤ **Recording Requirements**

Finally, a Requirement Specification document is created which serves the purpose of guideline for the next phase of the model. Requirements are documented in various forms, including a summary list and include natural-language documents, use cases, user stories, process specifications and a variety of models including data models

3. Design:

➤ **Logical Design**

1. Abstract representation of the data flows, inputs and outputs of the system.
2. This is often conducted via modelling
3. Logical design includes creation of entity-relationship diagrams(ER diagrams).

➤ **Physical design**

1. In physical design, the input, output, storage, processing, and recovery requirements about the system are decided.
2. User Interface Design
3. Data Design: concerned with how the data is represented and stored within the system.

4. Process Design: concerned with how data moves through the system (DFD)
 - Architectural design
 1. Design of the system architecture that describes the structure, behaviour and more views of that system and analysis.

Creation of DFD, UML diagrams etc to define the overall system architecture. The system design specifications serve as input for the next phase of the model.

4. Coding and Integration:

On receiving system design documents, the work is divided in modules/units and actual coding is started. Since, in this phase the code is produced so it is the main focus for the developer.

Implementation of the

1. Front-end:
Website done using HTML, CSS, JavaScript
2. Back-end:
Flask, Json, Python

Integrate both the frontend and backend for hosting the website

5. Testing and Debugging:

Perform unit testing, integration testing, system testing to identify the faults and use Debugging to find the source of already identified defect and to fix it.

Steps in debugging:

1. Attempt to reproduce the problem.
2. After the bug is reproduced, the input of the program may need to be simplified to make it easier to debug.
3. After the test case is sufficiently simplified, a programmer can use a debugger tool to examine program states (values of variables, plus the call stack) and track down the origin of the problem(s).
4. Fix the defect
5. Test to check if the fix is correct

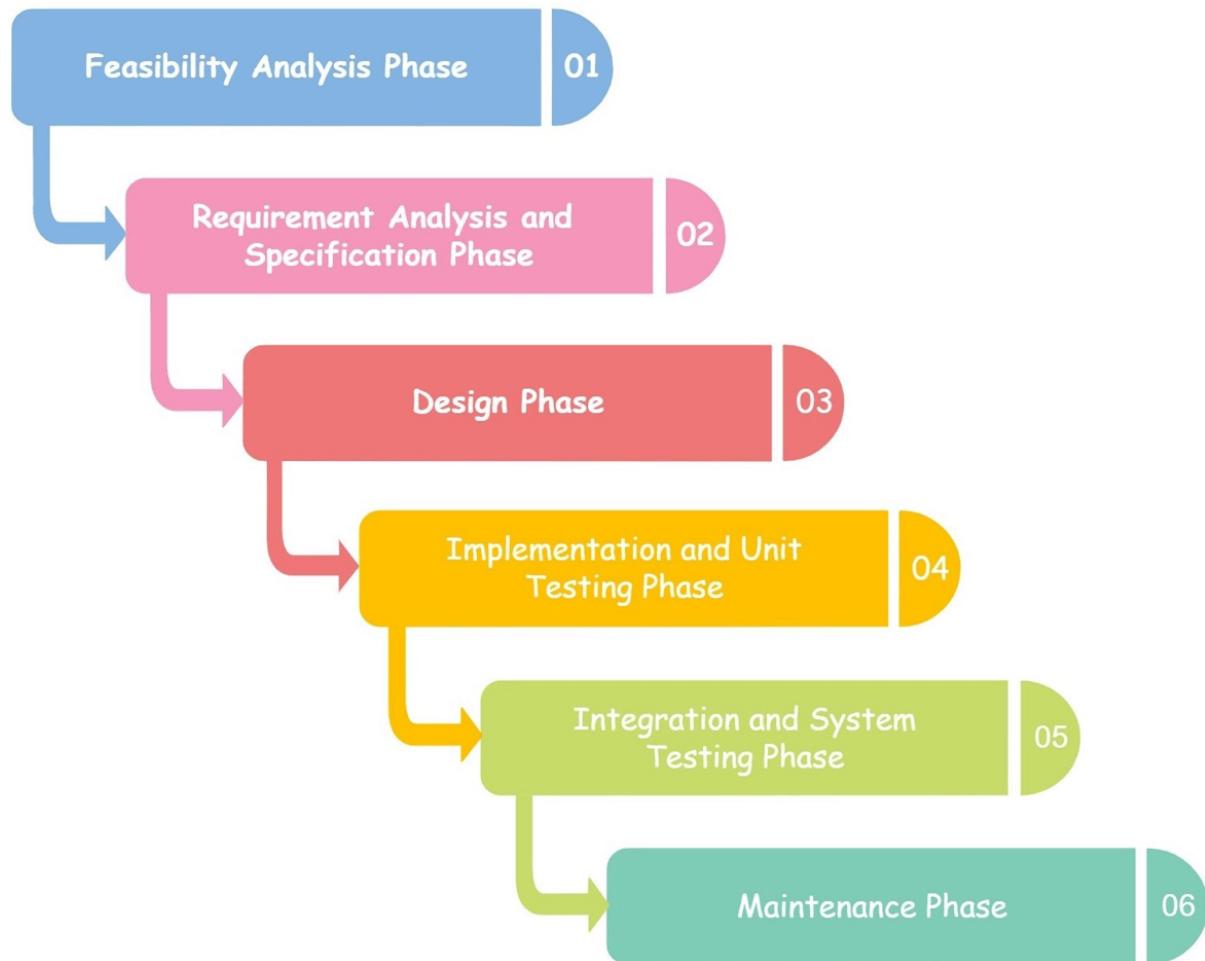
6. Implementation and Maintenance:

Deployment activities

- Release
- Installation and activation
- Deactivation
- Uninstallation
- Update

- Version tracking

Once when the customers start using the developed system then the actual problems come up and need to be solved from time to time.



Finally the Bookshop Automation software is developed and is made available in use by the customers.

Precautions:

1. As we are using the waterfall model, Integration is one big bang at the end. So development phase must be performed with utmost care

Advantages:

1. Easy to understand, easy to use, especially by inexperienced staff
2. Milestones are well understood by the team
3. Provides requirements stability during development
4. Facilitates strong management control (plan, staff, track)

3. LITERATURE REVIEW

The automation of business processes has become a popular trend in recent years. This has led to the development of software systems that automate various business processes such as inventory management, sales tracking, and customer relationship management. In the book industry, automation has also become important to streamline operations and increase efficiency. In this literature review, we will examine existing literature on Book-shop Automation Software (BAS) and its impact on the book industry.

