

Barcode Generation Tools in Integrated Library Management and Retrieval System

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Abstract: Barcode generation is an inevitable and indispensable in automated and digital library system. This paper highlights the barcode generation in library automation. Eighteen open source barcode tools have been selected and most of the softwares are support windows operating system but only few of them support both of the operating system (Windows and Linux). All of the softwares are selected on the basis of the global recommendations like Open Library Environment Project (OLE), Service Oriented Architecture (SOA), Digital Library Federation (DLF), Integrated Library System for Discovery Interface (ILS – DI) and Request for Proposal (RFP) and compare parameters on three levels like generic level, features and compatibility level and design tools level. Apart from this this research study also explore how Koha can create barcode in librarian or staff client interface under the tools option. Most of the comprehensive softwares selected on the basis of the scoring system for designing and developing the college libraries under the University of Burdwan.

Keywords: Barcode ; Barcode standards ; Barcode generation tools and Koha

1. Introduction

A barcode is an optical machine-readable representation of data relating to the object to which it is attached. Originally barcodes systematically represented data by varying the widths and spacings of parallel lines, and may be referred to as linear or one-dimensional (1D). Later they evolved into rectangles, dots, hexagons and other geometric patterns in two dimensions (2D). Although 2D systems use a variety of symbols, they are generally referred to as barcodes as well. Barcodes originally were scanned by special optical scanners called barcode readers. Later, scanners and interpretive software became available on devices including desktop printers and smartphones. In 1948 Bernard Silver, a graduate student at Drexel Institute of Technology in Philadelphia, Pennsylvania, US overheard the president of the local food chain, Food Fair, asking one of the deans to research a system to automatically read product information during checkout (Fishman, 2001). Silver told his friend Norman Joseph Woodland about the request, and they started working on a variety of systems. Their first working system used ultraviolet ink, but the ink faded too easily and was rather expensive (Seideman). An early use of one type of barcode in an industrial context was sponsored by the Association of American Railroads in the late 1960s. Developed by General Telephone and Electronics (GTE) and called KarTrak ACI (Automatic Car Identification), this scheme involved placing colored stripes in various combinations on steel plates which were affixed to the sides of railroad rolling stock. Two plates were

used per car, one on each side, with the arrangement of the colored stripes representing things such as ownership, type of equipment, and identification number (Cranstone). The plates were "read" by a trackside scanner located, for instance, at the entrance to a classification yard while the car was moving past (Keyes, 2003). The project was abandoned after about ten years because the system proved unreliable after long-term use in the field (Cranstone). Barcodes became commercially successful when they were used to automate supermarket checkout systems, a task for which they have become almost universal. Their use has spread to many other tasks that are generically referred to as automatic identification and data capture (AIDC). The very first scanning of the now ubiquitous Universal Product Code (UPC) barcode was on a pack of Wrigley Company chewing gum in June 1974 (Fox, 2011).

Convinced that the system was workable with further development, Woodland left Drexel, moved into his father's apartment in Florida, and continued working on the system. His next inspiration came from Morse code, and he formed his first barcode from sand on the beach. "I just extended the dots and dashes downwards and made narrow lines and wide lines out of them" (Seideman). To read them, he adapted technology from optical soundtracks in movies, using a 500-watt incandescent light bulb shining through the paper onto an RCA935 photomultiplier tube (from a movie projector) on the far side. He later decided that the system would work better if it were printed as a circle instead of a line, allowing it to be scanned in any direction.

1.1 Types of barcodes

There are two types of barcode like Linear barcodes and Matrix (2D) barcodes. Linear barcode is a first generation, "one dimensional" barcode that is made up of lines and spaces of various widths that create specific patterns. On otherhand Matrix (2D) barcodes is a matrix code, also termed a 2D barcode or simply a 2D code, is a two-dimensional way to represent information. It is similar to a linear (1-dimensional) barcode, but can represent more data per unit area.

1.2 Benefits

In point-of-sale management, barcode systems can provide detailed up-to-date information on the business, accelerating decisions and with more confidence. For example:

Fast-selling items can be identified quickly and automatically reordered.

- Slow-selling items can be identified, preventing inventory build-up.
- The effects of merchandising changes can be monitored, allowing fast-moving, more profitable items to occupy the best space.
- Historical data can be used to predict seasonal fluctuations very accurately.
- Items may be repriced on the shelf to reflect both sale prices and price increases.
- This technology also enables the profiling of individual consumers, typically through a voluntary registration of discount cards. While pitched as a benefit to the consumer, this practice is considered to be potentially dangerous by privacy advocates.

Besides sales and inventory tracking, barcodes are very useful in logistics and supply chain management.

- When a manufacturer packs a box for shipment, a Unique Identifying Number (UID) can be assigned to the box.
- A database can link the UID to relevant information about the box; such as order number, items packed, qty packed, destination, etc.
- The information can be transmitted through a communication system such as Electronic Data Interchange (EDI) so the retailer has the information about a shipment before it arrives.
- Shipments that are sent to a Distribution Center (DC) are tracked before forwarding. When the shipment reaches its final destination, the UID gets scanned, so the store knows the shipment's source, contents, and cost.

Barcode scanners are relatively low cost and extremely accurate compared to key-entry, with only about 1 substitution error in 15,000 to 36

trillion characters entered. The exact error rate depends on the type of barcode.

