Essen RFID your window to the interconnected world

ESSEN

CASE STUDY

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Sultanate of Oman
Ministry of Manpower

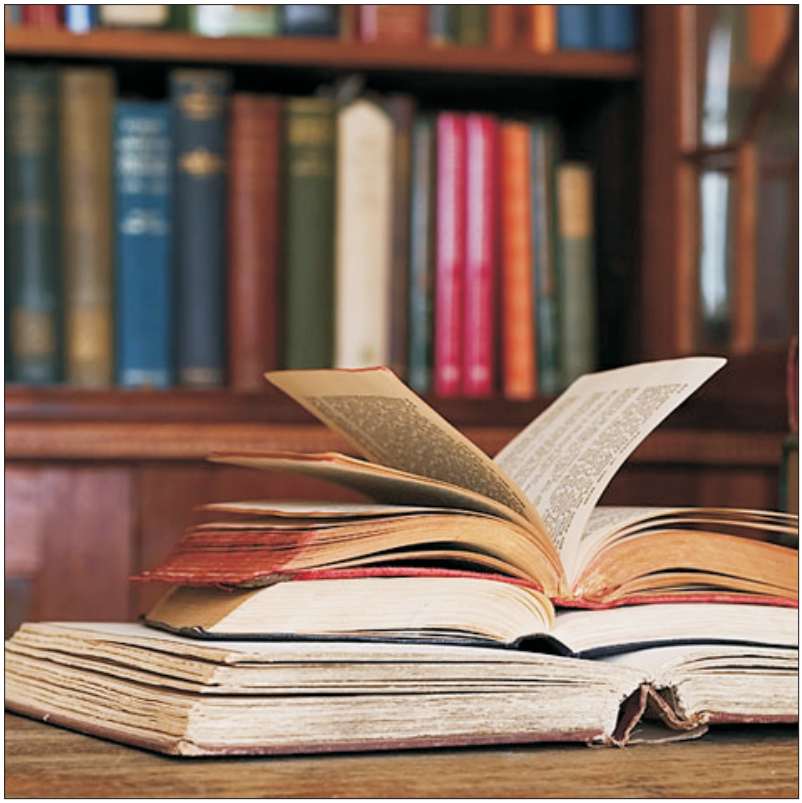
Government library in Oman opts for a RFID-enabled LIBRARY MANAGEMENT SYSTEM

Automated real-time maintenance of library inventory

Simultaneous check-in/check-out of stacked books

Minimum queuing with self check-in/check-out of books

Automatic confirmation messages, reminders and alerts along with theft prevention and checking for defaulters



INSIDE:

TECHNOLOGY

Solution:
EPC Gen2 compliant inventory and personnel tracking solution

Tag Type:
Personna™ UHF Passive
Libra™ UHF Passive

Reader/Antenna:
Xtenna Proximity™
Porta™

Method:
Multiple Tracking via near-range reader/antenna modules
Multiple Tracking via portal reader/antenna modules

Integration Platform:
RFID Middleware:
Xtenna™ WebToolkit
Xtenna™ Studio
Application: Essen RFID's Library Management System
Database: SQL Server 2005 Exp. ed.

Tag Manufacturer/Supplier:
Essen RFID, with US based chip inlay

Reader/Antenna Manufacturer:
Essen RFID, with US based module

Systems Integrator:
Essen RFID

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Xtenna™ Integrated RFID Antenna/Reader

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KEY REQUIREMENTS:

The government of the Sultanate of Oman has set up libraries across the country as part of its endeavor in human resource development. Its library in the Sur region is a pioneering project in this effort. The library incorporates modern facilities and provides educational and professional reading material for its visitors and members. As part of this process, it intended to include a high degree of automation in its operations while simultaneously tracking and preventing theft. The library therefore required an automated library management system for maintaining data of all its books, keeping track of all books issued and returned by its members, and sending reminders and alerts.

Main challenges:

- Ready data of all books available at the library.
- Easy search of any particular book within the library.
- Reduction in time for check-in and check-out of books.
- Preventing theft of books and preventing issue of non-lending reference books through alerts to security.
- Generating an alert to the library member on due date of book and to the library admin when the due date of a book has been exceeded.

SOLUTION:

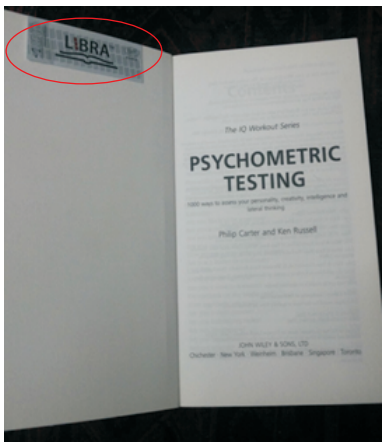
Essen RFID proposed a RFID-enabled Library Management System, that would meet all the above requirements and provide benefits at all levels for both members and library staff.

IMPLEMENTATION:

All books in the library are tagged with Essen RFID's LIBRA™ tags. New books are also similarly tagged when they arrive. Each library member is issued an ID card containing a PERSONNA™ RFID tag. All tags are registered into the database using a Xtenna Proximity™ reader.

A Porta™ RFID portal reader is installed at the entrance/exit doorway of the library. Two Xtenna Proximity™ readers are used for check-in and check-out of books.

