

# RFID Technology for Academic Libraries: A Case Study of its Implementation at Institute of Pharmacy, Nirma University

## ***What is RFID?***

Radio Frequency Identification (RFID) is an automatic identification and data capture technology. RFID systems use radio waves as the communication medium between RFID tagged objects and RFID reader stations.

## ***Applications of RFID***

- International Space Station
- Toll way and Transportation system
- Animal tracking
- Entertainment etc.

## ***RFID Facilitates***

- Unique Serialized item Identification
- Does not require line-of-sight to be read.
- Multiple tags can be read simultaneously without data collision.
- Location of items through read-event tracking
- Ability to generate reports using RFID event data.
- Security of data using encryption or authentication

## ***The current applications of RFID in Libraries include:***

- Resource management
- Resource security
- Circulation
  - Staffed Circulation Desk
  - Patron Self Check-out
  - Patron Self Check-in
- Self Management Functions
  - Inventory Control
  - Weeding
  - Location of Missing Items
- Automated Material Handling
- Sorting
- Audiovisual Materials
- Patron Cards

## ***Required Hardware and Software***

### Tags

An RFID Tag or Label Comprises a micro-chip, coiled antenna, substrate, adhesive backing, and optional eye-readable face. Two different types of Tags are used in Libraries

- Resource Tag
- Patron Card



### Readers

RFID readers or receivers are composed of a radio frequency module, a control unit and an antenna to interrogate electronic tags via Radio Frequency (RF) communication. Readers in RFID implementing library are used in the following ways:

**Conversation Station  
and Staff Circulation  
Station**



**Hand-held reader**



**Self check-out Station  
(KIOSK)**



**Exit sensors**



- **Conversion stations:** Where library data is written to the tag
- **Staff workstation at circulation:** used to charge and discharge library materials
- **Self check-out stations:** used to check out library materials without staff assistance
- **Self check-in station:** used to check-in library materials without staff assistance
- **Exit sensors:** to verify that all material leaving the library has been checked out
- **Book-drop reader:** used to automatically discharge library materials and reactivate security
- **Sorter and Conveyor:** automated system for returning material to proper area of library
- **Hand-held reader:** used for inventorying and verifying that material is shelved correctly.

## Software

### Server

- Intel Pentium 4 or higher
- 1 GB RAM minimum
- Windows 2003 Server SP2 or higher
- Microsoft .Net Framework 3.5
- Microsoft SQL Sever 2008 Express

### Client

- Intel Celeron 1.5 GHz or higher
- 512 MB RAM minimum
- Windows Xp SP2 or higher
- Microsoft .Net Framework 3.5