Problems solved by introduction of BAS:

- **Difficulty in tracking book availability:** Before BAS, it was difficult for customers to know whether a book was available in stock, and they had to physically search for the book in the store. BAS solves this problem by allowing customers to query the availability of a book online, using the book title or author's name.
- **Inaccurate inventory tracking:** Before BAS, the bookshop may have had difficulty keeping accurate track of inventory levels, leading to overstocking or understocking of certain titles. With BAS, the bookshop can keep track of the inventory levels of each book in real-time, ensuring that the bookshop always has the right amount of stock on hand.
- **Manual sales tracking:** Before BAS, sales tracking may have been done manually, which could be time-consuming and prone to errors. With BAS, the sales process is streamlined, and sales are automatically recorded in the system, reducing the chance of errors and making sales tracking more efficient.
- **Difficulty in restocking books:** Before BAS, the bookshop may have had difficulty knowing which books were in high demand and needed to be restocked. With BAS, the bookshop can track the sales data for each book, making it easier to restock books in high demand.
- **Limited sales analysis:** Before BAS, it may have been challenging to analyze sales data and make informed decisions about which books to stock and how much stock to keep on hand. With BAS, the bookshop can generate sales statistics and reports, allowing the bookshop owner or manager to make data-driven decisions about inventory management.

Overall, the introduction of BAS into a bookshop can solve several problems that were previously faced by the bookshop, such as difficulty in tracking book availability and inventory levels, manual sales tracking, difficulty in restocking books, and limited sales analysis. BAS can help bookshops to operate more efficiently, make informed decisions about inventory management, and provide a better shopping experience for customers.

4. REQUIREMENT SPECIFICATION

Requirement analysis involves a thorough examination of the user's needs, goals, and objectives to determine the features and functionalities required for the software system. Here is a requirement analysis for the Book-shop Automation Software (BAS):

1. BAS should help the customers query whether a book in a stock the user can query the availability of a book either by using the book title or by using the name of author.
2. If the book is not currently sold by the bookshop, then the customer is asked to enter the full detail of the book for procurement of the book by the bookshop.
3. The customer can also provide his e-mail address and mobile, so that he can be intimated automatically by the software as and when the book copy received.
4. If a book in stock, the exact number of copies available and the rack number in which the book is located should be displayed.
5. If a book not in the stock, the query for the book is used to increment a request field for the book.
6. The manager can periodically view the request field of the book arrive at a rough estimate regarding the current demand for different books.
7. BAS should maintain the price of various books.
8. As soon as customer selects his book for purchase, the sale clerk would enter the ISBN number of the books. BAS should update the stock and generate the sales receipt for the book.
9. BAS should allow employees to update inventory whenever new supply arrives. Also upon request by the owner of book shop.
10. BAS should generate sales statistics (viz, book name, publisher, ISBN number, number of copies sold and the sales revenue) for any period.
11. The sales statistics will help the owner to know the exact business done over any period of time and also determine the inventory level required for various books.
12. The inventory level required for a book is equal to the number of copies of the book sold over a period of one week multiplied by the average number of weeks it takes to procure the book from its publisher.

13. Everyday the bookshop owner would give a command for BAS to print the book which have fallen below the threshold and the number of copies to be procured along with the full address of the publisher.

4.1. Requirements analysis

The Book Shop System is having the following hardware:

1. Book shop main computer
2. Other pc's

Software Interfaces

1. System will interact with the system database to record all transaction data.

4.2. Interface Requirements

User Interfaces:

The system users are:-

1. The book shop management as the system administrators.
2. Book shop cashiers as the normal users

Overall, the Book-shop Automation Software (BAS) should provide an efficient and reliable solution for managing book inventory and sales, enabling the bookshop to meet customer needs, increase revenue, and maintain an optimal level of inventory.

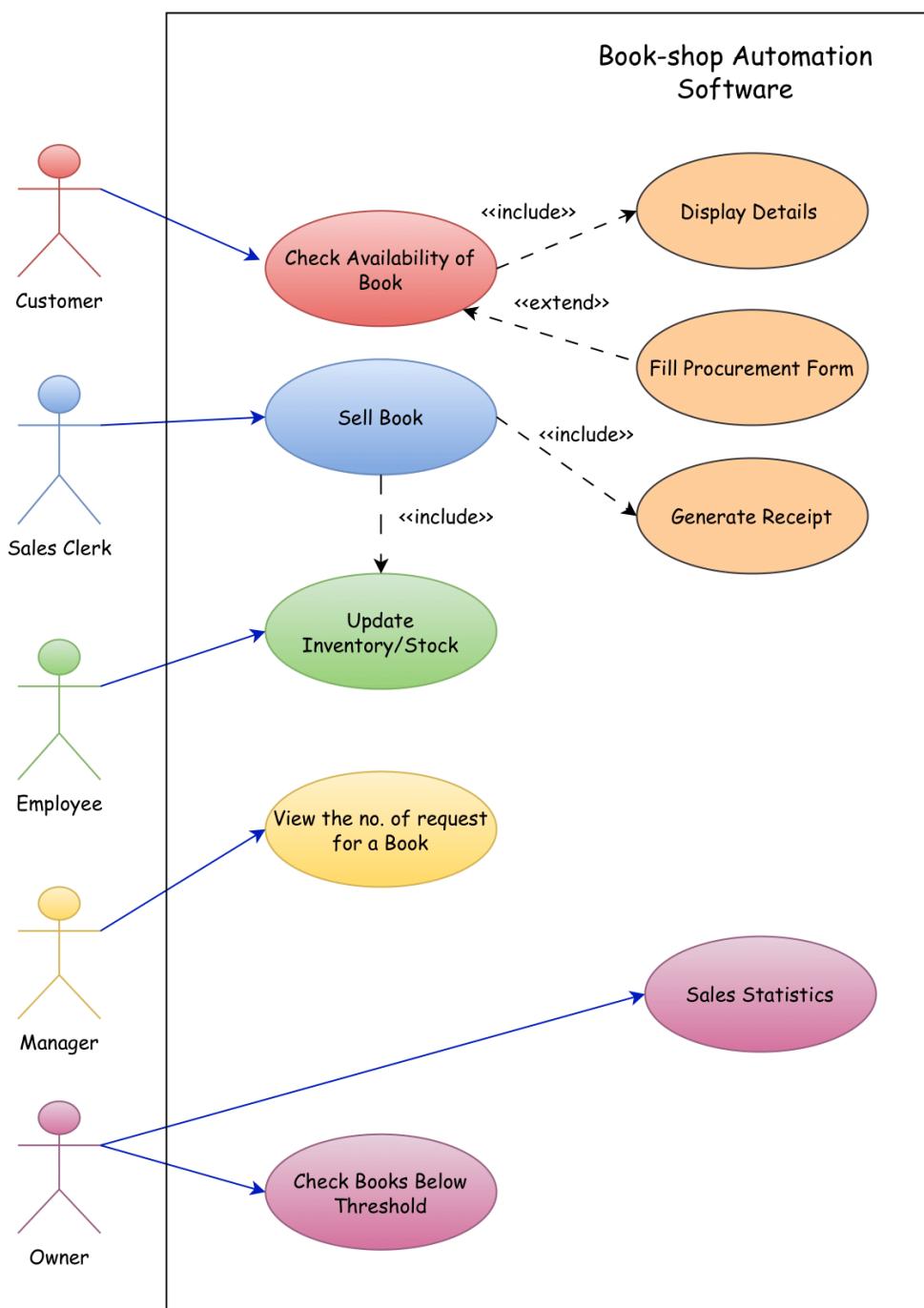
5. SYSTEM ARCHITECTURE AND METHODOLOGY

Algorithms in BAS:

