**Backwoods Regional Library System**

**Architecture Notebook**

# 1. Purpose

This document describes the philosophy, decisions, constraints, justifications, significant elements, and any other overarching aspects of the Backwoods Regional Library System that shape the design and implementation.

# 2. Architectural goals and philosophy

This computer system is to be designed and implemented with usability and availability as the primary goals, not only focused for library personnel but also for library members, which may include those that are not technically confident.

To achieve this high level of usability and availability, not only are various hardware devices to be employed, but also variations of the common user interface to meet the intended purpose of the device. For example, the self-service borrowing station is only required to allow the borrowing or checking of member’s loans and therefore a touchscreen with minimal selection options should be adopted; however, the librarians counter system must have full access allowing for the adding / removal of library items, members, fine handling, etc.

Adding to the optimization of user interfaces, the availability for each of the devices is also dependent on its functionality. For example, the online catalogue should be available 24/7 via a website; and library personnel should be able to access the system remotely either during or after business hours.

This computer system must also focus on the traceability of data through the inclusion of auditing functionality. This will ensure that the location of the valuable library items will always be known, including who has taken part in specific transactions i.e. who borrowed what item. Additionally, the management of member’s fines will also be traceable which in turn reduces the costs and liability of the Library.

To further support the auditing functionality of the system, security / user authentication must be included as a functionality. To minimise the impact on the usability of the system, the security functionality should focus on user management only. This means that some specific functionality of the system is only made available to authorised users (library personnel). Additionally, as member’s personal information is being obtained and stored, suitable security must be in place to protect this information.

Finally, the system must be reliable with the focus of ensuring availability during business hours to all users (library and council personnel and members). This will ensure the improved efficiency of Library is maintained and impacts on the usability and availability of the system.

# 3. Assumptions and dependencies

The system is extremely dependent on the intended hardware devices (barcode scanners, swipe card readers, etc.) and a database for data management. Additionally, the connectivity to the internet is also crucial for the publication of the website (online catalogue).

It is assumed that the library system will have access to a database for data management requirements (library item, member and loan information).

It is also assumed that the publication of a website is permitted by the council.

# 4. Architecturally significant requirements

* The system must be intuitive and easy to use for members, with interfaces customised for the specific purposes. i.e. self-service borrowing station allows for creating or checking loans only, the website is primarily designed for catalogue searches and reserving items.
* The system must be available at the library during business hours (8am - 6pm Mon - Sat). An unscheduled downtime frequency of 2 - 3 times are year is acceptable and the system should be back up within 5 - 10 mins.
* Maintenance of 1 - 2 hours a week is acceptable, after business hours.
* An online catalogue must be available to users 24/7. In event of a system crash out of hours, it is acceptable for a “fix during business hours” response to be displayed to users.
* The system must be able to manage the data relating to library items, members and loans in a manner which allows for specific reliable and accurate retrievable data upon request.
* The transactions / changes to the data relating to library items, members and loans must be tracked to ensure the location of library items is known at all times.
* Authentication of the users is required so that only authorised personnel (library / council personnel) can access restricted data and perform restricted transactions (discharge or loan, take payment of outstanding fines). All library / council personnel are required to have a login and password to allow unrestricted access.
* The personnel information regarding member’s must be protected as per the governing privacy policy.
* During data entry, it must be ensured that all the required data is entered, no duplicate data entries are made and that the format of the data is correct.
* It should take less than 2 secs to bring up a member’s borrowing record once a barcode is scanned. Other response times are not critical but desired to maintained less than 3 secs.
* Any electronic interface failures, or user cancellations, must be handled so that the system reverts to the previous valid state.
* The system, including all library item, member and loan data, must be able to be restored from backups. The transactional, member and library item data is to be backed up daily, while the system code is only required to be backed-up upon changes.
* The system must use barcode scanners for acquiring data regarding specific library items.
* The system must use swipe card readers for acquiring data regarding library users.
* Receipts of transactions for members must be printed, along with barcodes and stickers for library items and general paper-based reports.
* Storage of library item information is intended to be indefinite, while member information is to be stored for up to 60 years and transactional information (loans, payments, etc.) is to be stored up to a maximum of 10 years.
* The capacity of the system must account for an expected 3 % growth in the number of Library members (currently thousands), and an expected 1-2 % growth in the number of library items (currently thousands).

# 5. Decisions, constraints, and justifications

* Constraint - library item details are to be obtained using a barcode scanner, however a search at the librarian’s station can be performed in case of missing barcode.
* The devices throughout the library are to be connected through local networking ports to a local server.
* A website is to be available for online catalogue searches and item reservation 24/7 for enhanced useability and availability.
* A relational database server is required to handle the member, library item and loan information as it provides perseverance, availability, integrity and security to the system. It is to remain separate from the rest of the software.
* All transactions are to be tracked and recorded using the relational database to ensure auditability of the system.