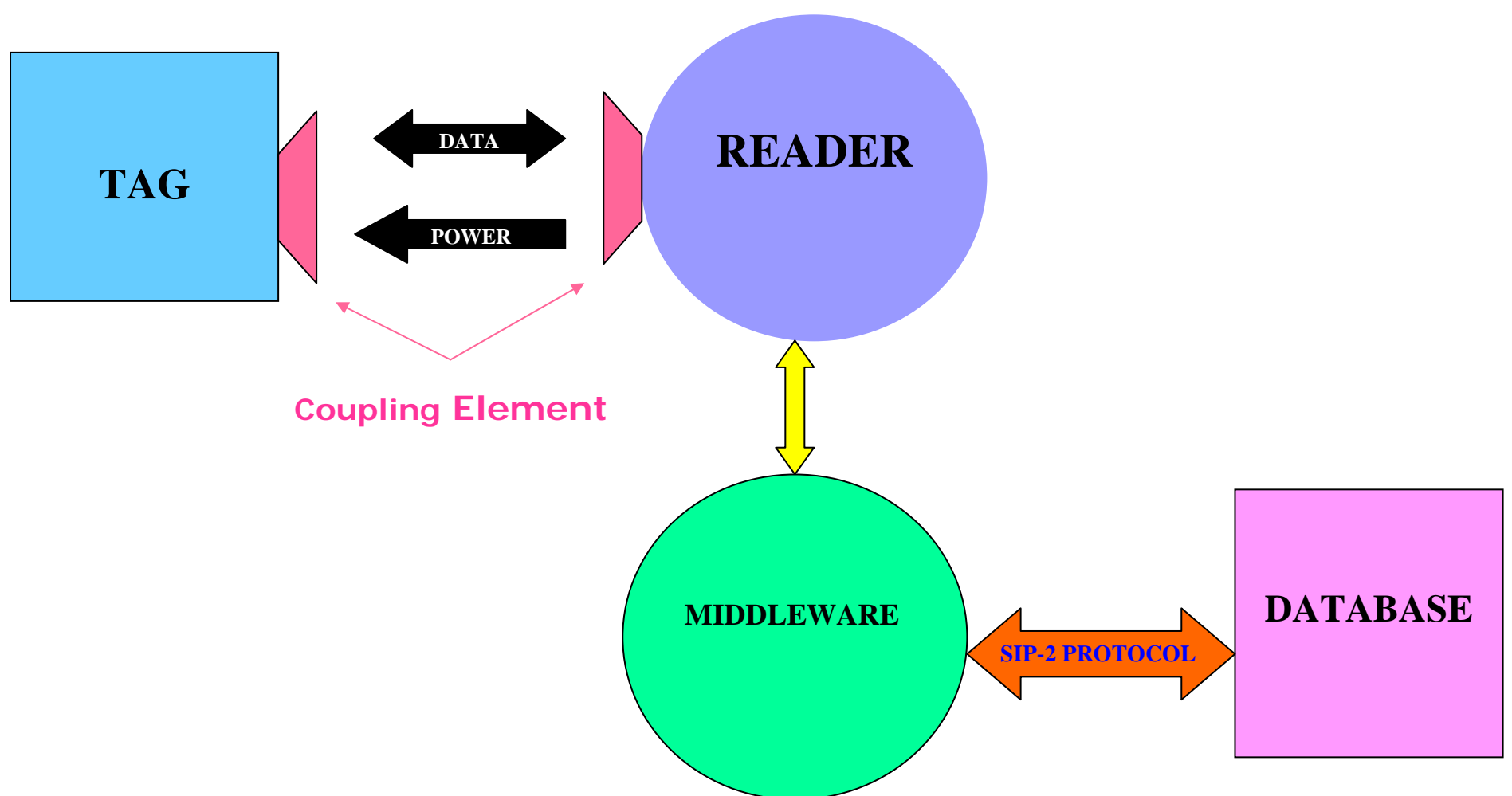
## Application Software

Application System includes Middleware, Protocol and LMS. The middleware is an interface to exchange data between the two sets of hardware i.e., LMS and RFID. In order for data to be successfully transferred between RFID and LMS, there need to be a common protocol.

The protocols used in Library are:

- SIP2
- NCIP
- ISO28560-1/2/3 (under development)

The Work flow of Middleware along with Protocol and LMS is as depicted below:



### Implementation of RFID at **Institute of Pharmacy Library, Nirma University**

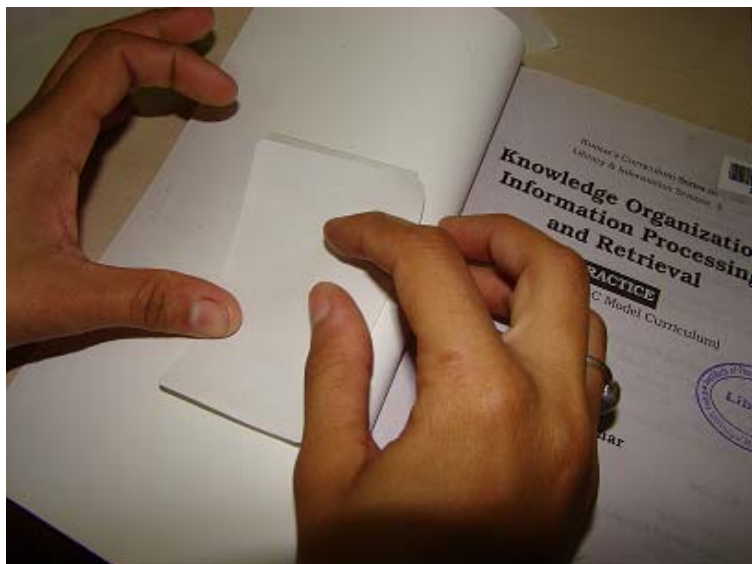
The Library and Resource Centre at the Institute of Pharmacy houses more than 6600 volumes and 3871 titles of books selectively chosen for reading and reference. The Library subscribes to printed international journals (35) and national (69) periodicals. The library is fully automated by using User friendly Software Alice for Windows and currently running a Pilot project on RFID implementation. Our supporting RFID Vendor is Rapid Radio Solutions Pvt. Ltd, Ahmedabad. Once we reach to the scalability, RFID will be implemented at all other Libraries in the campus.

