**Problem Specification and Project Plan**

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Project Title: Electronic Point of Sale and Inventory System for small second hand and charity bookshops

**Abstract/Problem**

Second hand and charity bookshops sell independently purchased and donated books along with a range of smaller items. These businesses are typically staffed by volunteers with limited experience in the retail sector and associated software solutions. Furthermore the businesses do not have the capacity to purchase professional equipment or software due to the high costs involved yet must meet the expectations of customers who are used to the modern facilities available in large commercial rivals.

This project aims to create a point of sale and inventory system to reduce the time required to catalogue and track new stock while also providing an intuitive and effective point of sale service which can be used with minimal training or experience.

**Background**

There are many existing web, Android and IOS POS systems, such as AirPOS1 and ShopKeep2, which have had success in targeting small businesses with android & IOS EPOS systems. Modern EPOS are typically sold with bespoke hardware, costing upwards of £1,000 for the initial equipment and installation, followed by on-going subscription and support costs. Due to the large invest required many small business, especially charity shops, still use simple till systems which produce daily reports which then must be transcribed by hand to track sales information. It is often the case that stock is not automatically tracked and the only indication that the owner has comes from manual stock takings which are extremely time consuming and offer little in the way of sales analysis if not performed regularly. Expensive EPOS systems are usually not capable of reading existing barcodes, instead requiring new items to be allocated a new barcode which leads to shortcuts being made by management to save time. For example, to avoid creating a new barcode for every item the user may simple created a ‘Fiction - £5.00’ code which can be applied across a wide range of books.

Since 1970, the vast majority of all published books have been assigned a unique International Standard Book Number (ISBN) which forms the basis of all barcodes printed on books, regardless of the country of origin4. Barcodes offer the fastest means to both find information about new stock and record accurate sales information. There are a number of online databases, such as ISBNdb3, which may be accessed to return details such as Author, Title, Edition, and Publisher based on an ISBN. These databases are often used in specialised cataloguing apps such as Book Catalogue5 or Libib6, aimed at individuals who wish to create a digital record of their personal libraries.

Even small independent bookshops require a minimum of approximately 10,000 books in stock to have a viable business. New stock may arrive at any time and needs to be quickly sorted and added to the inventory, ideally on the same device as the point of sale device to avoid spending on additional hardware.

Second hand book stores are one of the few retail environments where bartering is still commonplace, with sales staff making on the spot reductions or deals to close a sale. This creates problems for management when working with standardised EPOS systems as often item prices cannot be easily changed and such deals are only reconciled in physical paperwork at the end of a days sales.

As many small bookshops are run by volunteers without an accounting or IT background any management controls should be intuitive and easily operated while still maintaining tools for reporting and in-depth sales analysis available where possible.

**Problem Specification**

This project will create an android based inventory and electronic point of sales system. The system must be easily deployed work with commonly available and inexpensive hardware. The solution will be aimed at providing an inventory and EPOS system for businesses primarily dealing in the sale of second hand books but should also facilitate the sale of other items which may or not come with a barcode. To ensure that data is safely stored and recoverable in the event of hardware failure or theft; all data should be regularly backed up to a remote server.

The solution should be suitable for multiple users to provide confidence to management that other members of staff may utilise various functions needed without endangering the system integrity or accidently deleting data. The system must be intuitive to use with as few as actions as possible required to locate a book, add an item to the inventory, or make a sale. It should include a simple screen to show the total to pay, monies received and change required.

The solution should also provide reporting features to exceed those that would be available with a manual system. Default reports should be available to summarise user and sales activity within a given date range and extract useful marketing measurements such as the sales of popular authors and genres. It should also be possible to extract all sales information within a given date range to allow for further tailored analysis by the end user by extracting to a Google Sheets & Microsoft Excel compatible format.

**Project Plan**

With a six month window to complete this project an agile approach to development will be adopted based on fortnightly sprints and meetings with the project supervisor to ensure progress is speedy and focused.

The initial sprint will involve the creation of a php server and of a MySQL database which can be utilized by an android application. The initial phase of the project will focus on the development of the database to store inventory, user, and sales data. An android application will be developed to access this database which is capable of editing and updating the information saved.

This will involve a lookup feature where by a books barcode can be scanned using a camera or Bluetooth barcode scanner and used to retrieve information from an online source such as ISBNdb. It not be possible to retrieve information the user will have the option to enter basic information manually. Each individual item will receive a unique item number and be linked to further information such as condition, price, and date added. This will allow the system to hold multiple prices for items with the same ISBN barcode. It will be possible to add an item without a barcode allowing for the accounting of books with missing or unreadable barcodes and for non-book items which do not feature a barcode.

The next phase will involve the creation of the EPOS element of the application. This will enable users to scan by bar code, or search by other means, for an item to retrieve information from the database including title and cost. This information will then be used to create an order and receipt and sold items removed from the available stock. It should be possible to sell an item in the basket at a different price than that preselected.

**Solution Criteria**

The following points represent the essential capabilities required to produce a working solution which will address the problem as described.

* Application successfully runs on Android Operating Systems from 5.0 and above.
* Application successfully retrieves current stock list from MySQL database when first activated
* Application sends updates to MySQL database following each transaction or saves transactional data and updates when connection is available.
* Application allows barcodes of new stock to be read and added to the inventory ready for sale with further details entered manually.
* Application automatically queries barcodes of new items against existing database and online resources to provide information automatically.
* Application allows barcodes of items to be read and removed from the database when sold by use of an android devices inbuilt camera.
* Application allows items in inventory to be searched by Title/Description, Author, or ISBN use of a barcode scanner and returns price and location of item.
* Items may be added to basket order once identified through the search feature.
* Application provides a simple POS interface to add items to an order, input payment amount, payment method, and calculate change due.
* Application can provide a basic ‘Cash Up’ Screen to the user summarising all takings and expected amount in till.
* Application can generate a full sales report of the current user’s session as a google sheet.
* The solution should automatically back up data at regular intervals and be capable of restoring to an earlier state should an irreparable error occur.
* Application records any discrepancies against user ID
* Application can process a refund to the original payment method.
* Application full back up can be provided.
* Application can provide a daily sales log of all items and prices sold to be exported as a csv file.

Additional features which could be developed to enhance the solution include:

* Application can have features enabled or disabled depending on the user’s authorisation level.
* Application is able to print a receipt with use of a bluetooth printer paired to the device.
* Application is able to email a customer’s receipt on entry of email address.
* Application is able to use a barcode reader to read stock and reduce time taken to scan new items.
* Application can be used to set up regular reports which will be emailed to the user from the server (end of day, weekly/monthly/annual summary).
* Should internet connection be lost or slow, application will allow new transactions to be carried out and synchronise all when connection is re-established.
* Application can add discounts to basket which can be applied to either individual items or to the entire order (e.g. 10% off) at the user’s discretion.
* Application can apply discounts to both ‘basket’ and individual items.
* Application can manage a selection of ‘Special Offers’ such as (2 for 1 on Crime Fiction)
* Application can issue and accept gift vouchers as payment
* Application can process additional payment methods such as PayPal or Google Wallet

**References**

1. AirPOS Software for Retail: [www.airpointofsale.com](http://www.airpointofsale.com)
2. ShopKeep: <http://www.shopkeep.com/uk>
3. ISBNdb: <http://isbndb.com/>
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5. Book Catalogue: <https://play.google.com/store/apps/details?id=com.eleybourn.bookcatalogue&hl=en_GB>
6. Libib: <http://www.libib.com/>