LIBRARY BOOK / MEDIA MANAGEMENT and RFID TRACKING SYSTEM
Executive Overview

More and more libraries worldwide are utilizing RFID to automate the issue and return of books, CDs/DVDs and related media. In addition to the ability to create alerts if items are being removed from the library without appropriate authorization, RFID enables self check-in and check-out, by associating books with the person that is checking-out or returning books. This is accomplished through RFID tags that are encoded-with or associated-with the library book onto which the tag is placed, and issuance of RFID ID cards to members in good standing with the library (or, place RFID labels on existing library cards). When a person exits the library, motion sensors detect the person and establish directionality, and if any books are detected, then the software expects and requires that a library card is detected. If books go OUT and a library card is not detected, then alarms and/or flashing lights are triggered. If books go OUT and a library card is detected, then the books are transferred to that ID card (person). The database will track due-back dates, and will automatically transmit emails (if desired) to the persons with overdue books. When books come back IN to the library, they are automatically checked IN to the library, and the location changes from the person that had the books to the location ‘IN’.

As such, in addition to providing security against unauthorized removal of books, UHF 915 MHz RFID enables self-Check IN and self-Check-OUT, while also automating overdue notifications.

Additionally, RFID tagged books and media also enables rapid inventories of items in circulation, and/or items 'on the shelf', from up to 20' away (whereas many library RFID systems use outdated 13.56MHz, which only has an approximate 8” read-range)! The portable scanner enables:

- Rapid inventories from up to 20' distance
- Find missing/needed books from up to 20’ distance
- Scan shelf and book bar codes to update database with exact book/item storage locations

RFID BENEFITS FOR YOUR LIBRARY SYSTEM:

- Increased circulation due to the elimination of time-consuming manually handling processes
- Improved customer experience as automated processes enable staff members to focus on their core tasks such as customer service and guidance
- Built-in materials security
- Self check-out
- Automated book check-in
- Check-in/out processes for single or multiple books / media ‘all at once’
- Automated Overdue notifications
- RFID Tags can be sequentially assigned and associated with Book/Media ID #’s, or, RFID labels can be printed with variable text, such as Author, Title, ID #, bar code, etc. from standard ink jet printers (13.56MHz labels generally cannot be printed with book/media identifiers)
RFID (Radio Frequency Identification) is a technology for identifying and tracking discreet items, such as library books, digital/film media or similar materials, by adhering or attaching labels or tags that include a RFID transmitter (computer chip) and antenna (for receiving radio signals), and utilizing RFID ID cards to track library members. Typical RFID systems are made up of two (2) major components: Readers and Tags (inlays). The reader, sometimes called the interrogator, sends and receives RF data to and from the tag via antennas. A reader may have multiple antennas that are responsible for sending and receiving the radio waves. The tag, or transponder, is made up of the microchip that stores the identifier (data), an antenna and a carrier to which the chip and antenna are mounted (label). The RFID labels draw their power from the reader. The reader transmits a low power radio signal through its antenna to the tag, which in turn receives it through its own antenna to power the integrated circuit (micro-chip) that is built-into the label. The tag will briefly converse with the reader for verification that the tag was "read" and the exchange of data. The state-of-the-art in passive RFID includes RFID tags and readers/antennas utilizing the 915 MHz frequency, and is referred to as UHF (Ultra-High Frequency).

**RFID Portals / Member and Media Tracking**

RFID antennas can be placed at entrance/exit points to a library and will track whatever RFID tags pass through the read zone. Antennas provide 4 watts of power and saturate read-zones with radio waves to identify the person or items being removed or returned, including the ability to display the member's photo on-screen to authenticate the person/ID card. RFID antennas can be placed on existing surfaces, such as ceiling or walls, or can be housed in stand-up portals (see photo above). When a person walks through the read-zone, the RFID antennas identify the person and any books/media that they have, and will send a message to the software to determine if the person is a member and authorized to check-out materials, and will automatically transfer the items to that person within the database. The software keeps track of what items are checked-out by what members, and will generate automatic email alerts when items are becoming or are overdue status. If fees are due
or other business rules dictate, the software can generate flashing lights, alarm or other alert for library personnel to interact with the member accordingly. As such, RFID can validate members coming into or leaving the library and provides for a self-checkout capability, or, library staff can monitor the entrance/exit point for additional monitoring of people and books/media.

