

CITEP BAR CODE SYSTEM
SOFTWARE DESIGN SPECIFICATION
VERSION 0.5, REVISION 1

24 August, 2006

1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This document describes the design of a software package to be developed by a development team working with the Community Information Technology Enterprise Project (CITEP) at Loyola University Chicago. This software package, hereby referred to as the CITEP Bar Code System, will aid various organizations in the management and distribution of services. The goal of this project is to provide a paperless system that allows more efficient and reliable management of services. This document will detail the internal design of the CITEP Bar Code System. This design specification will be used by the developers as a blueprint during implementation of the CITEP Bar Code System.

1.2 INTENDED AUDIENCE

This design specification is intended to be used by the developers implementing the CITEP Bar Code System.

1.3 TECHNICAL ACHIEVEMENTS TO DATE

1.3.1

Two (2) bar code scanner models have been obtained (Unitech MS210, Unitech 146) and confirmed to be compatible with the development Linux machines. The development machines are running Gentoo Linux versions 2005.1 and 2006.1 and Ubuntu 6.06 distributions with the 2.6.x family of Linux kernels.

1.3.2

A python script which generates bar codes in the "Code 128" scheme with support for all three (3) character sets has been completed. This script is fully functional and will generate operational bar codes, however, some of the extended control characters in character set "A" have not been fully implemented. In addition, during testing, it was discovered that the Unitech MS210 bar code scanner does not recognize "Code 128" character set "C" bar codes.

1.3.3

A bar code printer has been obtained (Zebra 2824).

Gentoo: Printer is presently non-functional pending a kernel recompile in order to add printing via USB functionality.

Ubuntu: Printer is recognized by CUPS and the proper Foomatic driver for Zebra printers is installed. At present time, printing via USB is impossible due to an unknown issue.

1.3.4

An installation of MySQL 5 has been completed and verified as fully functional.

1.3.5

A simple python based web server with .cgi functionality has been implemented. The server software has undergone and passed simple quality assurance tests.

2 GENERAL DESCRIPTION

2.1 PRODUCT FUNCTIONS

The CITEP Bar Code System will enable organizations to efficiently manage usage of the services they provide to the community. Organizations will be able to issue identification cards which will aid in the management of usage and distribution of provided services and items.

2.2 USER CHARACTERISTICS

The users of the software system will be employees or volunteers of an organization. All users will be expected to be comfortable using typical consumer software products such as web browsers (Mozilla Firefox). It is safe to assume that users will not be familiar nor comfortable using command line applications.

2.3 USER PROBLEM STATEMENT

Community non-profit organizations provide numerous services and distribute numerous items to numerous people in their local communities. As a result, special management is necessary to ensure fair and efficient deployment and distribution of services and items.

At the present time, various uncoordinated and unstandardized systems are used to manage usage of services and distribution of items. These systems can be chaotic, and do not address the problem of people cheating the system in order to obtain extra services or features.

As a result, a management system which offers a quick and efficient way to manage users, services and items, and transactions is necessary. The system must be able to identify users to the organization, provide auditing tools, and offer some protection of privacy for the users. Meanwhile, the system needs to be quick and easy to deploy and use with a minimum of training.

3 SYSTEM ARCHITECTURE

3.1 DESCRIPTION

The CITEP Bar Code System is composed of three (3) parts: the database, the .cgi back end, and the user interface.

The database used for the system must be MySQL version 5.

The user interface will be implemented as a series of web pages. These web pages will allow a user to create, modify, and delete new items and user ids, as well as log user-item transactions.

The .cgi back end is responsible for interfacing with a database and allows any user interaction to take place.

3.2 IMPLEMENTATION LANGUAGE

The CITEP Bar Code System .cgi back end will be implemented in Python and the user

interface in hyper text markup language. The specific version for the back end will be Python 2.4.2.

Python was chosen as the primary language for the .cgi back end because the development team is most experienced and comfortable in it. Hyper Text Markup Language (html) was chosen as the primary language for the user interface due to its simplicity and multi-platform nature.

4 BAR CODES

4.1 DESCRIPTION

The CITEP Bar Code System shall use “Code 128” character set “B” bar codes. Information concerning the “Code 128” bar code scheme is widely available on the internet. One recommended reference website is <http://www.spatula.net/proc/barcode/code128.src> .

4.2 FULL HEIGHT BAR CODES

Full height bar codes must have a width of one hundred forty (140) pixels and a height of sixty (60) pixels. A 3 pixel white space must exist on both left and right sides. The bar code area is not to exceed a total height of fifty (50) pixels, and the text area below the bar code is not to exceed a total height of ten (10) pixels.

The resulting bar code should appear to be similar in format and size of the example below:



4.3 HALF HEIGHT BARCODES

Half height bar codes must have a width of one hundred forty (140) pixels and a height of thirty (30) pixels. A 3 pixel white space must exist on both left and right sides. The bar code area is not to exceed a total height of twenty (20) pixels, and the text area below the bar code is not to exceed a total height of ten (10) pixels.