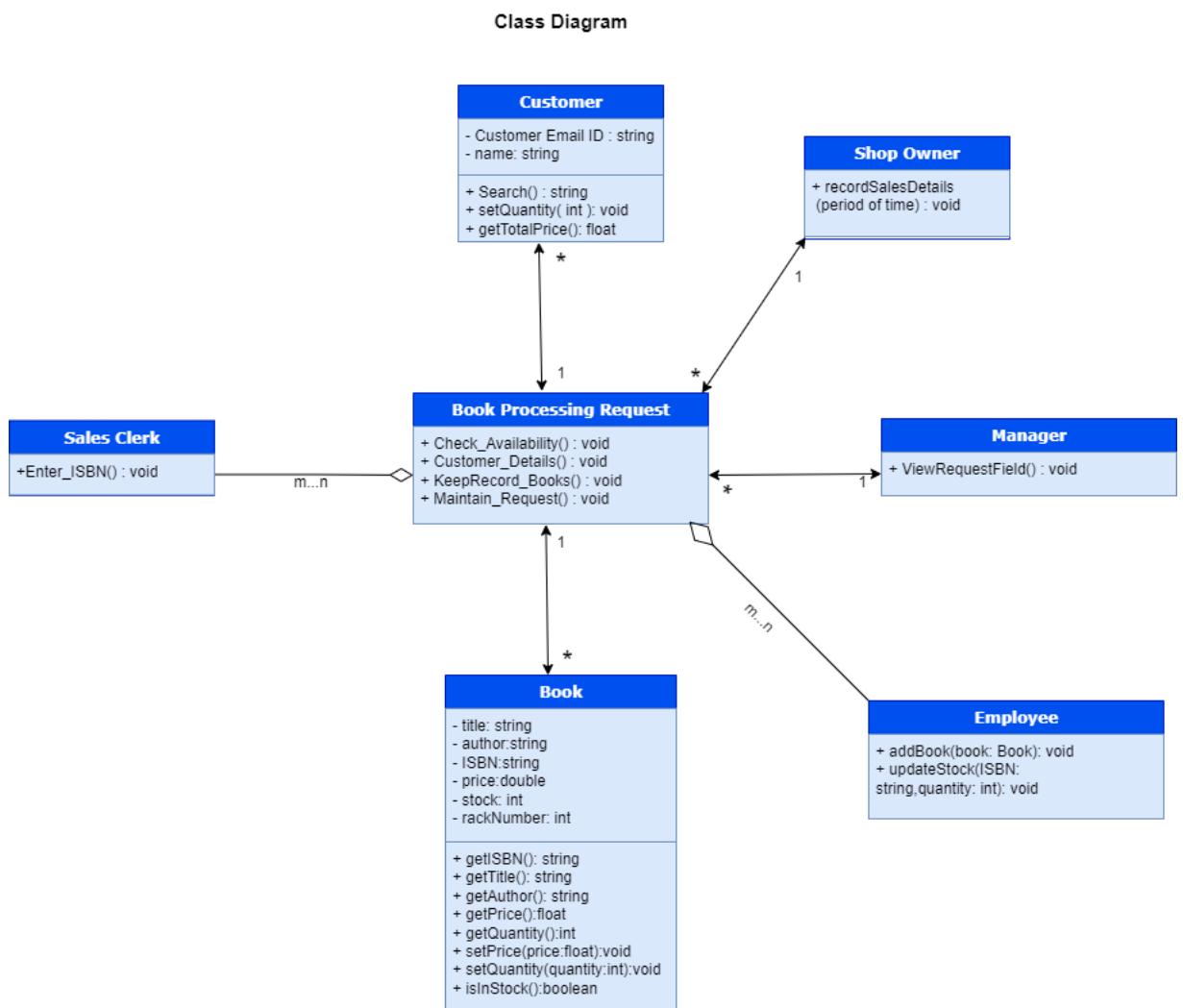
- **Search Algorithm:** This algorithm would be responsible for searching the database for books based on the book title or author name provided by the customer. It searches the database efficiently and returns the books related to the search .
- **Stock Management Algorithm:** This algorithm would be responsible for managing the stock levels of the books in the database. It would update the stock levels when a customer purchases a book, and increment the request field for books that are not in stock.
- **Sales Statistics Algorithm:** This algorithm would be responsible for generating sales statistics for any period requested by the owner. It would retrieve the relevant information from the database and generate a report containing the book name, publisher, ISBN number, number of copies sold, and the sales revenue.
- **Inventory Update Algorithm:** This algorithm would be responsible for updating the inventory when new supply arrives. It would update the stock levels and inventory levels for each book in the database.
- **Procurement Algorithm:** This algorithm would be responsible for printing the books that have fallen below the inventory threshold along with the number of copies to be procured and the full address of the publisher. It would help the owner to efficiently manage the procurement of books from publishers.