**Portable RFID Readers**

Portable RFID/Bar Code readers allow tracking of books/media using RFID and/or bar code technologies. Bar coding allows 'singularization' of reads, to identify a specific item, person and/or location. Books can be scanned and specific shelves or storage locations scanned, to update the database with the exact location of items and the time/date that the item was placed at the location. Bar coding also enables books and ID cards to be scanned to semi-manually transfer items to recipients. The RFID function enables rapid inventories of items, by scanning 'many items at a time from a distance', as well as the ability to enter missing item number(s) to the reader to search and find the item. The reader beeps when the item is in proximity, and then guides the User directly to the items location.

**Door Access, Security and Surveillance**

RFID ID Cards can include RFID to track staff, visitors or any classification of person desired, to control and monitor person movement and control access to different areas of a facility. Extensive security algorithms and programmatic logic exist and can be customized for clients to restrict individuals or classifications of people from access to specific facility locations and/or to keep them in specific facility locations, and to know where all people and/or items are located at all times. If a facility is evacuated, this allows identification of any people unaccounted-for. Motion sensors, motion sensors, light/sound alarms, camera/video and similar devices can be integrated with RFID for security benefits.

As an employee or visitor enters or exits a RFID checkpoint:

- Identifies the presence of a person
- Their ID Card is read using invisible Radio Frequency communication
- Authenticates the person via the software and validates access is approved for that person for that area
- Determines whether the person is entering or exiting and logs person, date & time to database
RFID Tags and Labels

RFID tags and labels are simply ‘housings’ for RFID inlays...which include a transmitter and antenna. RFID inlays are available in a wide range of sizes and designs, with a general label size range from approximately 1/4” x 3/4” to 4” x 8””. The book or item's unique identification # can be encoded into the RFID chip using the portable RFID reader, or the native RFID # can be 'commissioned' to the database to establish a unique cross-reference to the item.

RFID Database Management System

RFID produces data and creates history, and utilizes a database management system to manage library books and related media, their movements, their security parameters and chain-of-custody throughout the life of the item. The RFID software is enterprise-class and which can be placed on internal Server(s) and/or can be accessed via secure, hosted Server. The software is scalable to a virtually unlimited number of items, people and Users/

The RFID database management system includes functions to print bar code/RFID labels or tags and track items using software screens, bar codes and/or RFID technologies. RFID software can accommodate many different database views for different departments, classes of Assets, classes of People, record types and the like. The software is cross-platform with support for multiple databases and operating systems. The software is easily configured for the specific requirements of each customer and can be used for multiple database/item applications within a single software investment.
Deployment

Server / Deployment

Virtual Doxx is available hosted in a 'world class', highly secure data center, including Production Server and Back-up Server, as well as nightly back-up to external media for Disaster Recovery. Virtual Doxx can also be installed in data center(s) in any physical locale. The software is available to any Internet-connected computer using any standard browser.

Alternatively, Virtual Doxx can be installed on local Server(s) (behind firewalls) and accessed by any network-connected computer. Virtual Doxx is cross-platform, and is available with all best-of-breed open source tools, including Linux, Java and MySQL, enabling enterprise-class implementations without any licensing or maintenance fees. Virtual Doxx is also fully supports Microsoft operating systems, SQL-SVR and LDAP. Workstation computers are thin-client, only requiring a browser and recent version of Java.

Server Requirements:
- RAM – 4GB+
- Processor – 1 dual core or quad core
- Hard Drive – 2 x 500GB for RAID1
- Java 6.0 JDK (1.6)

Networking Requirements:
- Static IP Address Compatible with Network
- Network Mask
- Network Gateway IP Address
- Domain Name Server IP Addresses
- Domain Name (optional)
- DNS Entry Positioning to Server, unless HOSTS files will be updated per workstation, or use IP Address for Server Name

Workstation Requirements:
- RAM – 2GB+
- Recent version of Java

RFID Requirements:
- Portable scanner requires workstation computer where software will be installed for syncing with Virtual Doxx (data upload and download when synced via USB connection
- RFID detection-zones require network connection and power source