1.3 Barcode Verifier Standards

Barcode verifiers should comply with the ISO/IEC 15416 (linear) or ISO/IEC 15426-2 (2D). This standard defines the measuring accuracy of a barcode verifier. The current international barcode quality specification is ISO/IEC 15416 (linear) and ISO/IEC 15415 (2D). The European Standard EN 1635 has been withdrawn and replaced by ISO/IEC 15416. The original U.S. barcode quality specification was ANSI X3.182. (UPCs used in the US – ANSI/UCC5). This standard defines the quality requirements for barcodes and Matrix Codes (also called Optical Codes). As of 2011 the ISO workgroup JTC1 SC31 was developing a Direct Part Marking (DPM) quality standard : ISO/IEC TR 29158. International standards are available from the International Organization for Standardization (ISO). These standards are also available from local/national standardization organizations, such as ANSI, BSI, DIN, NEN and others.

2. Barcode Generation Tools

There are many barcode generation tools are available but this research work select 18 (eighteen) Barcode generation tools are explained in the below and its require for the college libraries under the University of Burdwan.

Barcode Label Maker

Barcode Label Maker's design tools are fluid, intuitive and easy to use. This software creates a host of barcodes for tracking, shipping and other needs. Barcode Label Maker is one of the easiest barcode label software to use. It offers a full complement of barcodes for shipping, packaging, products and other uses. This barcode label software gives you the complete package to create barcodes and labels within the user interface. It offers templates to create barcode labels of any size and lets you import data from Excel, Access and text files. It also include varied data in your barcode labels, including product codes and descriptions, logos, images and more. In addition to barcodes, produce address labels, shipping labels, identity cards, and CD and DVD covers (<http://barcode-label-software-review.toptenreviews.com/barcode-label-maker-review.html>).

(b) Labeljoy

Labeljoy has a modern, easy-to-use interface and the largest image library. It also supports the highest number of languages. It lacks a grid view, and these symbologies: MSI-Plessey, PDF417 and ISSN. This barcode label software is a quality product to meet most of your barcode-generation

needs. Labeljoy barcode label software is a top-quality barcode creator. Its user-friendly interface, tools and features let user can easily generate barcodes, print custom labels and import data from external sources. You can make address labels, badges, barcode labels, business cards, CD labels, data-linked labels, envelope labels and more. It can create basic labels with just a few clicks of your mouse, or design intricate labels by accessing the software's comprehensive features. By connecting to an external data source such as Excel, Access, Outlook, SendBlaster, MySQL, Oracle and others, and possible to create customized and barcode labels. Labeljoy has a modern user interface and simple tools to design barcode labels (<http://bar-code-label-software-review.toptenreviews.com/labeljoy-review.html>).

(c) LabelRight

LabelRight barcode label software is one of only two products to offer every barcode listed on our lineup. This barcode generator offers features and tools to design and produce any format or size of barcode label. It has dozens of templates and a prompt tool that lets you more easily fill in data required to create labels and templates. LabelRight produces shipping labels, shelf tags, box labels, compliance labels, warning labels, pallet labels, nametags, asset tags, serial numbers, UPC product barcodes, route accounting sheets and several other types of labels. You can even print large text labels to be read from several hundred feet away (<http://bar-code-label-software-review.toptenreviews.com/labelright-review.html>).

(d) ConnectCode

ConnectCode barcode label software easily creates a large number of barcode labels to track, ship and manage your company's packages and products. This barcode generator lets you paste barcodes into Windows- and Mac-based programs to generate labels. This barcode maker offers 27 barcode types and a couple of hundred fonts. It copies the barcodes you create to the clipboard of the software in which you are working, whether that's Microsoft Word, Excel, Publisher, Access or another application. This barcode maker is one of only two on our lineup that is compatible with all versions of Windows and Mac operating systems. This is a great plus for Mac fans. ConnectCode creates all barcodes on our lineup except UPC (A, E). (<http://bar-code-label-software-review.toptenreviews.com/connectcode-review.html>).

(e) B-Coder

B-Coder barcode label software is a simple application that generates a host of barcodes. It earns high points for the varied barcodes it produces and for its support options. It falls short in its design capabilities because it lacks some features and tools. This barcode maker places barcodes onto your Windows clipboard to paste

into other Windows-based software. It's intended to let you create barcode labels in applications you own and are familiar with, such as Microsoft Word, Adobe Illustrator and other software. B-Coder can generate 1D and 2D barcodes. Among these are Code 39, UPC A, UPC E, EAN 8, EAN 13, Bookland, Interleaved 2 of 5, Code 128, Code 93, EAN/UCC 128, POSTNET, Codabar, MSI-Plessey, PDF417, Aztec Code, Data Matrix and others. B-Coder offers a long list of useful barcodes and full customer support (<http://bar-code-label-software-review.toptenreviews.com/b-coder-review.html>).

(f) LabelMagic

LabelMagic barcode label software generates barcodes that track retail items in stores and for commercial shipping and mailing, among other types. It offers 18 barcode symbologies, but only eight of the 16 listed on our lineup. Among them are our top seven barcodes, as well as UPC (A, E). LabelMagic lets you print to Windows-compliant printers and export barcodes. You can copy barcodes you generate to Microsoft Office Suites and design them in WYSIWYG. You adjust label size and other attributes through a pop-up window in the Edit dropdown menu. You can adjust the page margins, label borders and read the page info, including the dimensions. LabelMagic offers several design tools and compatibility features to create quality barcode labels (<http://bar-code-label-software-review.toptenreviews.com/labelmagic-review.html>).