The resulting bar code should appear to be similar in format and size of the example below:



5 DATABASE

5.1 DATABASE OVERVIEW

The database will have three (3) tables: USERS, ITEMS, TRANSACTIONS. Each table is described in more detail below. Primary Keys are shown in **bold**.

5.2 USERS

The USERS table has fourteen (14) fields, of which UID is the primary key. Six (6) of the fields (UID, F_Name, L_Name, Modify, Expire, Status) will not accept null values.

The table has the following structure:

UID	bigint(9) zerofill auto_increment	No Nulls
Prefix	text	Nulls
F_Name	text	No Nulls

M_Name	text	Nulls	
L_Name	text	No Nulls	
Suffix	text	Nulls	
H_PH	text	Nulls	
C_PH	text	Nulls	
W_PH	text	Nulls	
Email	text	Nulls	
Address	text	Nulls	
Modify	datetime	No Nulls	0000-00-00 00:00:00
Expire	datetime	No Nulls	0000-00-00 00:00:00
Status	set(Active, Expired, Suspended, Deleted)	No Nulls	Active

UID is the user identification number, which is a nine (9) digit auto incrementing big integer with leading zeros. Prefix, F_Name, M_Name, L_Name, Suffix are all text fields which represent parts of a name. H_PH, C_PH, W_PH are text fields which represent home, cell, and work phone numbers. Modify is a datetime field which represents the exact date and time a user id has been created or modified in any way. Expire is a datetime field which shows when a user id will expire. In the case of no expiration date, the date 3001-01-01 00:00:00 should be used. Status is a four (4) item set which designates a user's id as being active, expired, suspended, or deleted.

5.3 ITEMS

The ITEMS table has five (5) fields, of which CLASS and IID are the primary keys. Three (3) of the fields (Class, IID, Status) will not accept null values.

The table has the following structure:

Class	set(I, S)	No Nulls	
IID	bigint(8) zerofill auto_increment	No Nulls	
Description	text	No Nulls	
Owner	text	Nulls	
Status	set(Active, Inactive, Expired)	No Nulls	Active

Class is a two (2) item set field which designates an item as being an item ("I") or service ("S"). IID is the item identification number, which is an eight (8) digit auto incrementing big integer with leading zeros. Description is a mandatory text field. Owner is an optional text field. Description and Owner provide additional information concerning an item entry. Status is a three (3) item set which designates an item as being active, inactive, or expired.

5.4 TRANSACTIONS

The TRANSACTIONS table has five (5) fields, of which Class and TID are the primary keys. All of the fields will not accept null values.

The table has the following structure:

Class	Set(T)	No Nulls	T
TID	bigint(8) zerofill auto_increment	No Nulls	
Date	datetime	No Nulls	0000-00-00 00:00:00
UID	bigint(9) zerofill	No Nulls	

Items	text	No Nulls
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Class is the transaction class, however it is not fully implemented in this version. TID is the transaction identification number, which is a nine (8) digit auto incrementing big integer with leading zeros. Date is a datetime field which represents the exact date and time a transaction has been occurred. UID is the user identification number. Items is a text field which will contain the item(s) rendered in the transaction.

6 USER INTERFACE

6.1 OVERVIEW

The user interface for the CITEP bar code system will be a web site. The web site itself will consist of two frames – navigation and main.

6.2 NAVIGATION FRAME

The navigation frame will consist of simple text links linking to the various forms which will implement the functionality of the CITEP bar code system.

6.3 MAIN FRAME

The main frame will be the area where the various forms and outputs shall be displayed. Upon initial loading of the system, a page featuring the organization's logo shall be displayed.

7 DEPLOYMENT / PACKAGING

7.1 INSTALLATION

In order to provide an easy way to create the necessary database tables, a command line installer will be provided. Full installation information shall be included in the documentation.

MySQL database server software will not be bundled with the CITEP Bar Code System, and therefore must be downloaded and installed separately.

7.2 DOCUMENTATION

To provide a means of technical support to the user, the development team will include a manual for the user in both plain text (.txt) and web (.html) formats.

The manual will include a table of contents, index, explanations of user interface, .cgi back end, and database, tutorials in various common tasks, and a troubleshooting section. The .html formatted version of the manual manual should include screen shots of the software for ease of understanding for the user.

7.3 DELIVERY

The CITEP Bar Code system software, database installer, and all related documentation will be delivered to the client by means of a tarred and gunzipped archive file (.tar.gz) or a zipped archive file (.zip).

8 FUTURE CONSIDERATIONS

8.1 SECURITY

The transfer of all network traffic between the computer running the user interface and the server should be encrypted by means of secure socket layering (SSL), virtual private

networking (VPN), secure shell tunneling, or other method in order to prevent the interception and/or corruption of user data being accessed or modified from the database.