5.1. Use Case Diagram

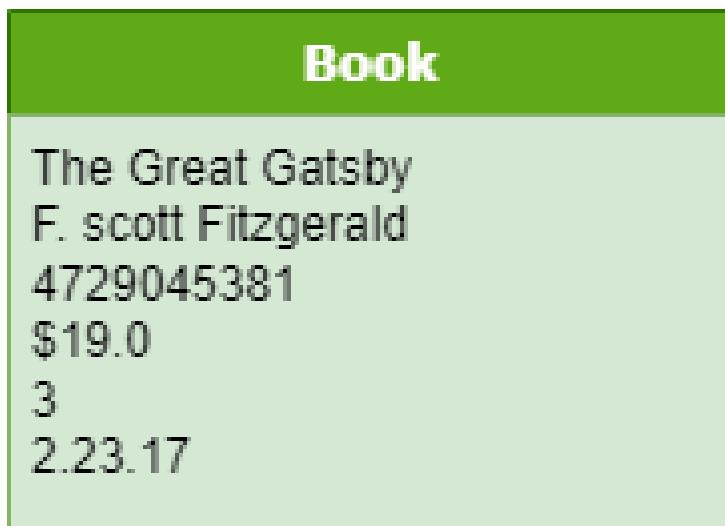
Use Case Diagram



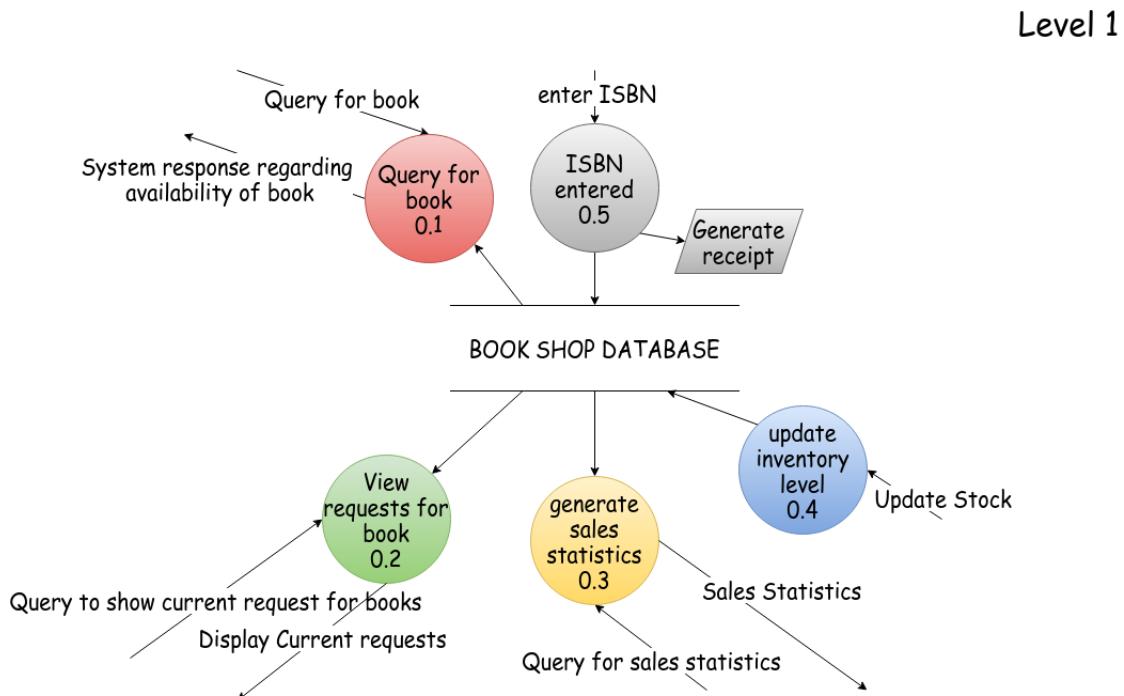
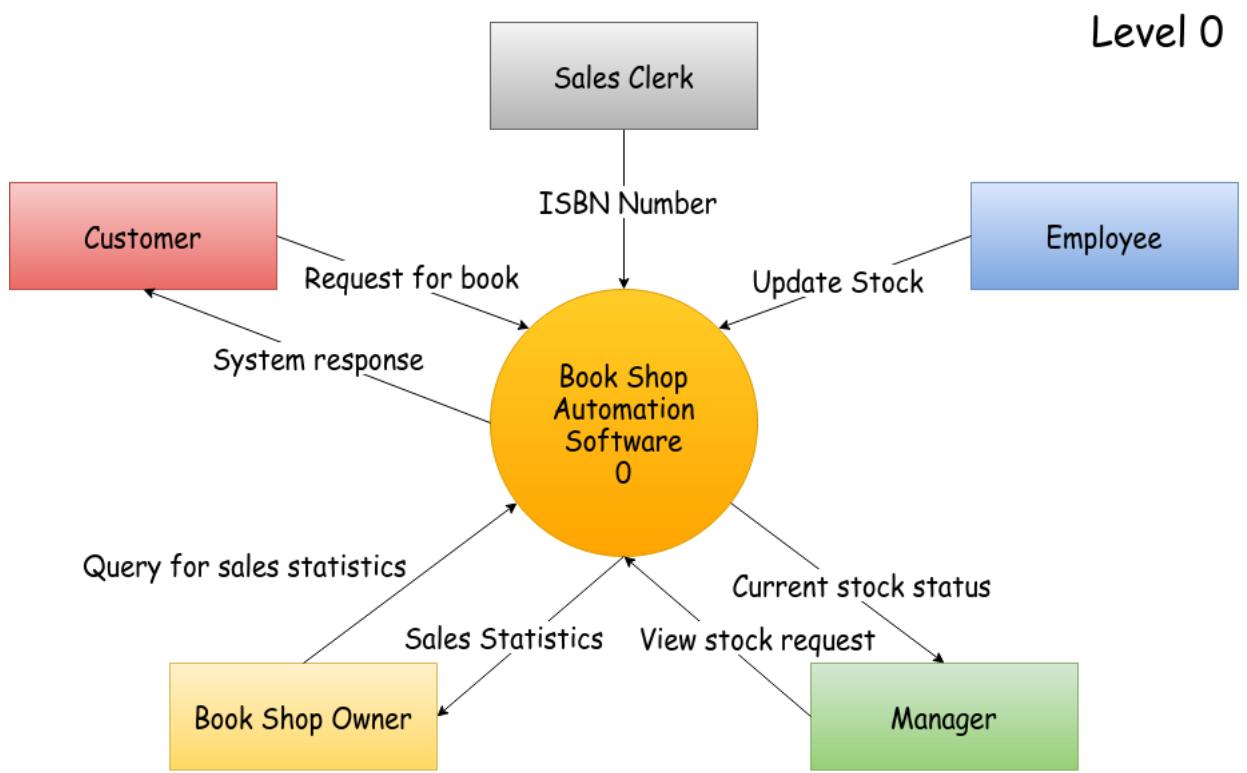
5.2. Class Diagram