The Library Management System is a .NET based application and uses SQL Server as the back-end database, with network connectivity to the central server.



LIBRA™ RFID Tag

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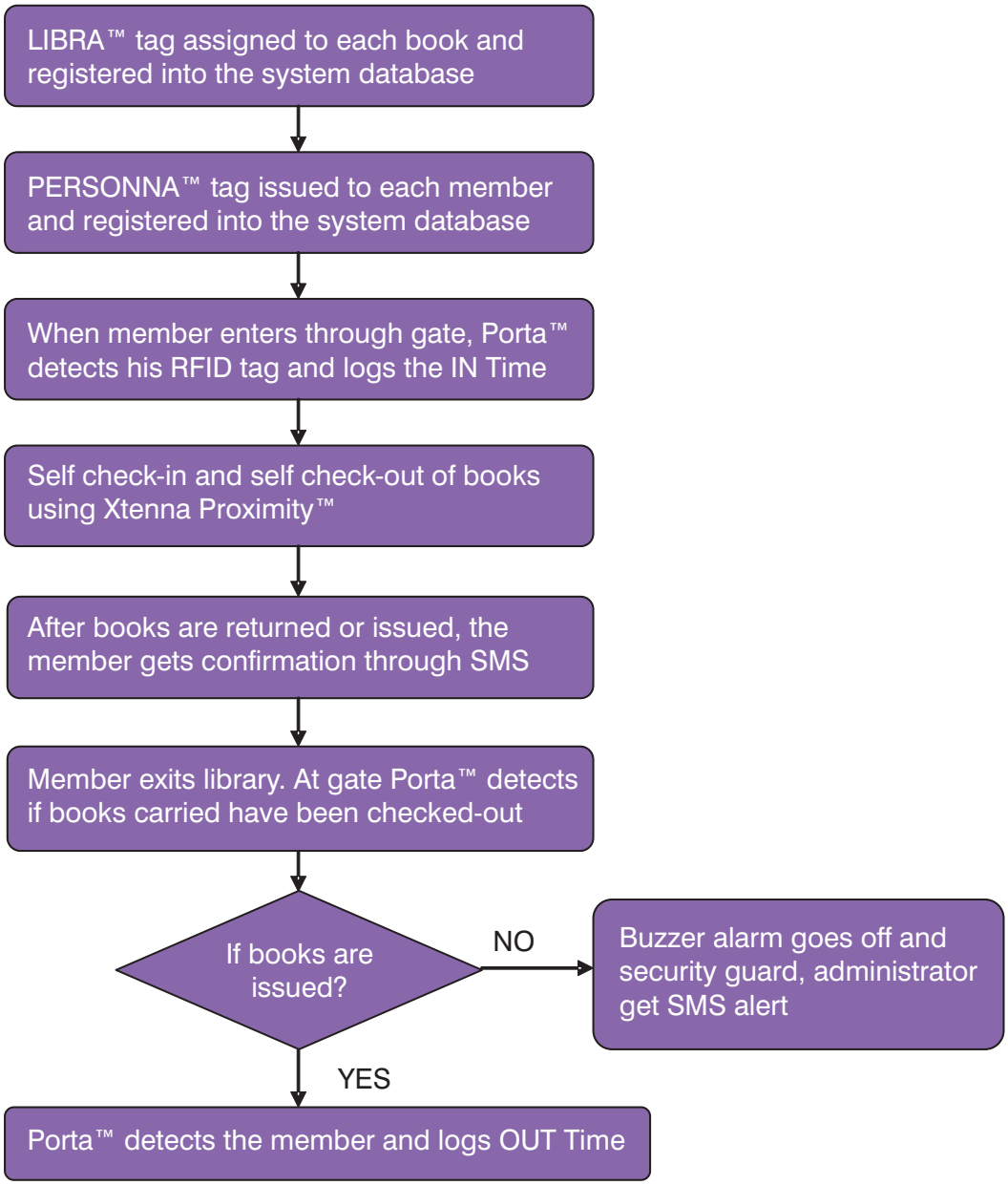
WORKING:

Flow Chart:



Process Flow:

1. The Library Management System contains a record of every book in the library. Each book is affixed with a LIBRA™ tag and registered into the database using the Xtenna Proximity™ reader. New book arrivals are also similarly tagged and registered.
2. Each library member is issued a membership ID card containing a PERSONNA™ tag. The tag is registered and assigned to that particular member in the database along with the required details.

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3. Porta™ portal readers are installed at the IN and OUT gates of the library. When a member enters the library, his PERSONNA™ tag ID is read by the Porta™ reader and entered into the database.

4. If he is returning books back to the library, the library member goes to the check-in counter. He places the books in front of the Xtenna Proximity™ reader along with his PERSONNA™ ID tag. The reader identifies the tagged books and the library member. The system application updates the records in the database and the member receives a confirmation SMS that the books have been returned.

5. To borrow and take away books for reading, the library member picks up the required books and goes to the self-issuing check-out counter. He places these books in front of the Xtenna Proximity™ reader along with his PERSONNA™ ID tag. Xtenna Proximity™ reads the book tags and the membership ID tag, and automatically identifies the books and the library member.

6. The Library system application confirms the books in the database and makes an entry issuing these books to the particular library member, who then gets an SMS confirming the issue of these books to him along with the due date for returning them.