(g) Barcode Magic

Barcode Magic is simple barcode label software to generate barcodes for use in Windows-based programs. It copies barcodes onto the clipboard of the application in which you are working. It's made by BulletProof Software, which is also the developer of our number six product. This barcode generator offers 18 barcode symbologies from which to choose, though only eight of the 16 listed in our lineup. These include the first seven barcodes on our list and the UPC (A, E) barcode. Barcode Magic has a simple user interface. It prints to Windows-compliant printers and lets you import data from Microsoft Office Suite and export barcodes to the suite. It offers WYSIWYG design. Barcode Magic is easy to use to generate barcodes for use in Windows-based applications. (<http://bar-code-label-software-review.toptenreviews.com/barcode-magic-review.html>).

(h) Bars & Stripes

Bars & Stripes barcode label software is a unique application. It installs directly into Microsoft Word and operates within that application's Add-ins tab. Even the help guide opens in Word. You may have to enable Macros in Word to install this barcode generator. Bars & Stripes offers directions on how to do this, and other troubleshooting suggestions, in

the Read Me file. Once installed into Word, you can click on the small Bars & Stripes icon in the Add-ins tab. A control box appears. It lets you change the barcode parameter settings, create sequentially numbered barcodes and use the current parameter settings. You can create barcodes by using data from an existing Word table, create a new Word document into which you can enter data, create labels and envelopes using more data and search for strings and replace them with barcodes. Bars & Stripes operates as an add-in to Microsoft Word, which is a great boon if you're familiar with and own that software (<http://bar-code-label-software-review.toptenreviews.com/bars-and-stripes-review.html>).

(i) UPTools

UPTools is simple barcode label software. This barcode generator creates six types of barcode symbologies. They are UPC-A, UPC-E, EAN-8, EAN-13, Bookland and ISSN. The interface utility is small and simple. It measures 6 inches by 4 inches on your screen and cannot be expanded. It's meant to generate barcodes to be pasted into another application, though you have the ability to print directly from the utility. This barcode generator works within Windows applications, including databases, spreadsheets, word processors and desktop publishing applications. It is one of only two products in our ranking that also work on Apple computers. The utility acts like a wizard to help you print barcodes from within other applications. You select the type of barcode you want to create, input your data, preview it in the utility and then copy and paste it into the software you are using, such as Microsoft Excel or Access. It prints to Windows-compliant printers. It supports only English (<http://bar-code-label-software-review.toptenreviews.com/upc-tools-review.html>).

(j) Barcode Wizard

Barcode Wizard is a simple application meant to produce basic barcodes. This barcode label software copies barcodes into Microsoft Word or compatible programs. It offers five of the 16 barcode symbologies we looked for in our review. These include EAN (8, 13), Code 39, Code 128, GS1-128 and UPC (A, E). This barcode creator lets you change the barcode height and font size. You can offset barcodes you create and select a printer from within the user interface. It prints to Windows-compliant printers. The user interface is small – only 6 inches square on your screen. Even if you drag the corner of the window with your mouse to expand its size, the interface remains 6 inches square within the expanded window. (<http://barcode-wizard.en.softonic.com/>).

1. (k) Barcode Generator & Overprinter

Barcode Generator & Overprinter provides the tools necessary to create barcodes and apply them to any paper surface. Its simplicity is its savior, as it makes a very complicated task much easier. The

program's interface was the highlight for us, because it kept all of the commands and options on a single screen. This screen is intuitively broken into three steps, a layout that is so informative that it saved us from having to read the instructional Help file. One option we loved was the capability to scroll through dozens of paper and envelope choices, with Barcode Generator automatically placing the barcode in the correct position on each selection. Using these helps create a clear document, label, or envelope with a properly placed barcode, all ready for printing and shipping. The program also deals separately with the complicated ISBN barcode system, which is a nice touch for publishers and booksellers. (http://download.cnet.com/Barcode-Generator-Overprinter/3000-2064_4-10914445.html).

(l) Barcode Label Generator

Seagull Scientific has been a trend-setting innovator of label software and barcode software since 1985. We developed the world's first Windows software for industrial label printers, including the very first Windows printer drivers. Today, our industry-leading BarTender design and print software for label, barcode, RFID, and card printing is an essential tool for hundreds of thousands of users in more than 150 countries. Use the CGI form below to generate a printable and scannable barcode in Interleaved 2 of 5, Code 39, Code 128 A, B, or C symbologies. This free service can be used to generate individual barcodes or called via URL's to include inline PNG or JPEG images directly into your documents (<http://www.bartenderbarcodesoftware.com/label-software/welcome.aspx?Gclid=CO2Z4qnTlhrsCFYEI4godXnAAqA>).

(m) Easy Barcode Creator

Easy Barcode Creator offers a fast, user-friendly interface with a WYSIWYG preview of the barcode you're creating. Select the barcode you need, or browse Symbology Info to decide what kind of bar code you need. Easy Barcode Creator supports industry standards like EAN, ISBN (Bookland EAN), UPC, I2of5 (Interleaved 2 of 5), Code 39, Code 128, EAN-13, UPC-A, and more. Easy Barcode Creator's integrated barcode generator will build the barcodes you need in a snap. Best of all, Easy Barcode Creator is affordable and reusable! No longer will you need to pay expensive fees for barcode generation services or required software renewals; with Easy Barcode Creator, simply try it out, buy a license, and it's yours to use as you wish, as often as you wish. When you order online, you'll get your activation key instantly, so you can save your first bar code instantly (http://download.cnet.com/Easy-Barcode-Creator/3000-2067_4-10313371.html).