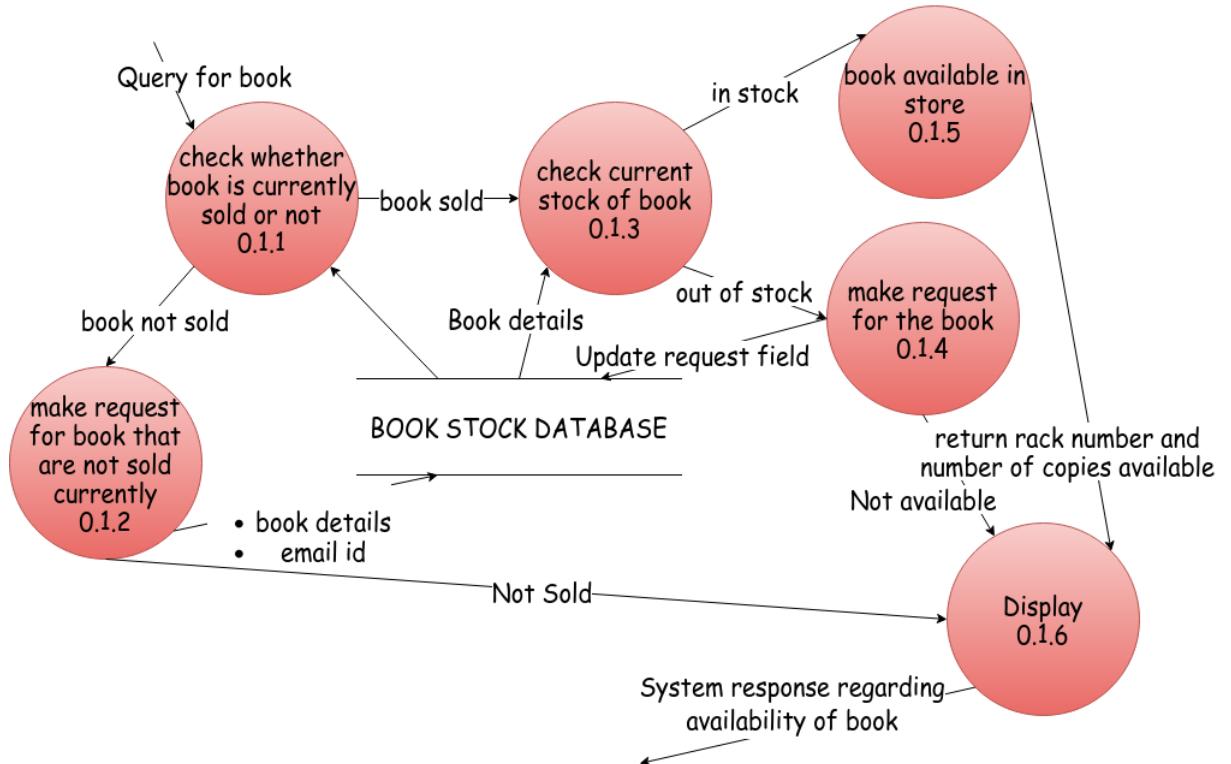
5.3. Object Diagram



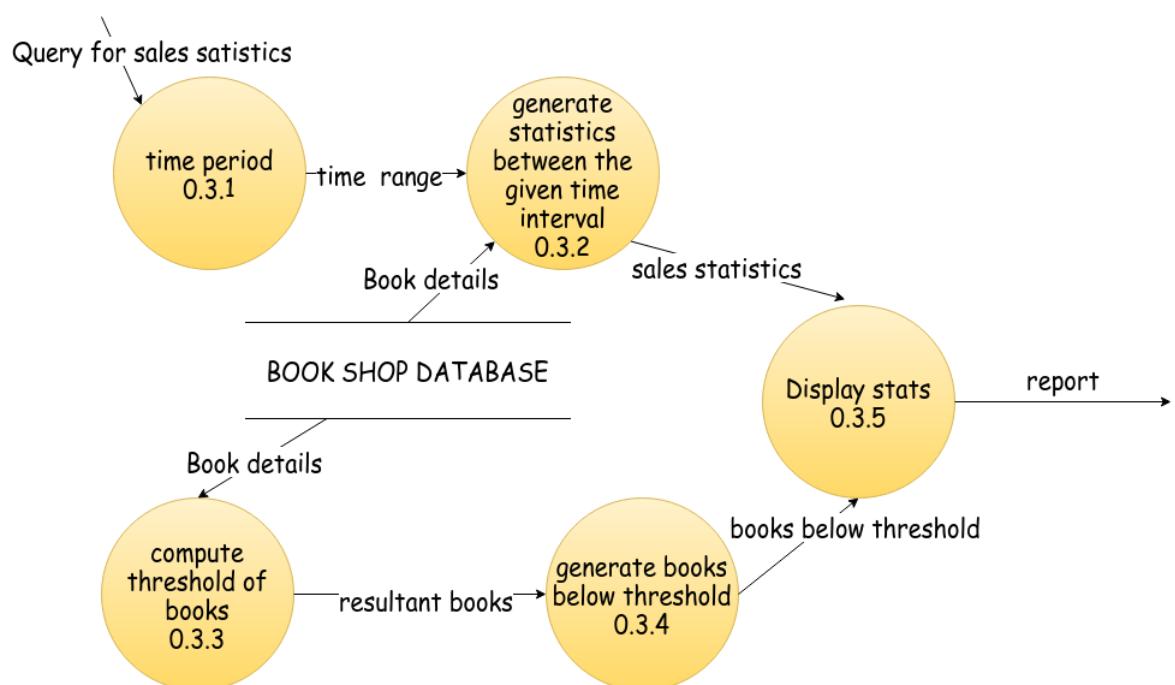
5.4. Data Flow Diagram



Level 2



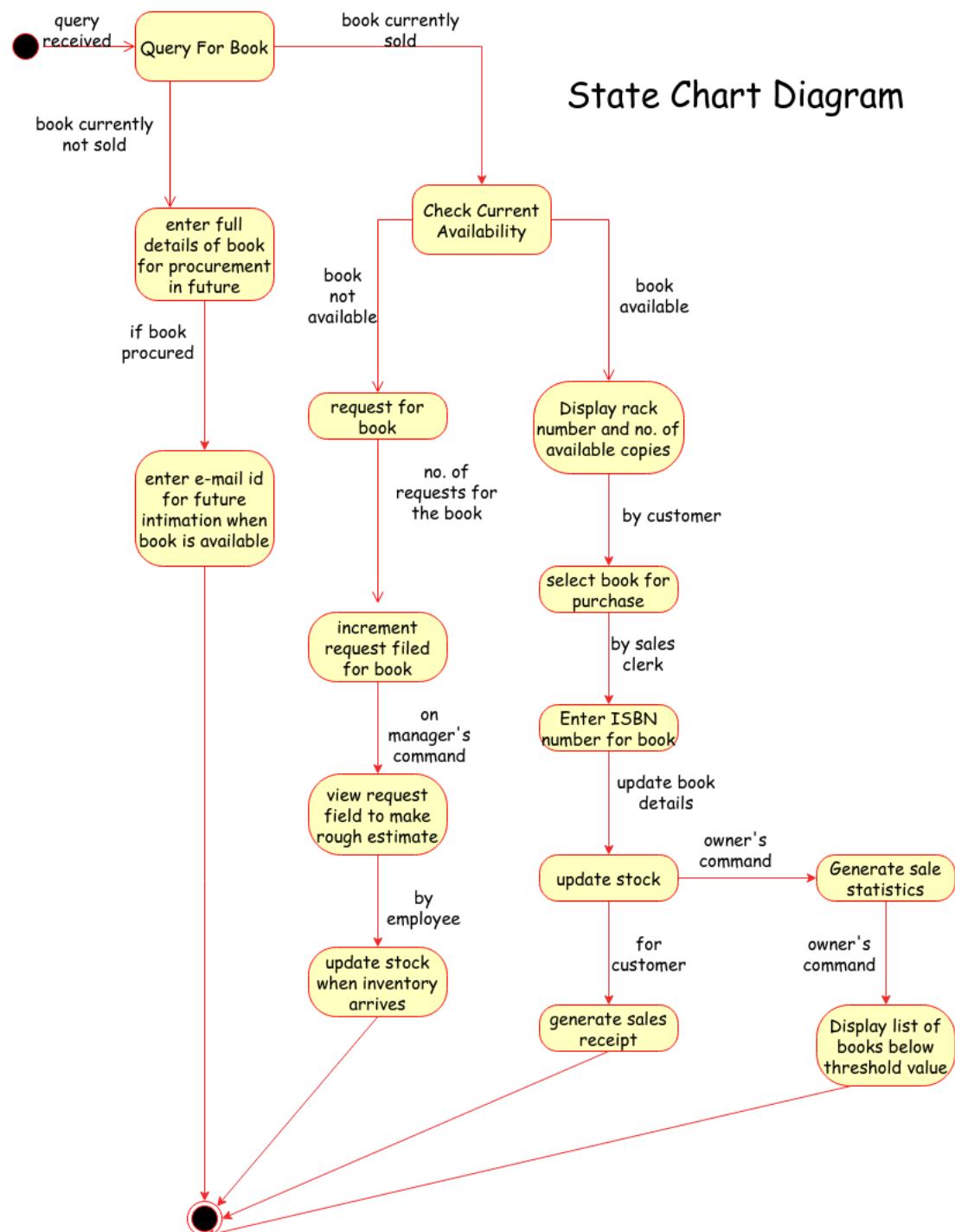
Level 2



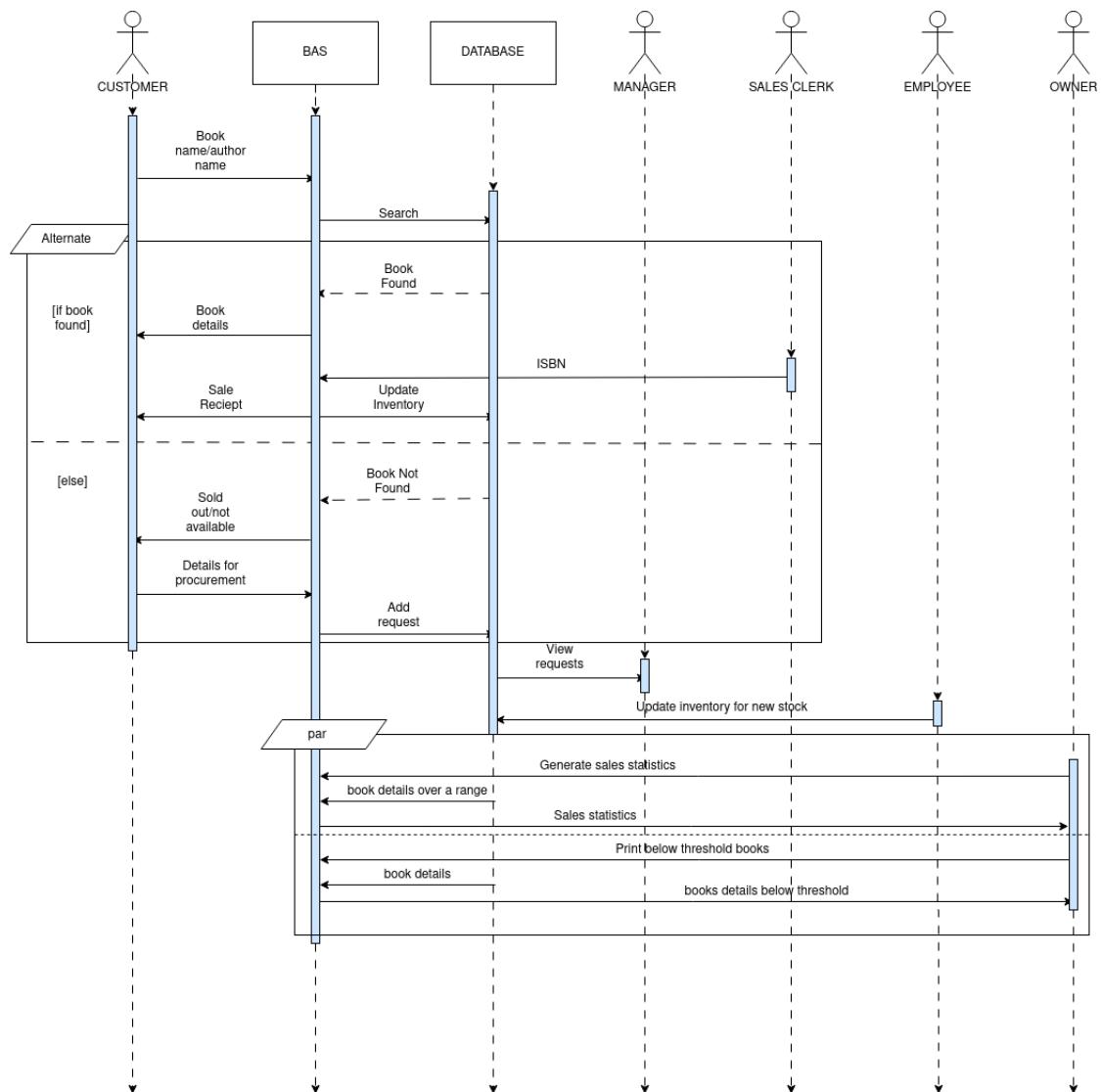
5.5. Data dictionary

- author: string *input string*
- title: string *input string*
- Query-for-book: [author, title]
- system-response: [location, not-available, not-sold]
- location: string *Rack No. and No. of copies*
- not-available: string *Book Not Available message*
- not-sold: string *Book Not Sold message*
- query: period /* query from manager regarding sales statistics*/
- period: [date+date,month,year,day]
- date = year + month + day
- year: int
- month: int
- day: int
- ISBN-No.: int *input*
- Stock: int *available copies of book*
- book-detail: {title + author + ISBN-No. + Stock + location +
(date)}* *records of book sold info*
- threshold:int *equal to the number of copies of the book sold
over a period of two weeks multiplied by the average number of
days it takes to procure the book from its publisher*
- statistics: {author + title + quantity + price }*
- sales-statistics: {statistics}*- quantity: integer
- books-below-threshold: {book-details}*- report = sales-statistics + books-below-threshold