7. When the member exits the library, the tag on his ID card is read by the Porta™ RFID portal reader and this information is sent to the database that he is leaving the premises. The tag IDs of books he is carrying with him are also read and confirmed that they have all been through check-out and have been issued to him.

8. If the member takes a book out of the library without getting it issued at the check-out counter, then the Porta™ reader at the gate detects the non-issued book and immediately triggers a buzzer alert. The security guard as well as the administrator get a SMS with the book details. This enables the security guard to immediately intercept the offender. The administrator is also sent an email putting this on record for further punitive action.

9. On due-date, the system sends a reminder SMS as well as email to the library member that the books he has borrowed are now due for return.

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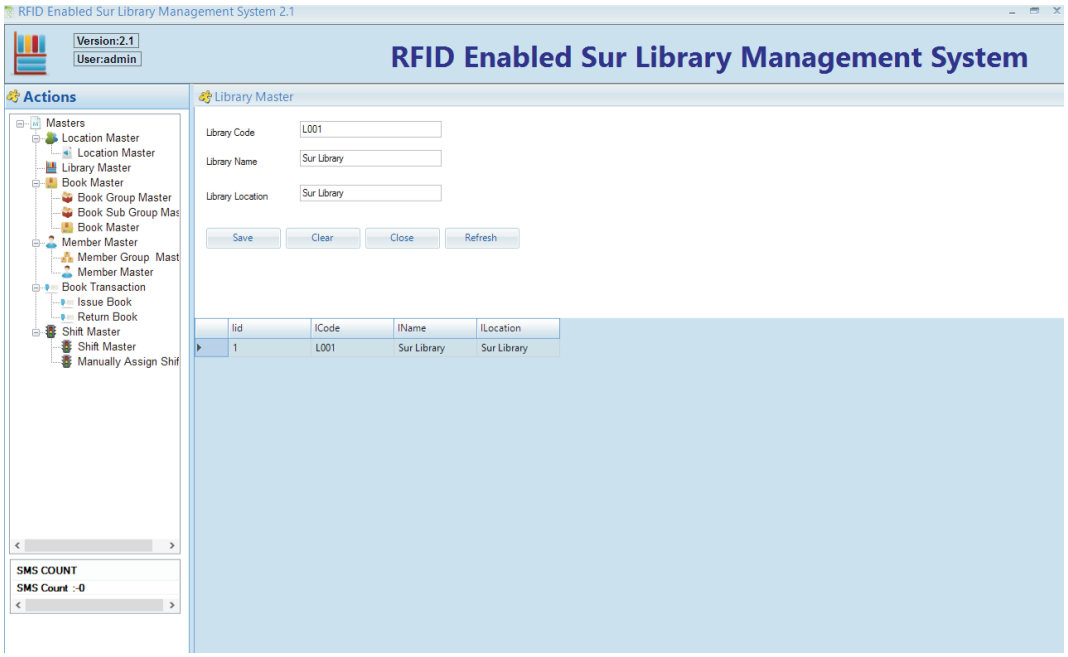
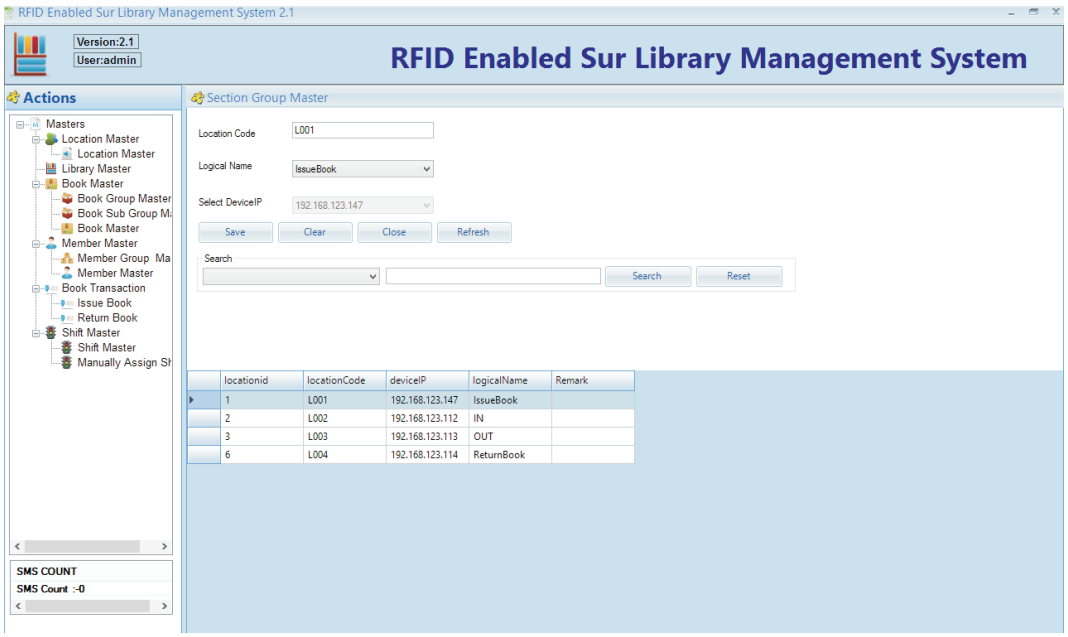
Application:

The main modules of the Library Management System are as follows:

Library Master: The main details of the library, such as library name and location are entered in this module.