(n) XBL Barcode Generator

XBL Barcode Generator is a handy application designed to help you create barcodes with

minimum effort. You just need to enter the text content and to arrange the layout of the page in order to print the barcode. Barcode Generator supports all the most popular bar code types, the barcode's data can be import from text or Excel file. Barcode Generator gives you the flexibility to meet your most demanding labeling needs, it is a good choice for those who want an easy way to print bar codes (http://download.cnet.com/XBL-Barcode-Generator/3000-2077_4-75332098.html).

(o) Barilo Barcode Software

Barillo Free Barcode Generation Software. Quickly create the barcodes you need for product and inventory barcode labels. Simply select your UPC or EAN barcode type, enter the barcode number for an instant preview of the barcode, then save and export the barcode graphic for printing, choosing from a variety of file formats and setting the height and width for the final barcode graphic. UPC-A Barcodes. UPC (Universal Product Code). UPC-A is the most common barcode used in the US and Canada, consisting of a 12 digit GTIN (Global Trade Item Number). EAN-13 Barcodes. EAN (European Article Numbering). An EAN-13 is an extension of UPC-A, adding an extra digit for more extensive international use. Barcode Software. Barillo also supports generating EAN-8 and UPC-E barcodes with more barcode types to be added in future releases (http://download.cnet.com/Barillo-Barcode-Software/3000-2067_4-75453397.html).

(p) Great Barcode Generator

Great **Barcode Generator** is expert tool to create and print standardized, professional quality barcode images and labels effortlessly in minimal steps. Generator instantly creates single and number of barcodes comprising defined values and conveniently prints by using ordinary, thermal and barcode printers with optimum quality for different layouts and pre defined labels. Great Barcode Generator is designed with user friendly interface including intuitive toolbar to create professional barcodes frequently in two basic steps and save them as projects. Tool also retains convenient provision to save values and images separately (<http://www.greatbarcodegenerator.com/>).

(q) Barcode Studio

Barcode Studio is the ideal tool for barcode design and bar code creation. This barcode maker software supports all common linear codes, all 2D-Codes, GS1-DataBar/RSS and Composite Codes. Barcode Studio prints the bar codes on arbitrary printers or exports them as image. Barcode Studio is also available for UNIX and other Linux distributions. Barcode Studio is a program that allows to quickly create high-quality bar code images for pre-press requirements and desktop publishing applications. Users can generate serial numbers automatically or import the barcode data from external files (TXT, CSV). The Barcode Creator Software Barcode Studio makes sure that each bar code that's created

in the output are of perfect quality and will no longer require any test runs that are costly. The program supports more than 100 barcode symbols which include 2D barcodes, stacked codes and composite barcode just like the OS1 DataBar. The Barcode Creator Software Barcode Studio is easy to operate with just a click of the mouse and you won't need any special training to figure out how the program works (<http://barcode-creator-software-barcode-studio.en.softonic.com/>). The important functions of barcode studio are represents in the table – 1.

For Immediate Use	Barcode Studio is an independent application. For generating barcodes no programming skills are required.
All Barcodes	Barcode Studio supports linear, 2D, GS1 and composite symbologies. QR-Code, Data Matrix and Deutsche Post Premiumadress (Data Matrix) are supported as well.
Barcodes as Bitmaps	Barcode Studio supports the export of barcode graphic files (BMP, GIF, JPG, TIF, PNG).
Barcodes as Vector Graphic	With Barcode Studio you also create vector graphic formats (EPS, PDF, PostScript).
Quality Preview	With Barcode Studio you create perfect bar codes: The quality preview shows the expected barcode quality during the design and helps to avoid unreadable barcodes.
Versatile	All barcode parameters are freely adjustable (e. g. module width, resolution, ECC level, structured append, code page, ...).
Captions	Multiple captions can be positioned above or below a barcode symbol.
Data Input Assistant	The new assistant simplifies the input of application identifiers for GS1 barcodes . In addition mobile tagging barcodes like vCard, meCard, Facebook likes , etc. are created in seconds. (V11.5 or higher)
Data Import	The data import function allows the generation of bar codes with data from text or CSV files.
Sequences	With the built-in barcode sequence generator you create barcode series easily.
Special Barcode Design	Embed logos or graphics into the barcodes with just a few clicks. Create special-effect barcodes by changing the drawing mode (circle, rounded rectangle or images).
Barcode Label Printing	Print the bar-code on predefined templates or define custom labels .
Cross Platform	Barcode Studio is available for Microsoft Windows, Mac OS X [®] and Linux. (UNIX on request!)
Command Line	Create bar code bitmaps through command line interface support . Command line parameters for batch operation (silent mode) and integration into third party applications (like Oracle Reports) are supported.

Print Controls	On demand Barcode Studio (V6) generates SAP R/3 print controls . These control sequences control the bar-code printing with TBarCode/SAPwin.
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Table – 1: Functions of Barcode Studio

(r) Kbarcode
(<https://gitorious.org/kbarcode-kde4>)

KBarcode is a barcode and label printing application for Linux and KDE 3. It can be used to print every thing from simple business cards up to complex labels with several barcodes (e.g. article descriptions). Kbarcode comes with an easy to use WYSIWYG label designer, a setup wizard, batch import of labels (directly from the delivery note), thousands of predefined labels, database management tools and translations in many languages. Even printing more than 10.000 labels in one go is no problem for KBarcode. Additionally it is a simply xbarcode replacement for the creation of barcodes. All major types of barcodes like EAN, UPC, CODE39, DataMatrix and ISBN are supported. The generated barcodes can be directly printed or you can export them into images to use them in another application. **KBarcode** is free software released under the terms of the GNU GPL.