# 6. Architectural Mechanisms

## 6.1 Usability – Consistent, Customised User Interfaces

The user interface across all devices must be consistent, however depending on the specific functionality of the device, the interface should be optimised. This increases the usability of the system and assists with users that are not technically confident.

An application server allows for network-enabled versions of the same application software to be generated and removes the requirement for installing the software on each of the various workstations.

6.1.1 Self-Service Borrowing Stations

The self-service borrowing stations are specifically for patrons’s use and must have the restricted functionality of just creating and checking loans.

It is to have a touchscreen interface, with a swipe card reader to obtain the member’s details and a barcode scanner to obtain the Library item details. At the completion of the transaction, a receipt must be printed if required by the member.

6.1.2 Website / Online Catalogue

The primary function of the website is to provide an online catalogue to external users and allow members to reserve items if desired. This website is also to be used locally within the library at various search stations utilising networked computers.

6.1.3 Library Personnel Stations

The library personnel must have unrestricted access to the system so that they can perform additional functions such as adding / removing library items and discharging outstanding fines. The interface must be designed for intuitive and easy use.

This station must be equipped with a swipe card reader to obtain the member’s details and a barcode scanner to obtain the Library item details. A printer must also be available to print library item stickers and barcodes, transaction receipts for members and general paper-based reports.

## 6.2 Website / Networking

Various devices within the library must provide constant availability to the system to member’s and library personnel. These devices include the catalogue search terminals, the self-service borrowing stations and the librarian stations. These devices can be connected to the system on the main server using local networking ports.

However, access to an online catalogue is also required for external users allowing them to search the catalogue of library items for loan and reserve, if desired. This service should be provided 24/7 regardless of the location of the user. Therefore, a website is to be developed allowing for this functionality.

Finally, library and council personnel should be able to access the system remotely 24/7 for increased efficiency. This is to be enabled using a remote desktop gateway as it is not expected to be frequently used.

## 6.3 Relational Database Server

To achieve persistence and optimise the management of library items, members, and loans, a relational database is required to be utilised. Relational databases allow for the structured storage of data which avoids unwanted complexity and increases the usability of the system.

Additionally, relational databases not only ensure the integrity of the stored data, but they also allow the data to be reliably available to users.

## 6.4 Back Up

The data generated and system software must be stored on a backup. Although the cheapest and simplest option is to back up to a removal hard drive, connecting to another external server. such as the council server provides the added security of off-site back-ups in case of disaster (fire, flood, etc) at the Library.

# 7. Key abstractions

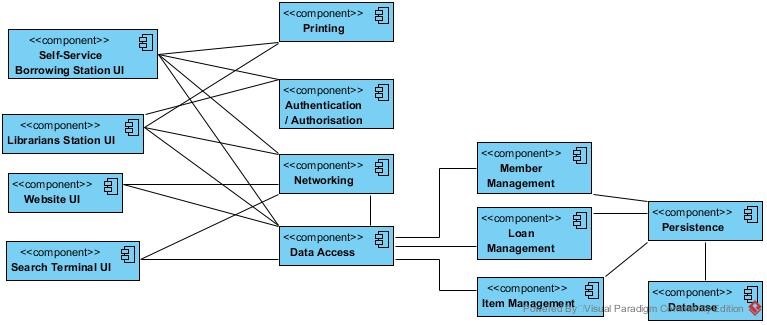
* Library item - any item available for loan at the Blackwoods Regional Library
* Member - a member of the public who has provided their personal details to the Library with the intent of borrowing Library items.
* Loan - a transaction between a library member and the Library, where a selected item is transferred to the possession of the member for a specified period of time.
* Library / council personnel - members of staff at the Blackwoods Regional Library or regional council who has responsibilities pertaining to the management of the Library.
* Catalogue - a detailed collection of information pertaining to all Library items which can be borrowed.
* Self-service borrowing station - physical station within the Blackwoods Regional Library specifically designed to allow members to create / check their own loans.
* Website - Backwoods Regional Library website allowing for online catalogue searches and reservation of Library items.
* Authentication - ensuring the user of the system has permission to access the system and the permitted access level.
* Relational database - collection of tables containing information regarding specific library items, members and transactions (loans).

# 8. Layers or architectural framework

The library system design is to reflect that of a three-tier architecture so that there is a;

* presentation tier (module) - which is responsible for the displaying the various user interfaces for the self-service borrowing station, the website and the librarians station. This tier sends the results / inputs from the user to the application tier;
* application tier - which is responsible for the logic of the software and basically controls the application functionality; and the
* data tier - which is responsible for the storage and retrieval of data from the database. This data is maintained independently from the application servers.

# 3. Component Diagram



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# 4. Deployment Diagram