Location Master: In this module, the administrator assigns a specific task to each RFID hardware device that has been deployed and enters its IP address in the database, e.g. Porta™ portal reader devices are assigned to the IN and OUT gates, while the Xtenna Proximity™ reader devices are assigned to the Book Issue (check-out) and Book Returns (check-in) counters.



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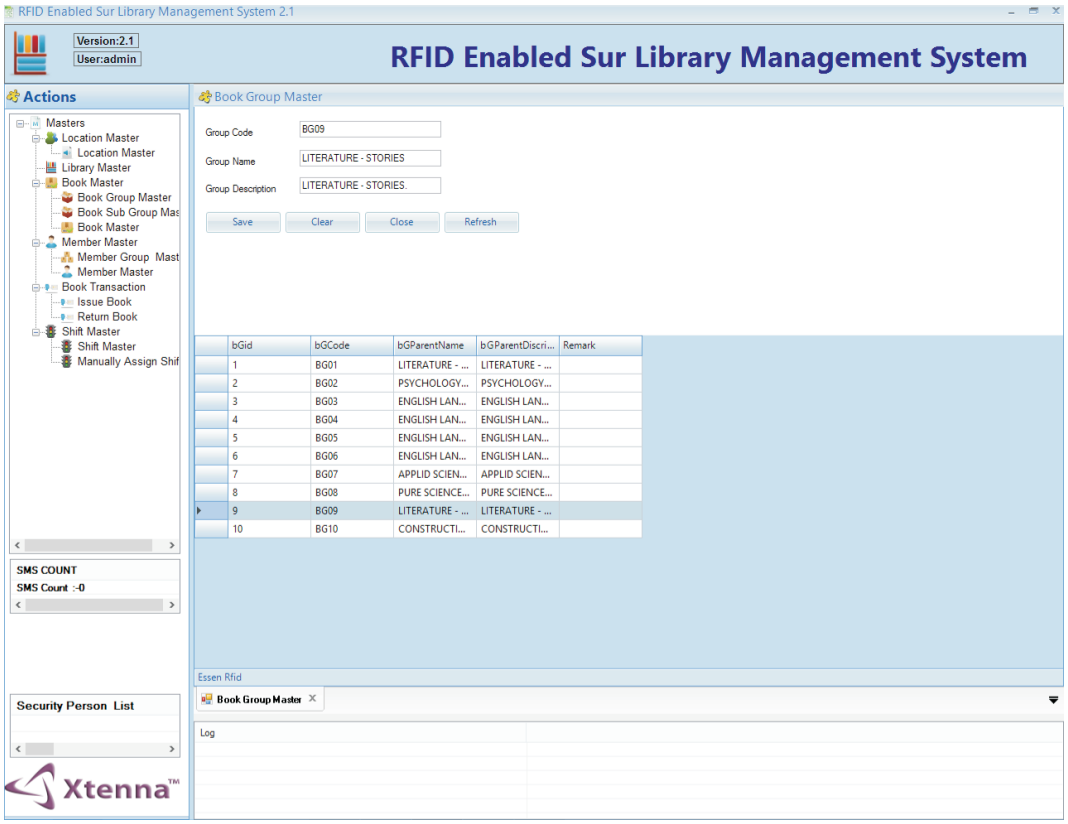
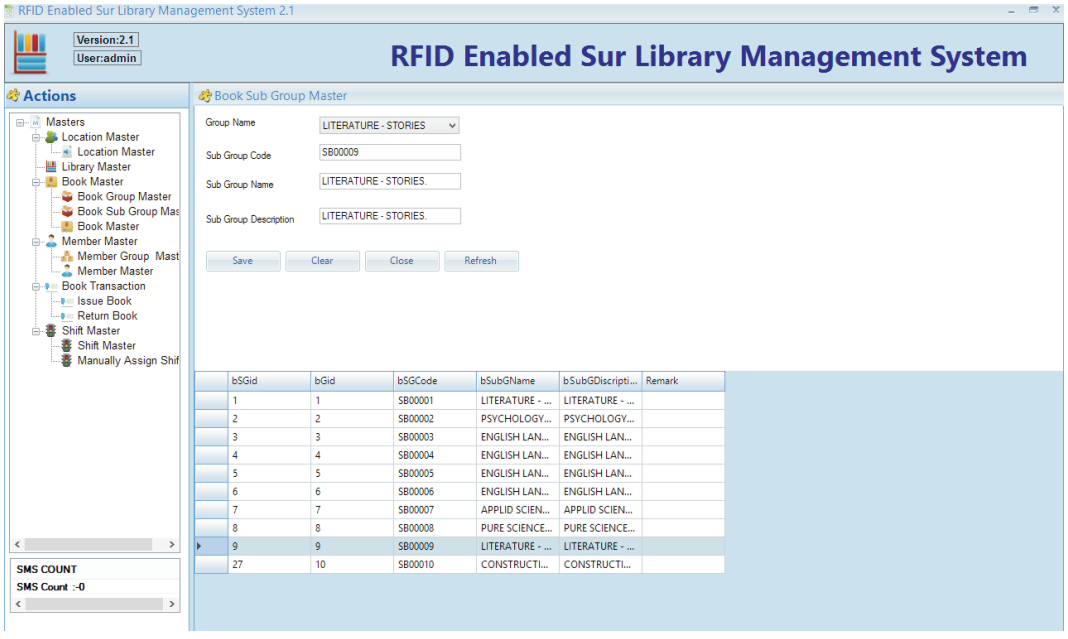
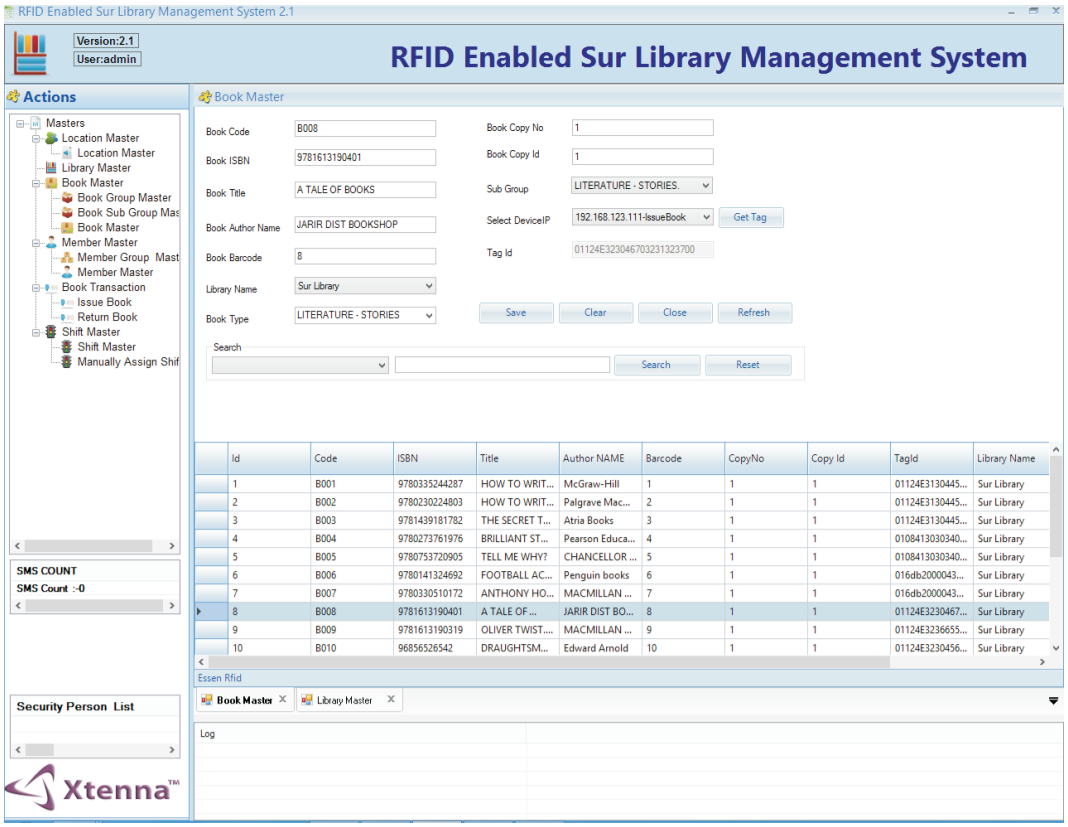
Book Group Master: Books available in the library are divided into groups based on subject category. The administrator creates these groups in the system, such as Literature, Science, History, etc., in this module.