3. Methodology

The methodology of this research paper is made in comparison of open source software on the basis of global recommendations and barcodes related parameters are selected in three levels like generic

level, features and compatibility level and design tools level. This research study tries to solved the problem of barcode generation in next generation library automation. The problem is to be solved through two open source software Barcode studio and kbarcode and both the software are compatible in Linux operating system. Install these two software on Ubuntu 10.04 through synaptic package manager and also by using in terminal. Most comprehensive barcode software is determined on the basis of ranking where 1 represents yes, 0 represents absence value and 0.5 partial value. Apart from this the paper also explore how the Koha can create barcode or spine label for designing and developing the college libraries under the University of Burdwan.

3.1 Generic level

Most of the features evaluated in this section for review pertain to the basic barcode generation of linear barcodes by products that are affordable for small businesses. Below are the criteria we used to evaluate barcode label software. Applications on our lineup that offer more barcode types rate higher than those that offer fewer barcode types. Many of these barcodes are for packaging and shipping, though some are for product labels and relaying information to the public, such as now-ubiquitous QR codes and the generic levels of barcode and their necessary parameters are represents in the table – 2.

Parameters	Barcode Label Maker	Labeljoy	LabelRight	ConnectCode	B-Coder	LabelMagic	Barcode Magic	Bars & Stripes	UPCTools	Barcode Wizard	Barcode Generator & Overprinter	Barcode Label Generator	Easy Barcode Creator	XBL Barcode Generator	Barilo Barcode Software	Great Barcode Generator	Barcode Studio	Kbarcode
EAN (8, 13)	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Code 39	1	1	1	0	0	1	1	0	0	1	1	1	1	0	0	1	1	1
Code 93	0	0	1	0	1	1	0	0	1	0	0	0.5	1	1	0	0	1	1
Code 128	0	0	0	0.5	1	0	0	1	0	1	1	1	0	0	0.5	1	1	1
Codabar	1	1	1	0	0.5	0	1	0.5	1	1	1	1	1	0.5	0	1	1	1
ISBN/ Bookland	1	1	0	0	0	0	0.5	0	1	0	1	1	1	0	0	1	1	1
QR Code	0	0	0	0.5	0	0.5	0	0	0	0	0	0	0	0	0.5	0	1	1
Data Matrix	0.5	0	0	0	0	0	1	0	0.5	0	0	0	0.5	0	0	0	1	1
UPC (A, E)	0	0	0	0	0	0	0	0	1	0.5	0	0	0	0	0	0	0.5	0
MSI-Plessey	0	0.5	0	0	0.5	0	0.5	0	0	0	0.5	0	0	0.5	0	0.5	0	0
PDF-417	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1
ISSN	1	0	0	0	0	0	0	0	0	0	1	0.5	1	0.5	0	1	1	1
Total Score (out of 12)	6.5	5.5	4	2	4	3.5	5	2.5	5.5	4.5	6.5	6	6.5	3.5	3	7.5	10.5	10

Table – 2: Generic level parameters of barcode generation tools

Comparison is made on the basis of scoring system where the score of Barcode studio is 10.5 and Kbarcode 10 out of 12. Both the software is compatable on Linux operating system and it can be run in Ubuntu 10.04 under office option. Here the selected parameters are EAN (8, 13), Code 39, Code 93, Code 128, Codabar, ISBN/

Bookland, QR Code, Data Matrix, UPC (A, E), MSI-Plessey, PDF-417 and ISSN. The most comprehensive software is considered as Barcode studio and Kbarcode as compared in other barcode related software which mentioned in the table – 2.

3.2 Features & Compatibility

Whether barcode makers can import data from other sources and export barcodes to other applications is important. The best barcode generator software should print to Windows-compliant printers and save barcodes as images rather than text. WYSIWYG barcode design is a favorable feature to help to produce quality barcodes by seeing them on the computer screen as they would appear for printed the library resources and it represents in the table – 3.

Parameters	Barcode Label Maker	LabelJoy	LabelRight	ConnectCode	B-Coder	LabelMagic	Barcode Magic	Bars & Stripes	UPCTools	Barcode Wizard	Barcode	Barcode Label	Easy Barcode Generator	XBL Barcode	Barilo Barcode	Great Barcode Generator	Barcode Studio	Kbarcode
Number of Languages Supported	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0	0	1	1	1
Prints to Windows-Compliant Printers	1	1	0	0	0	0	0.5	0	0.5	0	0	1	1	1	1	1	1	1
Exports / Saves as Image	1	1	1	1	1	1	1	0.5	1	0.5	1	1	1	0.5	1	1	1	1
Imports Data from Microsoft Office	0.5	0	0	0.5	0	0	0	0.5	0	0	0	0	0	0.5	0	0	1	1
WYSIWYG Design	0	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0	0	1	1
Copies to Microsoft Office	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.5	1	1
Total Score (out of 6)	2.5	2	1	1.5	1.5	1	1.5	1	1.5	1	1	2.5	3	2	2	3.5	6	6

Table – 3: Features & compatibility of barcode generation tools

Now features and compatibility level six parameters are selected like Number of Languages Supported, Prints to Windows-Compliant Printers, Exports / Saves as Image, Imports Data from Microsoft Office, WYSIWYG Design and Copies to Microsoft Office. The comparison of eighteen open source software on the scoring system and here also the highest scoring of two software Barcode studio is 6 and kbarcode 6 out of 6. So, it can conclude that these two software are the most comprehensive towards next level automated and digital library system. This research study also helpful in designing and developing the college libraries under the University of Burdwan.

