

ILP BUKIT KATIL CHECK-IN-SYSTEM (CiS)

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ABSTRACT

The ILP Bukit Katil Check in System, which is also known as ILP Bukit Katil CiS is developed for the Institut Latihan Perindustrian Bukit Katil, Malacca. The problems with the previous manual system are the difficulties faced by the security guard in recording student's check in and organizing those check in records efficiently. The usage of the barcode scanner in recording the student check in is the solution suggested through the ILP Bukit Katil Check in System. The users of the system will be the institute's administrator, head of departments, security guard, student and the visitor. The modules for each of the user differ according to their user level. The main modules will be the matrix card scanning module and check in record viewing module. Researches were carried out to gather the information about the proposed system by interviewing the future users and researching the current available systems. Rational Unified Process (RUP) with Unified Modeling Language (UML) was chosen as the methodology of this project. Object-Oriented approach applied in drawing the diagrams with Rational Rose software. The software requirement includes Microsoft Windows as the operating system for both the server and client, Apache as the web server, PHP as the programming language, MySQL as the database and Internet Explorer as the web browser. The hardware requirement includes the barcode scanner and the computers that are able to support the system.

ABSTRAK

ILP Bukit Katil Check in System yang juga dikenali sebagai ILP Bukit Katil CiS dibangunkan untuk Institut Latihan Perindustrian Bukit Katil, Melaka. Masalah yang dihadapi dengan sistem manual yang digunakan sebelum ini ialah kesukaran pengawal keselamatan dalam merekodkan waktu masuk pelajar dan menguruskan rekod-rekod tersebut secara efisien. Penggunaan pengimbas kod bar dalam merekodkan waktu masuk pelajar ialah penyelesaian yang dicadangkan oleh ILP Bukit Katil Check in System. Pengguna-pengguna sistem ini ialah pengurusan institut, ketua-ketua jabatan, pengawal keselamatan, pelajar dan pelawat. Modul-modul bagi setiap pengguna adalah berbeza bergantung kepada tahap pengguna tersebut. Modul-modul utama bagi sistem ini merupakan modul bagi mengimbas kad matriks pelajar dan modul untuk paparan rekod waktu masuk pelajar. Kajian-kajian telah dijalankan bagi megumpul informasi berkaitan sistem yang dicadangkan melalui temuramah dengan bakal pengguna dan kajian terhadap sistem yang sedia ada. Rational Unified Process (RUP) berserta dengan Unified Modeling Language (UML) dipilih sebagai metodologi bagi projek ini. Pendekatan Object-Oriented juga diaplikasikan bagi menghasilkan diagram dengan menggunakan perisian Rational Rose. Keperluan perisian meliputi Microsoft Windows sebagai sistem pengoperasi bagi kedua-dua pelayan dan klien, Apache sebagai pelayan web, PHP sebagai bahasa pengaturcaraan, MySQL sebagai pangkalan data dan Internet Explorer sebagai pelayar web. Keperluan perkakasan pula meliputi pengimbas kod bar dan komputer-komputer yang mampu menyokong sistem ini.

CHAPTER I

INTRODUCTION

1.1 PROJECT BACKGROUND

The attendance system or the check in system is used in many institutions in order to record the employees, students and etc attendance or check in record. The system is developed to overcome the weaknesses of the manual system.

The ILP Bukit Katil Check-in-System (CiS) is developed and used in the ILP Bukit Katil. This system is an idea from Head of the ICT Department of ILP Bukit Katil, Mr Zaidi b. Yusof. ILP Bukit Katil which stands for the Institut Latihan Perindustrian Bukit Katil is one of the engineering skills institutions administered by the Manpower Department, Ministry of Human Resources.

The system has 5 different categories of users. They are the institute's administration, head of departments, students, visitors and security guards.

1.2 PROBLEM STATEMENTS

Problems that were identified with the current manual system are as the following:

- **Security guard need to write down each student's name during the check in.**

Security guards need to submit the daily report to the institute's administrator. The daily report includes the log book that contains the check in record. The security guards record student's name, student's NDP, time in and time out. This task is tiring and inefficient. The time consumed during the task is also considerably long. Student's matrix card will be referred during the check in recording.