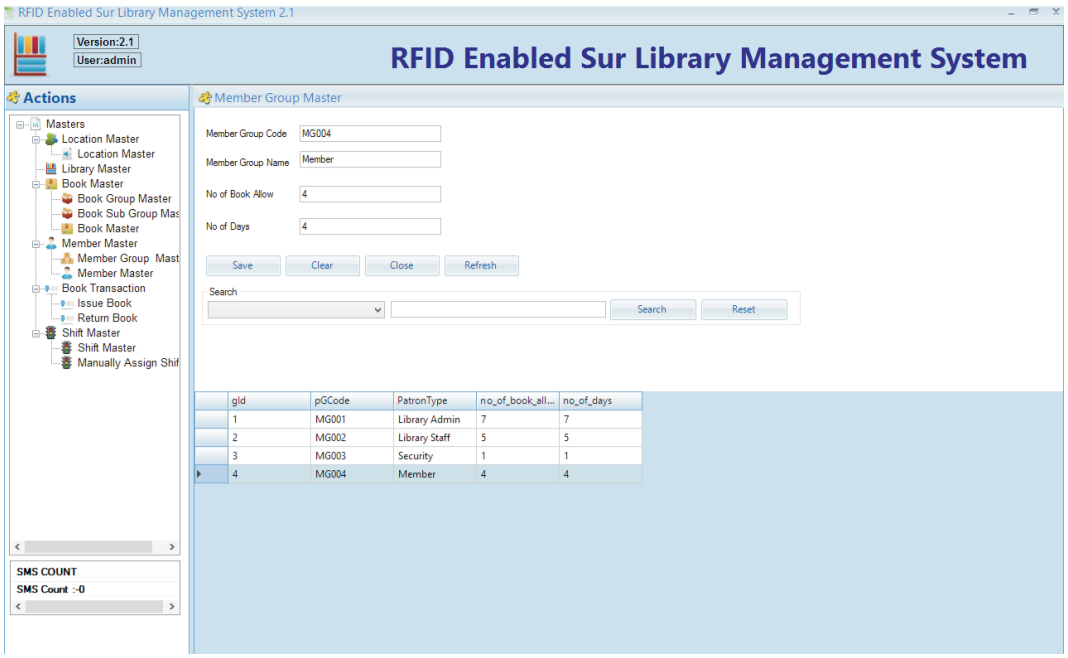
Book Sub-Group Master: Sub-categories are created within the Book Groups, for further classifications within each book category.