3.3 Design Tools

The barcode software we evaluated generates barcodes to create labels in Windows and Linux applications, and some stand-alone products create barcodes and labels within their individual interfaces. Design tools facilitate the creation and editing of label color, size, orientation and more. The best barcode label software lets you add images and shapes and manipulate text. Some have grid options, background color and offer U.S. or metric measurements and most of the comprehensive parameters for design related are represents in the table – 4.

Parameters	Barcode Label Maker	LabelJoy	LabelRight	ConnectCode	B-Coder	LabelMagic	Barcode Magic	Bars & Stripes	UPCTools	Barcode Wizard	Barcode Generator	Barcode Label Generator	Easy Barcode Creator	XBL Barcode Generator	Barilo Barcode Software	Great Barcode Generator	Barcode Studio	Kbarcode
Text Font Choices	0	0	0.5	0	0	0	0.5	0	0.5	0	1	1	1	0	0	1	1	1
Include Text	0	0	0	0	0.5	0	0	0	0	0	0	0.5	1	1	1	1	1	1
Full Color Support	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5
Orientation	0.5	0	0	0.5	0	0	0.5	0	0	0	0	0.5	0	0	0	0.5	1	1
Shapes	0	0.5	0	0	0	0	0	0	0.5	0	0	0	0	0	0	1	1	1

Barcode Color	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
Barcode Width	1	1	1	1	0	0.5	0	1	0	1	0	0	0.5	0	1	1	1	
Quiet Zone	0	0	0	0.5	0	0	0.5	0	0	0	0	0	0	0.5	1	1	1	
Import Images	0	0	0	0	0	0	0	0	0	0.5	0	0.5	0	0	0	1	1	
Grid Options	0.5	0	0.5	0	0	0.5	0.5	0	0.5	0	0.5	1	1	0	0	0.5	1	1
Metric and U.S. Measurements	0	0	0	0	0.5	0	0	0	0	0	1	0.5	1	0	0.5	1	1	1
Background Color	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
Total Score (out of 12)	2	1.5	2.5	2	1	1	2	1	1.5	1	3	3.5	4.5	1.5	2	7	12	11.5

Table – 4: Design related parameters of barcode generation tools

In design tools level twelve parameters are selected like Text Font Choices, Include Text, Full Color Support, Orientation, Shapes, Barcode Color, Barcode Width, Quiet Zone, Import Images, Grid Options, Metric and U.S. Measurements and Background Color. From the above table the score of Barcode studio is 12 and score of kbarcode 11.5 out of 12 as compared to other barcode software. In this level these two software is also considered as the most comprehensive for the barcode generation in College Libraries under the University of Burdwan.

4. Label creation through koha

Label or barcode generation is one of the important tasks in library automation towards next generation library automation. There are many open source software available in integrated library management and retrieval systems like Koha, NewGenLib, Emilda, OpenBiblio and so many software. But in this section this research paper selected only matured level software for designing and developing the college libraries under the University of Burdwan. Among this open source software Koha is selected on the basis of global recommendations like ILS-DI, SOA, RFP, DLF, RFC and OLE. Because Koha gives extra parameters under tools options in the following way:

More >> Tools >> Label creator / Quick spine label creator >> set layouts >> Templates >> Profiles >> Batches >> New Batch >> Add items / Add by barcodes >> this can be generated in the figure – 1. Also it gives three formats like pdf, csv and xml