- **Long list of names in the log book**

Records in the log book that submitted by the security guard will be viewed or analyzed by the institute's administrator. The records involve long list of names that need to be viewed. The task will take a long time and vulnerable to some of the human errors. The errors mentioned are students not being punished for being late, skipped students' names, and etc. Some of the details may not be viewed by the institute's administrator.

Late students are not being punished accordingly.

The possibility of students who were late to escape the punishment is also high. This scenario happens as only those students who came late for more than three times in a month will be punished. The institute's administrator did not have any kind of proper system to detect those students. Detection is carried out manually.

1.3 OBJECTIVES

Objective of the project describe the identification of anticipated outcomes in clearly specified terms. The objectives of the system are as the following:

- **Able to use the barcode reader in recording the students' check in**

The check in records will no longer stored manually. The barcode reader will be used in scanning the student's *nombor daftar pelajar* (NDP) that was printed on the matrix card. Using the NDP, the system will be able to detect the student's detail.

- **Able to get the correct number of students who came late to the institute by using the analysis module**

The system will allow the institute's administration to get the exact number of students who came late to the institute by using the analysis module. The module will provide the complete details about the students who came late.

- **Able to check in simultaneously**

More than one barcode reader will be used at a time. The stability of the system will be the main concern. There should be no problems like the system getting crashed or the unwanted error messages being displayed during the check in process. The stability of the system will be strengthened to allow more than a student to check in simultaneously.

1.4 SCOPE

The modules developed in this system are fully computerized. The scope for the system is as the following:

1. Institute's administrator

- Admin Login and Logout
- Register new student
- Edit student details
- Send online announcements
- Send online memo(s) to students who are late
- View student's check in record
- Approve or reject student's online outing application

2. Head of departments

- HOD login and logout
- View student's check in record
- Send online announcements

3. Student

- Scan their matrix card (*nombor daftar pelajar*) using the barcode reader
- Apply for outing permission online
- Upload leave letter(s)

4. Visitor

- Check in as visitor (will be given a visitor's pass)
- Get the direction to a landmark (main hall, administration office and etc.) in ILP Bukit Katil

5. Security guard

- Security guard login and logout
- Send online daily report to the admin
- Check student's online outing application status

1.5 PROJECT SIGNIFICANCE

The developed system is an idea to help the ILP Bukit Katil to upgrade their check in system and at the same time this system introduces the usage of the barcode reader in recording the check in information.

Students will be able to check in and check out by scanning the *nombor daftar pelajar* (NDP) that was printed on the matrix card and will also receive online announcements and memos from the institute's administration.

Security guards will also be able to save their time in writing down the names of the students who checked in late and will also be able to carry out their daily routine in a more efficient environment.

Institute's administration will be able to view the check in information at any time. The institute may also be able to save the papers used for the check in recording.

1.6 EXPECTED OUTPUT

The ILP Bukit Katil CiS is expected to provide several important modules in managing the check in information. The modules are the institute's administration modules, head of departments' modules, security guard modules, visitor modules and student modules. The developed system is expected to capture the *nombor daftar pelajar* (NDP) from student's matrix card using the barcode reader.

1.7 CONCLUSION

The developed system is the ILP Bukit Katil Check-in-System. The ILP Bukit Katil will be using the system after the project completion. The developed system uses the barcode reader in recording the check in information. The system should overcome the problems stated and achieve the objectives that were underlined in this chapter.

In Chapter II, literature review and project methodology are discussed in.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 INTRODUCTION

This chapter specifies literature review and project methodology that will be opted to optimize development of to-be system. Literature review includes study and research of published materials like journals, thesis, technical documents and online library. Object oriented analysis and design (OOAD) approach shall be applied to develop the software. Unified Modified Language (UML) which is suitable to OOAD approach also referred to as Rational Unified Process (RUP).

2.2 FACT FINDING

According to Nair, N.S. (1997), a **barcode** (also **bar code**) is a machine-readable (uses dark ink on white substrate to create high and low reflectance which is converted to 1's and 0's) representation of information in a visual format on a surface. Originally barcodes stored data in the widths and spacing of printed parallel lines, but today barcode also come in patterns of dots, concentric circles, and hidden within images. Barcodes can be read by optical scanners called barcode readers or scanned from an image by special

software. Barcodes are widely used to implement Auto ID Data Capture (AIDC) systems that improve the speed and accuracy of computer data entry.