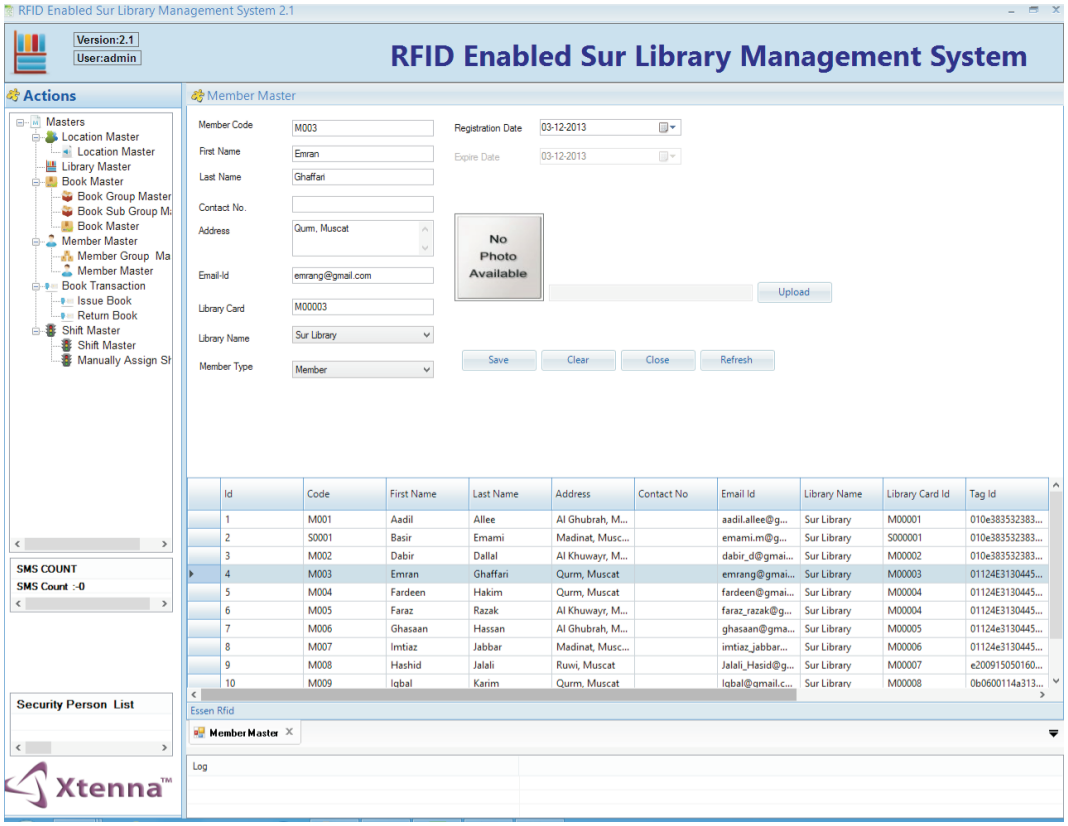
Book Master: Details of each book such as book code, book title, author name, book group and sub-group are entered in this module, after which the tag ID is also fetched and assigned to the book.



Member Group Master: In this module, library users are divided into group categories such as Members, Administrative personnel, Staff, Security, etc.



Member Master: This module contains details of each individual within the group category. The details of all library members as well as employees (admin, staff and security) are entered in this module. These include full address, contact telephone number and email ID. This is important since confirmation SMS and reminder emails to a library member are sent to the telephone number and email address provided here. Also, email and SMS alerts are sent to admin and security personnel based on the contact details provided here. The individual's photograph is also uploaded into the database. Membership registration and validity dates are entered. When a library member is to be registered, 'Member' is selected in the type field.



Issue Book: This module allows the user to self-issue and check-out the books that he requires. The library member places his PERSONNA™ ID tag along with his selected books next to the Xtenna Proximity™ at the counter. The device reads the membership ID tag and the book tags, and the member's name and book details are displayed on the screen. He then confirms these books and clicks the 'Issue Book' button to complete the check-out. After a book has been issued its status automatically changes to 'not available' in the database, for the purpose of lending to other library members.