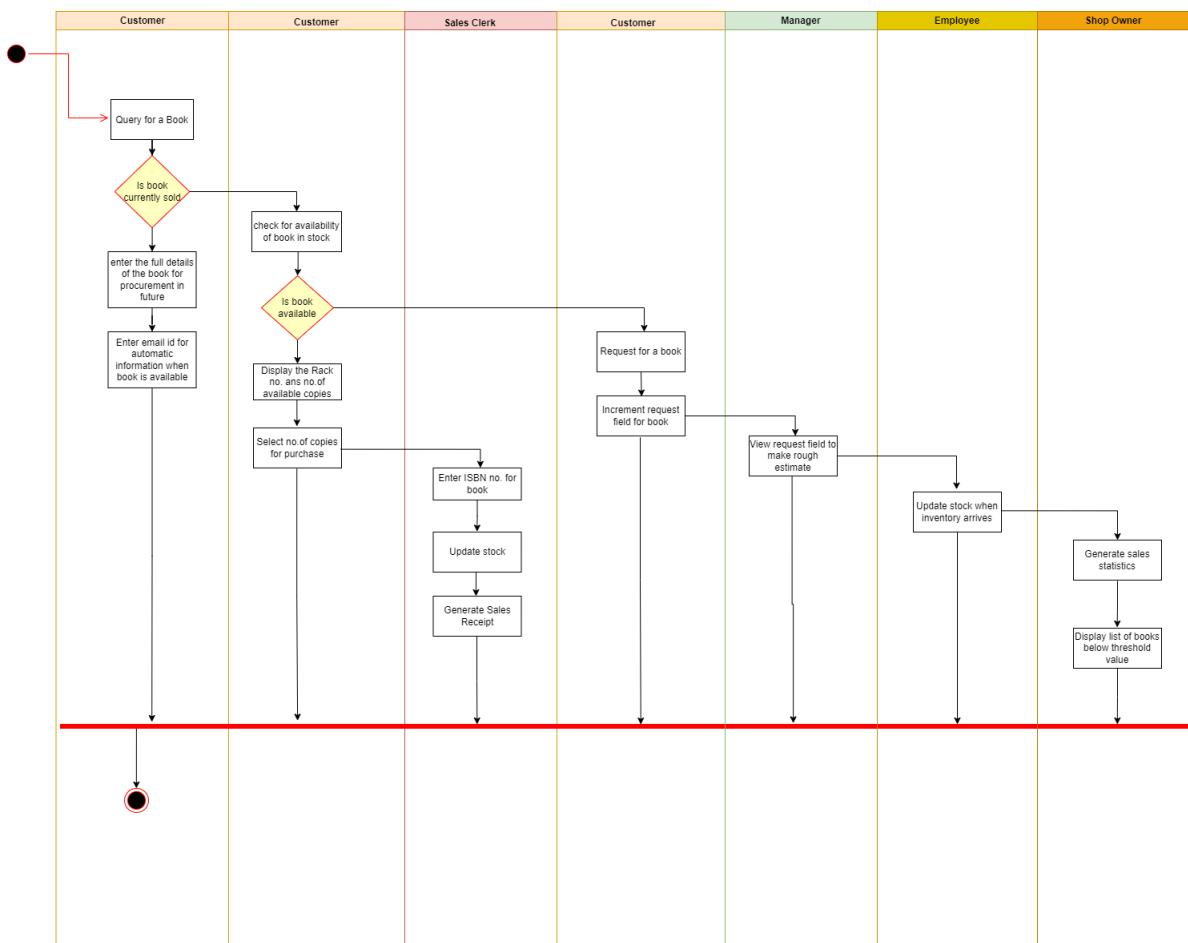
5.6. State chart diagram



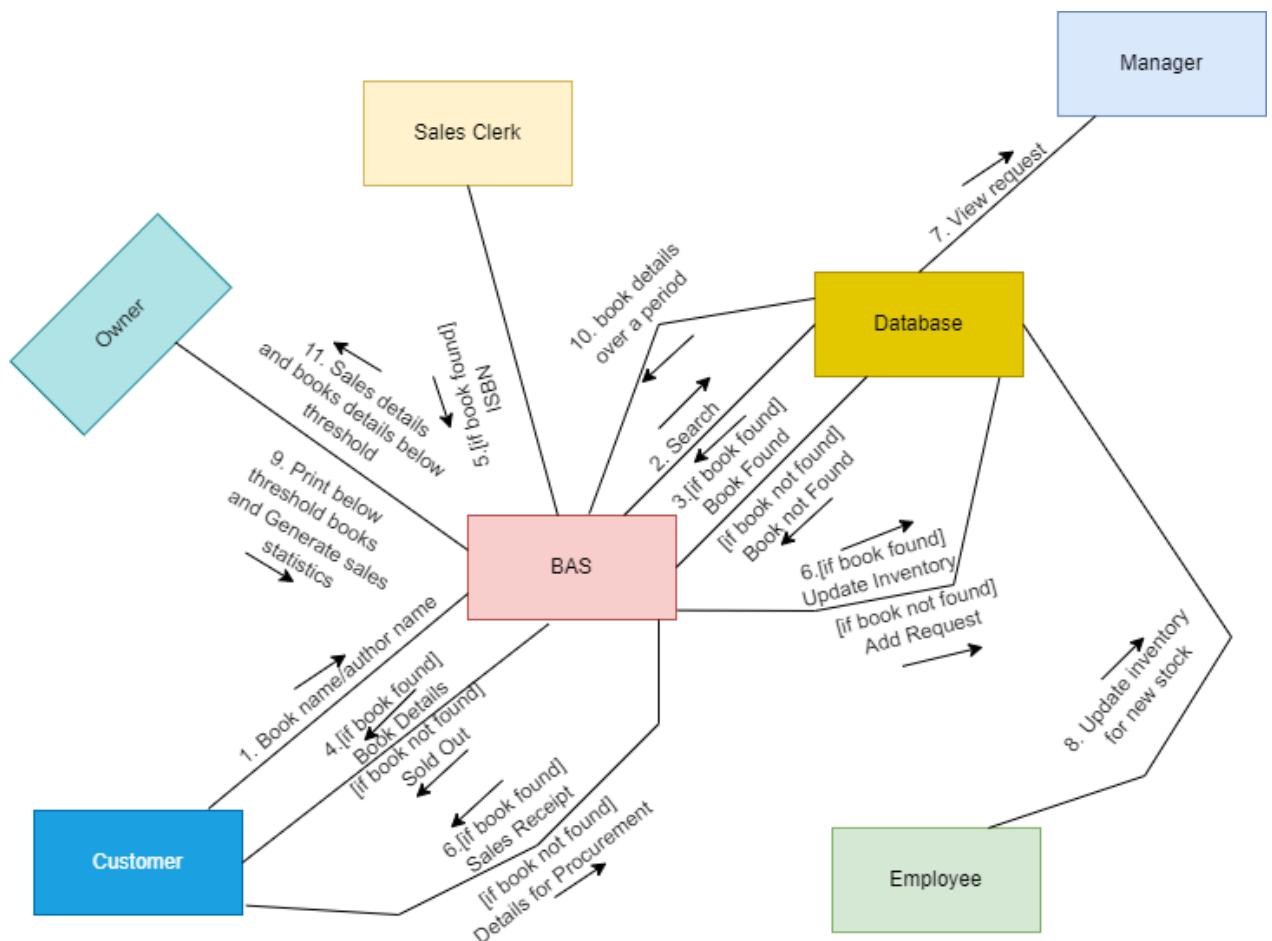
5.7. Sequence Diagram



5.8. Activity Diagram



5.9. Collaboration Diagram



6. IMPLEMENTATION DETAILS

To implement the Book-shop Automation Software (BAS), we need a combination of hardware components and software programs.

6.1. Hardware Components:

- Computer system (desktop or laptop) with sufficient processing power and storage capacity.
- Printer for generating receipts and printing orders.
- Storage devices (such as hard drives or cloud storage) for storing data and backup purposes.
- Network devices (such as router and switches) for connecting the computer system to other devices and the internet.

6.2. Software Programs:

- Database management software (such as MySQL) for storing information about the books, sales, and inventory levels.
- Programming language (such as Python) for developing the software.
- Web development framework (such as Flask) for creating a web interface for customers and employees.
- Statistical software (such as Excel) for generating sales statistics and inventory reports.

6.3. Calibration Process:

Printer: We need to ensure that the printer is properly connected to the computer system and has enough ink or toner. We also need to calibrate the printer settings to ensure that the receipts are printed correctly.

7. RESULTS AND DISCUSSIONS

The image shows two screenshots of a web-based book store application, likely a login page and a main store page.

Login Page: The background features a large stack of books and an open book in the center. The word "Login" is displayed prominently. There are two input fields: one containing "Team12" and another containing ".....". Below the fields is a "Login" button. A link "Don't have an account? [Sign up](#)" is also visible.

Book Store Page: The background is dark blue. At the top, the title "Book Store" is displayed in blue, along with a welcome message "Welcome, Team12! [Logout](#)". Below the title is a search bar with the placeholder "Search books...". A "Search" button is located next to the search bar. Underneath the search bar, the text "All books:" is followed by four book covers for "Geronimo Stilton" books:

- Valley of the Giant Skeletons:** Shows a mouse character in a green suit standing in a desert with a shovel and a giant skeleton hand.
- Geronimo and the Gold Medal Mystery:** Shows a mouse running on a track field with other characters.
- Geronimo Stilton, Secret Agent:** Shows a mouse in a green suit and hat in a city street.
- A Fabumouse School Adventure:** Shows a mouse in a school setting with other characters.