8.2 SUPPORT FOR OTHER SQL DATABASES

Future versions of the CITEP bar code project must support other SQL databases. This should be possible by using the SQLObject module. See <http://www.sqlobject.org/> for more information.

8.3 SUPPORT FOR USER ROLES

Users authentication and access privileges should be implemented in a future version.

8.4 SUPPORT FOR USER ID IMAGES

Future versions of the CITEP bar code project should support the uploading and storage of user id images. These images should be uploaded to the database for storage. The images may be in color or gray scale, and may possibly be featured on the id card itself.

8.5 ENHANCED USER INTERFACE

The user interface should be improved through the logical use of content style sheets (CSS) and other techniques.

8.6 ENHANCED USER INTERFACE ACCESSABILITY

The user interface must be Section 508 compliant. See <http://www.section508.gov/> for more information.

8.7 ITEM LIST GENERATION

The user interface may feature a tool which will generate a list of all active IIDs and their related bar codes. The list should be dynamically created and organized into a three (3) column document in the .pdf format.

9 REVISION HISTORY

Version 0.1 Specification: 11 August, 2006. Dr. Michael Tobis

Version 0.5 Specification: 18 August, 2006. George Bobeck

Version 0.5-r1 Specification: 24 August, 2006. George Bobeck

10 USE CASES

10.1 USE CASE 1: CREATE NEW USER

A user should be able to click a link on the user interface which will load the new user creation form. The user will then be able to enter the necessary user information into the form, which upon submit will be entered into the database. A unique user identification number will automatically be assigned, and a user identification card featuring the user id in both text and bar code form shall be created.

The bar code created for any user id must use the “Code 128” scheme, character set “B”. The resulting bar code should appear to be similar in format of the examples below:

All valid bar codes representing a “user” must contain the nine (9) digit user id (UID) number.



Note: The image has been resized and a blue background has been added in order to clearly show the generated bar codes and bordering white spaces.

10.2 USE CASE 2: MODIFY USER

A user should be able to click a link in the user interface which will load the modify user form. The user will then be able to enter the user's UID via keyboard or bar code scanner. Upon submit, a database query shall occur. If the UID exists, another form shall be loaded where the user may change the information related to the UID. If the query is unsuccessful, a short message indicating that the user was not found shall be displayed.

10.3 USE CASE 3: DELETE USER

A user should be able to click a link in the user interface which will load the delete user form. The user will then be able to enter the user's UID via keyboard or bar code scanner. Upon submit, the users status will be set to deleted.

10.4 USE CASE 4: LOOKUP USER

A user should be able to click a link in the user interface which will load the search user form. The user will then be able to enter the user's UID via keyboard or bar code scanner. Upon submit, a database query shall occur. If the query is successful, the user's information shall be displayed. If the query is unsuccessful, a short message indicating that the user was not found shall be displayed.

Alternately, the user may click a link in the user interface which will load an advanced search user from. The user will then be able to enter the user's UID or name. Upon submit, a database query shall occur. If the query is successful, the user's information shall be displayed. If the query is unsuccessful, a short message indicating that the user was not found shall be displayed.

10.5 USE CASE 5: CREATE NEW ITEM

A user should be able to click a link in the user interface which will load the new item creation form. The user will then be able to enter the necessary item information into the form, which upon submit will be entered into the database. A unique item identification number will automatically be assigned and an item tracking card featuring the item id in both text and bar code form shall be created.

The bar code created for any item must use the "Code 128" scheme, character set "B". The resulting bar code should appear to be similar in format of the examples below:

ITEMS

All valid bar codes representing an "item" must begin with "I" and include the eight (8) digit item id (IID) number.



Note: The image has been resized and a blue background has been added in order to clearly show the generated bar codes and bordering white spaces.

SERVICES

All valid bar codes representing a “service” must begin with “S” and include the eight (8) digit item id (IID) number.



Note: The image has been resized and a blue background has been added in order to clearly show the generated bar codes and bordering white spaces.

10.6 USE CASE 7: MODIFY ITEM

A user should be able to click a link in the user interface which will load the modify item form. The user will then be able to enter the item's IID via keyboard or bar code scanner. Upon submit, a database query shall occur. If the IID exists, another form shall be loaded where the user may change the information related to the IID. If the query is unsuccessful, a short message indicating that the item was not found shall be displayed.

10.7 USE CASE 8: LOG USER-ITEM TRANSACTION

A user should be able to click a link in the user interface which will load the transaction form. The user will then be able to enter the user's UID via keyboard or bar code scanner followed by the item(s) IID(s) which are involved in the transaction. Upon submit, the information from the form plus the current date and time shall be entered into the database. A unique transaction identification number shall be assigned to the transaction.