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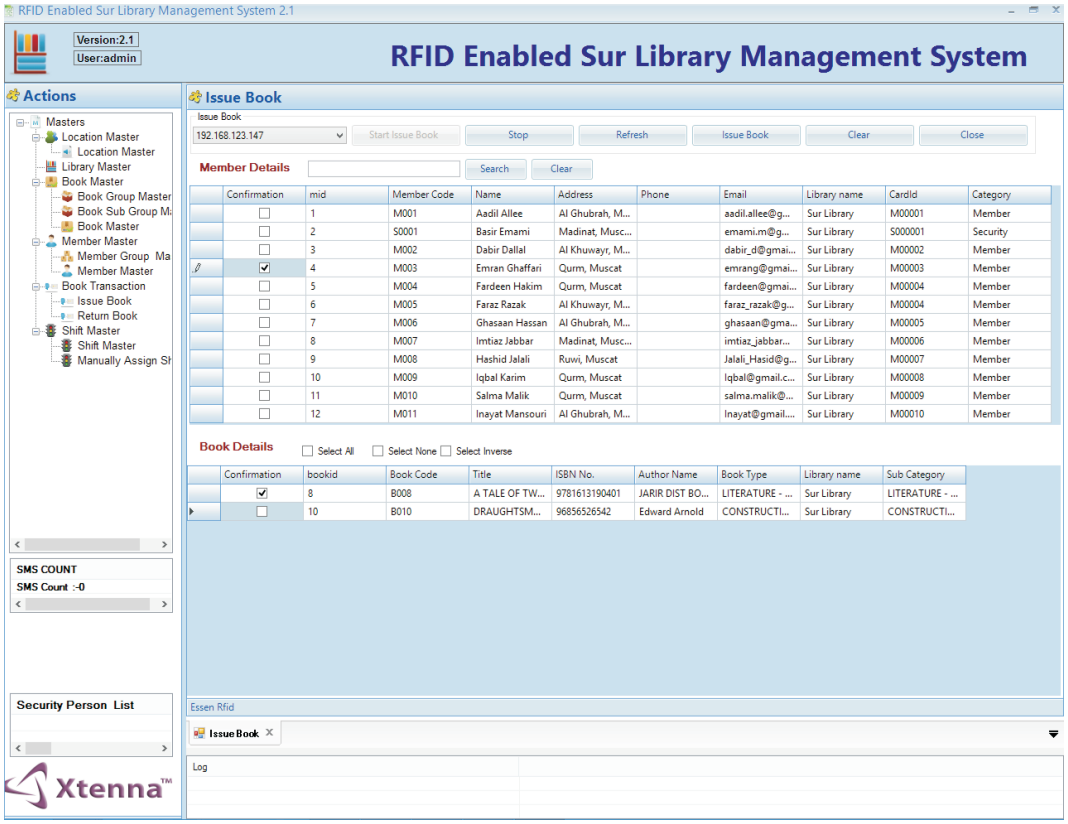
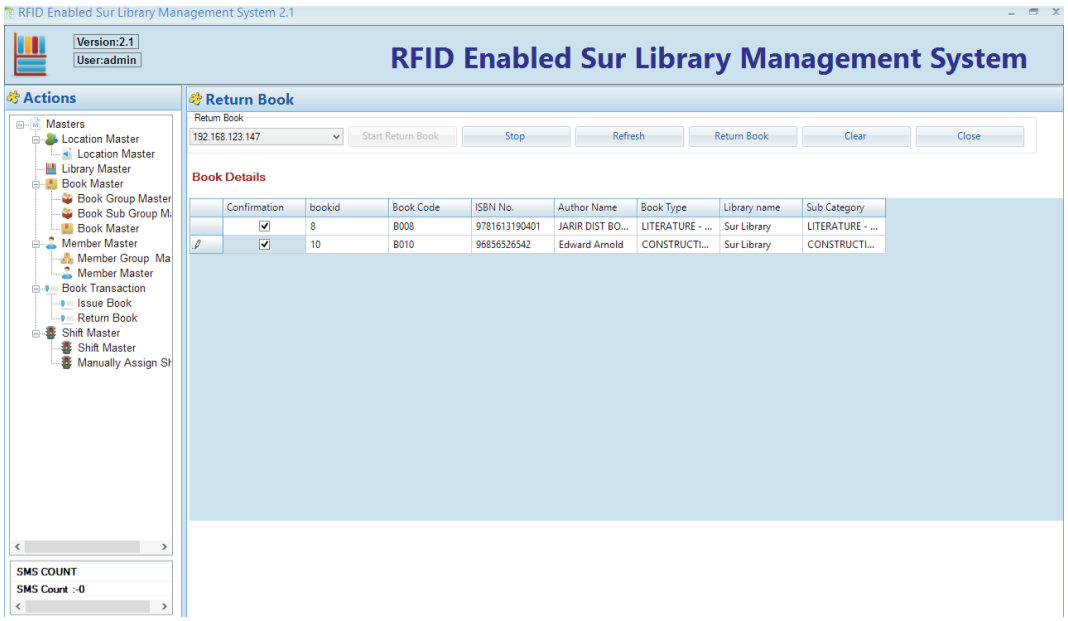


Return Book: This module allows the user to return books to the library. At the check-in section, the library member places the books along with his PERSONNA™ tag ID next to the Xtenna Proximity™ reader. The device reads the book tags and his membership ID tag and displays the details on the screen. The member confirms the books and clicks the 'Return Book' button to complete the check-in process. After the books are returned, their status is automatically changed to 'available' in the database.