Currently the library has acquired following RFID Products:

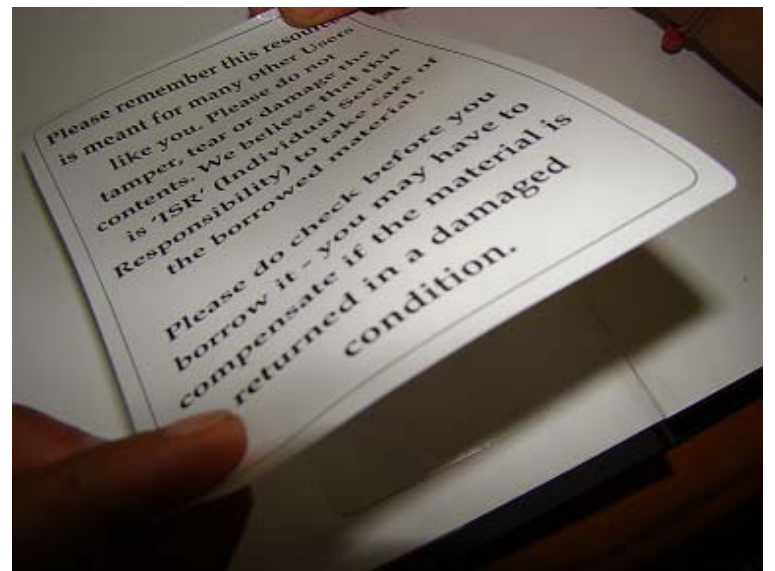
- Staff Station for entering new resources and Circulation Desk (Reading Range is 15 cm.)

- RFID Handheld Reader (Reading Range is 15 cm.)
- Security Gate Antenna System with two pedestals (Reading Range is 1m.)
- RFID enabled Self Check-Out Kiosk
- RFID Tags (Passive Tags with 13.56MHz. frequency and up to 2048 bits storage capacity)
- Rapid Radio Middle Ware Application (with SIP 2 Protocol)

The tagging process started in the month of April 2007 and at that time the collection was around 2900 volumes. Five people from morning 9.00am – 9.00pm were involved in tagging and it took two days to complete. Then the returned books were tagged as and when they were received. Later on, to avoid the tampering of Tags, a sticker with printed note on handling the book was labeled on the tag.



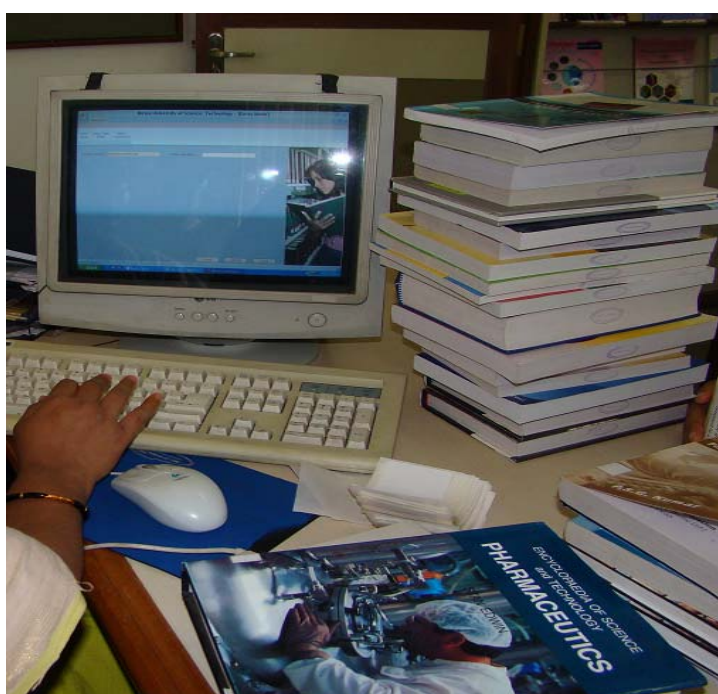
Tagging the Book



Labeling the Tag with a printed Note

Staff workstation for entering new resources and Circulation Desk:

Staff station (reader – RRHFLB01) is in use for entry of new materials and for issue/return of library materials.