127.0.0.1:5000

Book Store

Welcome, Team12! [Logout](#)

geronimo stilton

[Search](#)

All books:

No results found for "geronimo stilton". Would you like to [add this book?](#)



127.0.0.1:5000

Book Store

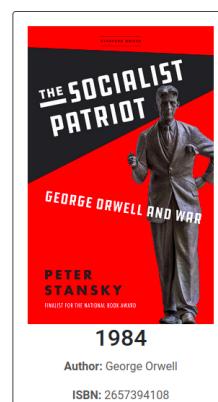
Welcome, Team12! [Logout](#)

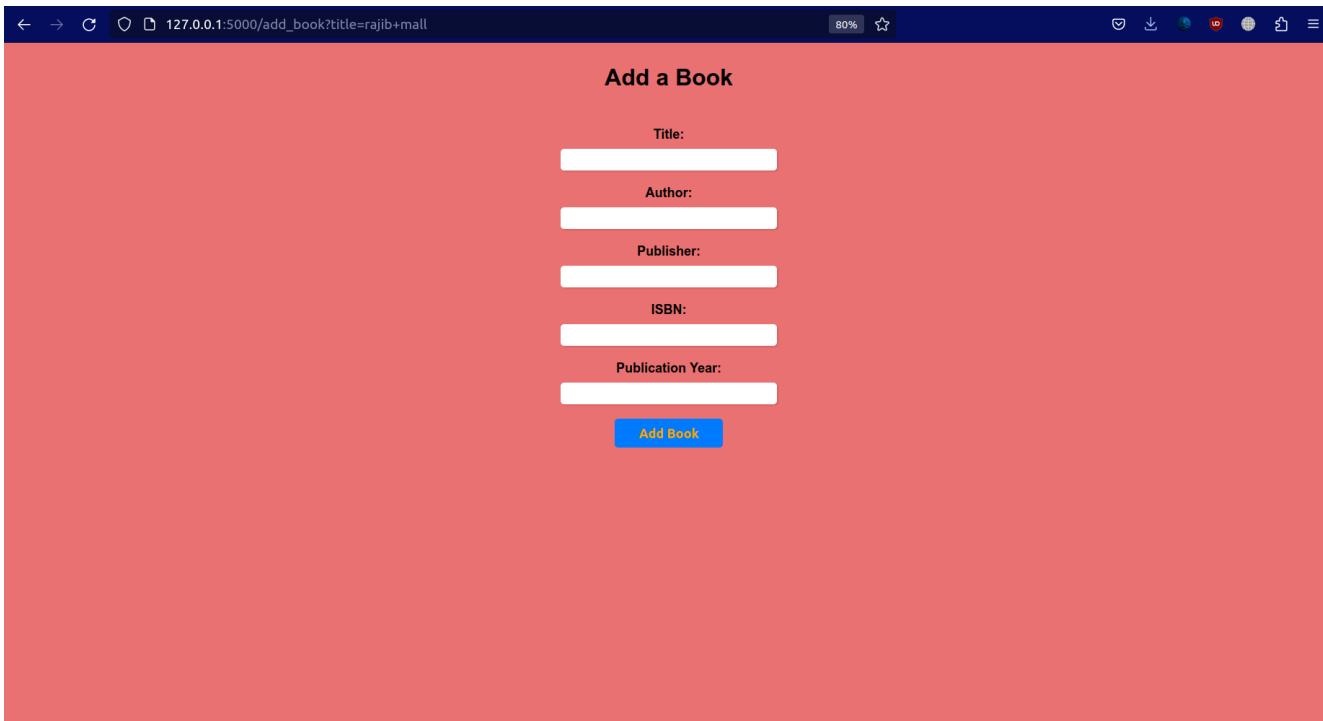
george orwell

[Search](#)

All books:

No results found for "george orwell". Would you like to [add this book?](#)





Results:

The Book-shop Automation Software (BAS) was successfully developed and implemented for the book-shop. The software allows customers to query the availability of a book using the book title or the name of the author. If the book is not currently in stock, customers can enter full details of the book for procurement in the future. If a book is in stock, the software displays the exact number of copies available and the rack number in which the book is located. If a book is not in stock, the query for the book is used to increment a request field for the book. The manager can periodically view the request field of the books to arrive at a rough estimate regarding the current demand for different books.

BAS also maintains the price of various books. As soon as a customer selects a book for purchase, the sales clerk enters the ISBN number of the book, and the software updates the stock and generates the sales receipt for the book. Employees can also update the inventory whenever new supply arrives. Upon request, BAS generates sales statistics (viz., book name, publisher, ISBN number, number of copies sold, and the sales revenue) for any period. The sales statistics help the owner to know the exact business done over any period of time and also to determine inventory level required for various books.

Discussion:

The Book-shop Automation Software (BAS) is an efficient and effective system that streamlines the operations of the book-shop. It provides customers with a convenient and hassle-free way to check the availability of books and also enables the shop to keep track of the

demand for various books. BAS also allows the shop to maintain accurate records of sales, inventory, and revenue, which can help in making informed business decisions.

The software's feature of maintaining the price of various books is beneficial for the bookshop as it helps to ensure that the books are sold at the correct price. The sales statistics generated by the software can provide valuable insights into the shop's sales trends, which can help in deciding which books to stock and which to remove from the inventory.

The inventory level required for a book, as calculated by the software, can help the owner to ensure that the shop has enough stock of each book to meet the demand. The feature of generating a command to print the books that have fallen below the threshold and the number of copies to be procured along with the full address of the publisher every day is useful for ensuring that the shop has adequate stock of books.

Overall, the Book-shop Automation Software (BAS) is an efficient and effective system that can help the book-shop to manage its operations better and provide better service to its customers. It can help in making informed business decisions and ensure that the shop always has adequate stock of books to meet customer demand.

8. CONCLUSION

This Bookshop Automation System is an attempt to overcome the present inefficient and time consuming process of locating, reserving and purchasing quality reading materials available in the store. Currently, clients have to go through a time consuming process to perform aforementioned tasks which cause waste of labor and firms resources. Through our automated book store solution, we provide an easy way of searching, reserving and purchasing of books.

User data are validated and checked for authenticity with the data stored in the system database. Customer satisfaction plays the most vital role in any form of product and service rendering store as the existence of any firm solely depends on its customer-base. Therefore, every system should facilitate the customer satisfaction up to a certain extent which is feasible from the company perspective. The aforementioned facts ensure customer satisfaction to a greater extent benefiting the store in:

1. Retaining current customers
2. Tempting current customers to attract their friends to the store
3. Attracting new customers
4. Enhancing the customer faith on the firm due to secure transaction techniques while temping customers to make more online purchases
5. Identifying profitable customers limit
6. Analyzing trends to make more effective management decisions and
7. development of new strategies to increase profit

These particulars will make sure the broadening the customer base of the store which will have good impact on the sales and revenue of the store. Employee satisfaction also plays an influential role in healthy revenue levels of a firm. Due to the proposed system, employees will have to handle minimum amount of workload than that of the existing system which will help the employees to provide optimal service to the firm while maintaining healthy physical and mental levels.