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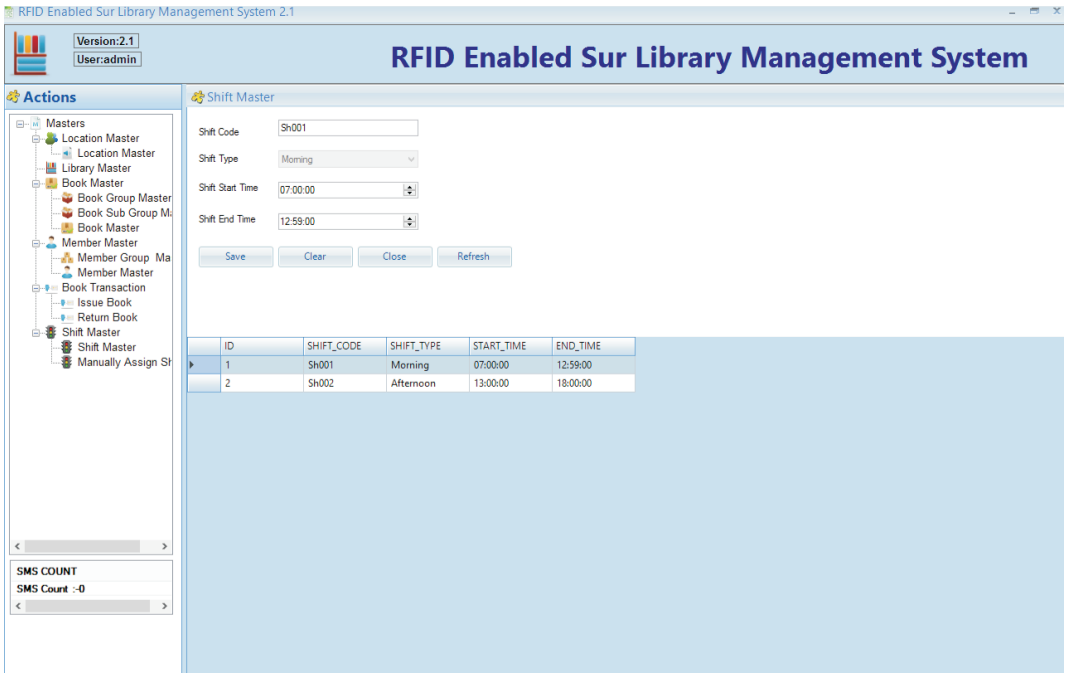
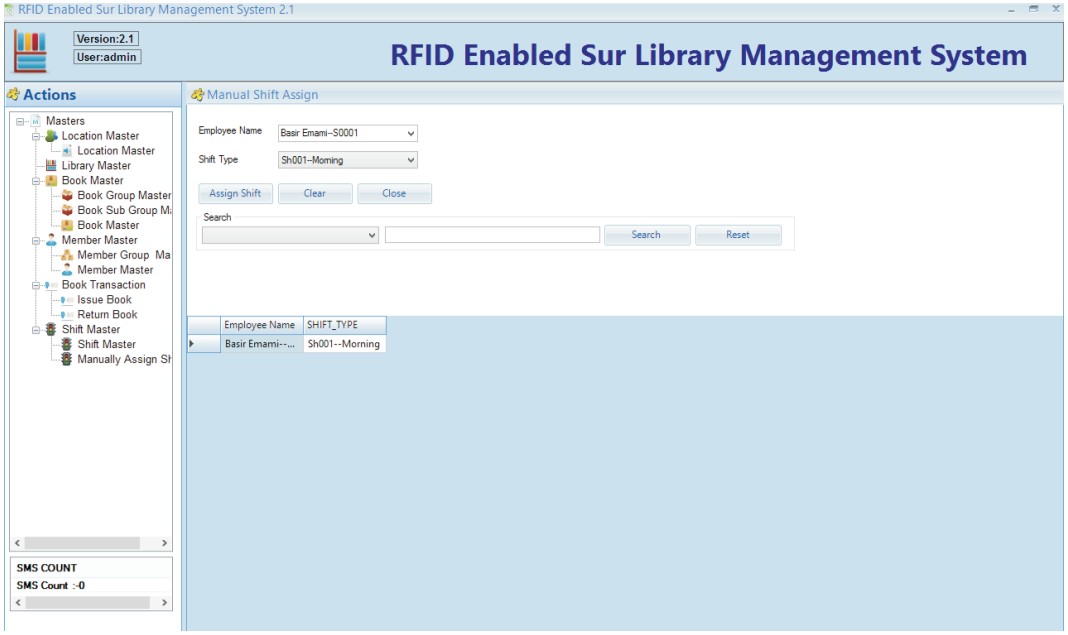
Shift Master: This module is used to set up work shift timings for library and security staff. Shift start and end timings are entered here.



Assign Shift: Through this module, the administrator assigns work shifts to library and security staff. The employee name is selected and the shift is assigned to him in the database. This assigning data is used for the alert system. When a book tag that has not been checked-out is read at the OUT gate, the alert SMS is sent to the security guard currently on the assigned shift.



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BENEFITS:

- Real-time status of inventory stock of library books.
- Tag IDs of many books can be read simultaneously at check-in and check-out even while books are stacked. The books do not have to be scanned one by one.
- Automation makes operations efficient and minimizes queuing.
- Self check-in and self check-out reduces staff requirement in the library.
- SMS confirmation sent to library members after check-out of books issued and check-in of books returned.
- Reminder SMS and email to library members on due-date.
- Defaulters and non-returns are easily ascertained when tag ID is read.
- Automated theft prevention measures and security alerts.

LINKS:

Hardware:

Xtenna Proximity™

PORTA™

Tags:

PERSONNA™

LIBRA™

Software:

Xtenna WebToolkit™

Xtenna Studio™

Reference Example:

http://www.essenrfid.com/Mailer/library-flash-demo.pdf