Tagging Station



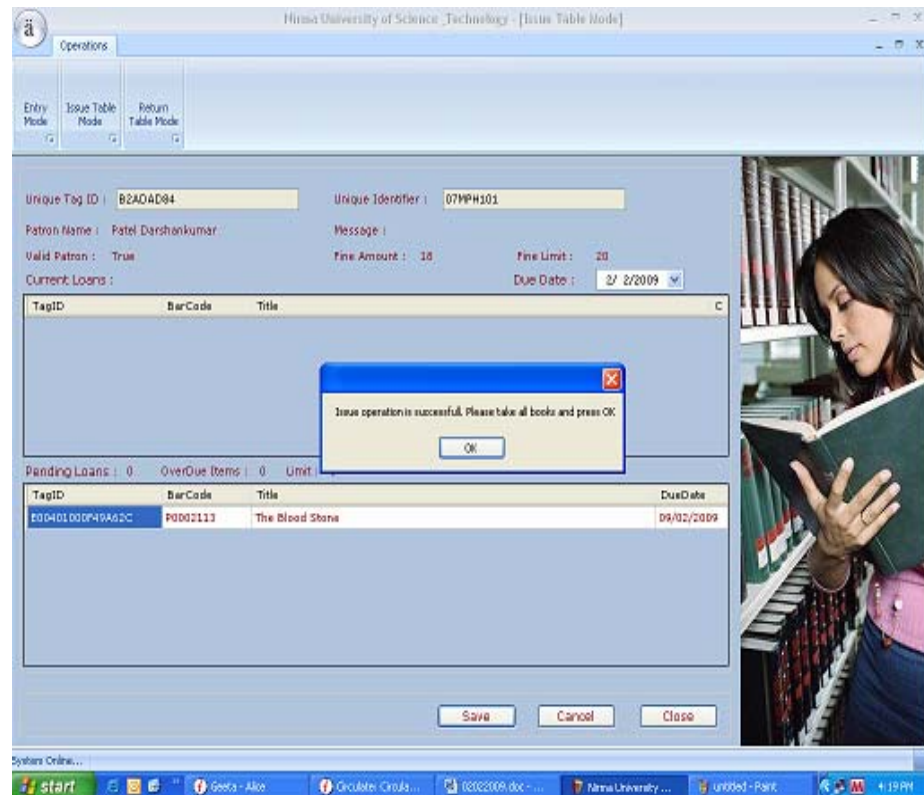
Issuing the Book

## Middleware & Protocol:

The middleware is developed by using Microsoft Visual Studio 2008 and SIP 2 Protocol

## Functionalities supported by SIP2:

- Overdue while returning
- Status of reserved book list while returning
- Overdue and reserved while returning
- Fine messages while issuing
- Due date while issuing
- Total number of Loans and Available resources limit



Issuing the book through Middleware

**RFID GATE:** RFID security gate is placed at the entry/exit point of the Library to keep check on and it beeps if an unauthorized book is passed



**KIOSK:** This is a stand alone multi protocol Self check-out touch screen enabled kiosk, which also provides facility of slip printing transaction acknowledgment.

# Advantages

## *Benefits for Libraries and Staff*

- Improves Patron Service and Staff Productivity
- Efficient Inventory Management and

## *Benefits for Patrons*

- Fast Check-out and Check -in by themselves
- Multiple items check-out and Check-in.
- Update patrons about their account information through SMS and Web Alerts.
- Self Service enhances Privacy and Usage.

## Yet to be implemented:

- Alerts through SMS and E- mails.
- Check Shelf Order
- Implementing automatic book drop station
- Tagging of the Audio Visual materials

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