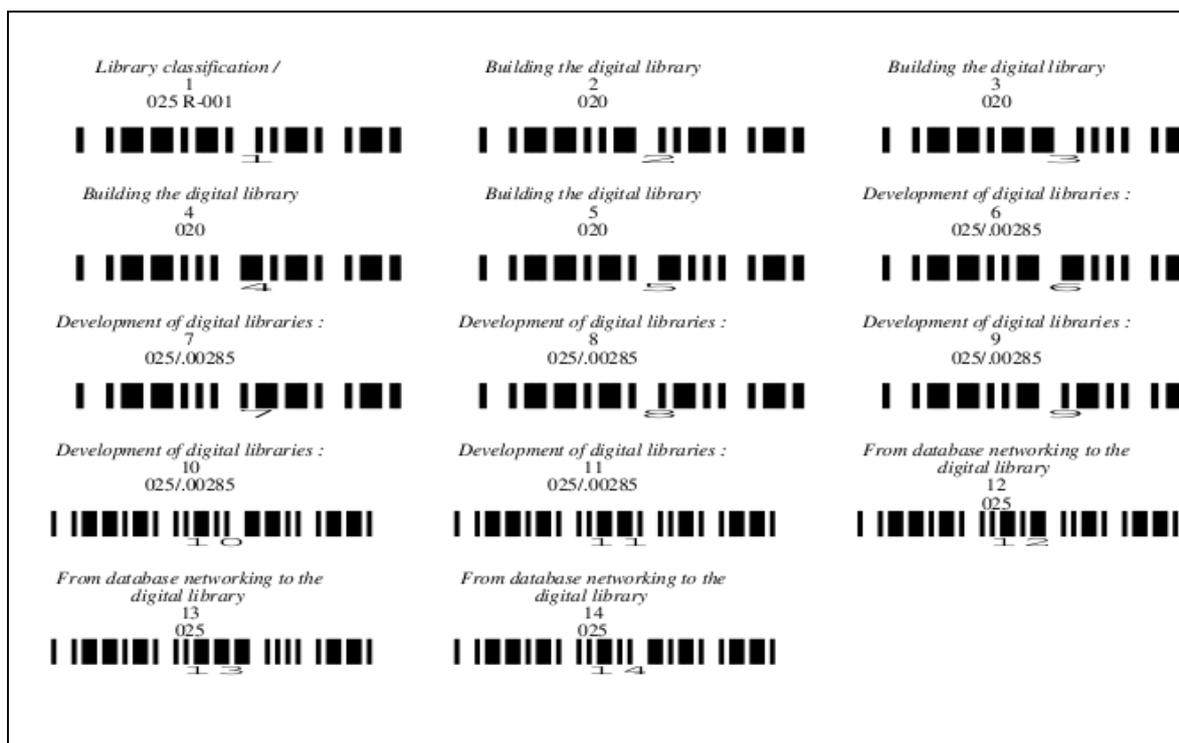


Figure – 1: Spine label create through Koha

5. Results of Barcode generation tools

Barcode Studio is one of the important tool in automated and digital library system. The results of Barcode studio are represents in the figure-2 on Ubuntu 10.04. The library staff can easiliy managed the Barcode through Barcode stodio.

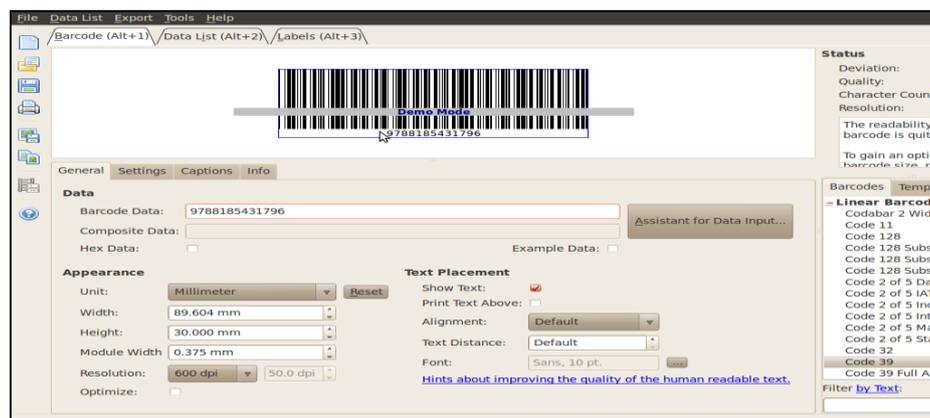
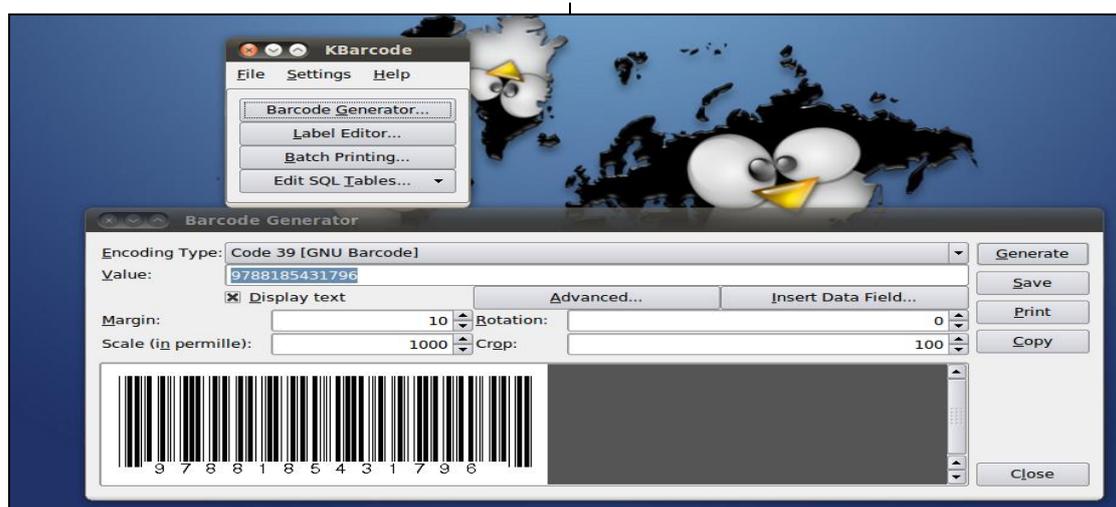


Figure – 2: Result of Barcode Studio on Ubuntu

KBarcode is free software released under the terms of the GNU GPL. The KBarcode in action are represents in the figure-3. Additionally it is a simple barcode generator (similar to the old xbarcode you might know). All major types of barcodes like EAN, UPC, CODE39 and ISBN are supported. Even complex 2D barcodes are supported using third party tools. The generated barcodes can be directly printed or you can export them into images to use them in another application.

Figure – 3: Result of Kbarcode on Ubuntu



6. Conclusion

Most of the college libraries are facing problem of barcode generation. There are many software available in integrated library system but most of the software are support in Windows operating system. This is the greate problem in barcode generation towards next level automated and digital library system and this problem is to be solved by two tools like barcode studio and kbarcode, because they are support in Linux operating system. These two barcodes are helpful in College libraries under the University of Burdwan. Apart from this two tools, Koha is open source integrated library management software that can create label creation

and spine label creation. Barcodes are truly fascinating. These barcodes inspired an entire new way of doing library operations, enabling seamless interaction with barcode tools from around the world. Beyond their everyday uses, barcodes have also inspired artwork, poetry, architecture, and people from around the world to push their creativity. Stay tuned for more posts on the amazing history of barcodes, and their many uses around the globe. So barcode tools is an inevitable and indispensible for designing and developing an integrated information management and retrieval system for college libraries under the University of Burdwan.

References

- Barcode Generator & Overprinter (2013). About on Barcode Generator & Overprinter. Retrieved from http://download.cnet.com/Barcode-Generator-Overprinter/3000-2064_4- (Accessed on Dec 5, 2013)
- Barcode Label Generator (2013). About on Barcode Label Generator. Retrieved from <http://www.bartenderbarcodesoftware.com/label-software/welcome.aspx> (Accessed on Dec 5, 2013)
- Barcode Label Maker (2013). About on barcode label maker Retrieved from <http://bar-code-label-software-review.toptenreviews.com/barcode-label-maker-review.html>. (Accessed on Dec 5, 2013)
- Barcode Magic (2013). About on Barcode Magic. Retrieved from <http://bar-code-label-software-review.toptenreviews.com/barcode-magic-review.html>. (Accessed on Dec 5, 2013)
- Barcode Studio (2013). About on Barcode Studio. Retrieved from <http://barcode-creator-software-barcode-studio.en.softonic.com/>(Accessed on Dec 5, 2013)
- Barcode Wizard (2013). About on Barcode Wizard. Retrieved from <http://barcode-wizard.en.softonic.com/>. (Accessed on Dec 5, 2013)
- Barilo Barcode Software (2013). About on Barilo Barcode Software. Retrieved from http://download.cnet.com/Barilo-Barcode-Software/3000-2067_4-75453397.html(Accessed on Dec 5, 2013)
- Bars & Stripes (2013). About on Bars & Stripes Retrieved from <http://bar-code-label-software-review.toptenreviews.com/bars-and-stripes-review.html> (Accessed on Dec 5, 2013)
- B-Coder (2013). About on B-Coder. Retrieved from <http://bar-code-label-software-review.toptenreviews.com/b-coder-review.html>. (Accessed on Dec 5, 2013)
- ConnectCode (2013). About on ConnectCode. Retrieved from <http://bar-code-label-software-review.toptenreviews.com/connectcode-review.html>. (Accessed on Dec 5, 2013)
- Cranstone, Ian (n.d). "A guide to ACI (Automatic Car Identificaiton)/KarTrak". CANADIAN FREIGHT CARS A resource page for the Canadian Freight Car Enthusiast. Ian Cranstone. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- Cranstone, Ian (n.d). "A guide to ACI (Automatic Car Identificaiton)/KarTrak". CANADIAN FREIGHT CARS A resource page for the Canadian Freight Car Enthusiast. Ian Cranstone. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- Easy Barcode Creator (2013). About on Easy Barcode Creator. Retrieved from http://download.cnet.com/Easy-Barcode-Creator/3000-2067_4-10313371.html (Accessed on Dec 5, 2013)
- Fishman, Charles (1 August 2001). "The Killer App – Bar None". American Way. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- Fox, Margalit (15 June 2011), "Alan Haberman, Who Ushered in the Bar Code, Dies at 81", The New York Times. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- Great Barcode Generator (2013). About on Great Barcode Generator. Retrieved from <http://www.greatbarcodegenerator.com/>(Accessed on Dec 5, 2013)
- Kbarcode (2013). About on Kbarcode. Retrieved from <https://gitorious.org/kbarcode-kde4> (Accessed on Dec 5, 2013)
- Keyes, John (August 22, 2003). "KarTrak". John Keyes Boston photoblogger. Images from Boston, New England, and beyond. John Keyes. Retrieved from <http://en.wikipedia.norg/wiki/Barcode> (Accessed on Dec 2, 2013)
- Labeljoy (2013). About on Labeljoy. Retrieved from <http://bar-code-label-software-review.topten/>. (Accessed on Dec 5, 2013)
- LabelMagic (2013). About on LabelMagic. Retrieved from <http://bar-code-label-software-review.toptenreviews.com/labelmagic-review.html>. (Accessed on Dec 5, 2013)
- LabelRight (2013). About on LabelRight Retrieved from <http://bar-code-label-software-review.toptenreviews.com/labelright-review.html>. (Accessed on Dec 5, 2013)
- Seidman, Tony (n.d). "Barcodes Sweep the World", Wonders of Modern Technology. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- Seidman, Tony, (n.d)."Barcodes Sweep the World", Wonders of Modern Technology. Retrieved from <http://en.wikipedia.org/wiki/Barcode> (Accessed on Dec 2, 2013)
- UPCTools (2013). Abou on UPCTools. Retrieved from <http://bar-code-label-software-review.toptenreviews.com/upc-tools-review.html> (Accessed on Dec 5, 2013)
- XBL Barcode Generator (2013). About on XBL Barcode Generator. Retrieved from http://download.cnet.com/XBL-Barcode-Generator/3000-2077_4-75332098.html (Accessed on Dec 5, 2013)