According to Alexis, W.J. (2002), a barcode reader (or barcode scanner) is a computer peripheral for reading barcodes printed on various surfaces. Like a flatbed scanner, it generally consists of a light source, a lens and a photo conductor translating optical impulses into electrical ones. Additionally, nearly all barcode readers currently produced contain *decoder* circuitry analyzing the barcode's image data provided by the photo conductor and sending the barcode's content to the scanner's output port. Figure 2.1 shows a typical barcode scanner that is available nowadays.



Figure 2.1: A typical barcode scanner.

According to Tang *et al.* (1998), most barcode readers use a PS/2 or USB cable for output: PS/2 cables are connected to the host computer in a Y formation, the PS/2 keyboard port with its first end, to the keyboard with its second, and to the barcode reader with its third end. The barcode characters are then received by the host computer as if the barcode came from its keyboard decoded and converted to keyboard input within the scanner housing. This makes it extremely easy to interface the bar code reader to any application that is written to accept keyboard input. However, this kind of direct input has some drawbacks. User cannot operate with that data, so in case the user need to parse a code into several parts user will not be able, and the input will appear wherever the cursor was, so user must be sure it is set in the proper place. Figure 2.2 will show the PS/2 port in a detailed view.

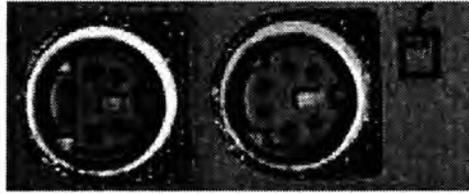


Figure 2.2: PS/2 Port

According to Dahle, J. and Callahan, D. W. (2002), Rational Unified Process (RUP) methodology can be used in analysis and design and eXtreme Programming (XP) technique for construction phase. XP technique has superior advantage in construction phase where unit tests are written to define how the objects under construction should work. Programmers will use this unit tests as a guideline to write code to meet tests' expectation. It is an advantage compared to RUP methodology where both coding and testing phases are separated. The combined approaches enable the developer to identify errors at early stage as the check in process involves data complexities that cannot be compared easily to any other type of project.

Based on Wesley, J.P. (1999), an **authentication factor** is a piece of information used to authenticate or verify a person's identity for security purposes. Table 2.1 summarizes the authentication factors and the descriptions.

Table 2.1: Authentication Factors

Factor	Benefit	Weaknesses	Examples
Something you know : Password	Cheap to implement portable	Can't detect sniffing attack. Password are either easy to guess or hard to remember. Cost of handling passwords.	Password, PIN, Safe combination
Something you have : Token	Hardest to abuse	Expensive. Can be lost or stolen. Risk of hardware failure. Not always portable	Token, Smart card, Secret data embedded in a file

			or device, Mechanical key.
Something you are : Biometric	Easiest to authenticate with portable	Expensive. Replay threats. Privacy risks. Characteristic can't be changed. False rejection of legitimate users. Characteristics can be injured.	Fingerprint, Eye scan, Voice recognition, Photo ID.

According to Longman, D.C. (1999), **client-server** is computing architecture which separates a client from a server, and is almost always implemented over a computer network. Each client or server connected to a network can also be referred to as a node. The most basic type of client-server architecture employs only two types of nodes: clients and servers. This type of architecture is sometimes referred to as *two-tier*. Table 2.2 shows the description of the tiers.

Table 2.2: Description of tiers

Task	Description
User interface and navigation	Labeled Tier 1 in the following graphic, this layer comprises the entire user experience. Not only does this layer provide a graphical interface so that users can interact with the application, input data, and view the results of requests, it also manages the manipulation and formatting of data once the client receives it. In Web applications, the browser performs the tasks of this layer.
Business logic	Tier 2, between the interface and data services layers, is the domain of the distributed application developer. Business logic, which captures the rules that govern application processing, connects the user at one end with the data at the other. The functions that the rules govern closely mimic everyday business tasks, and can be a single task or a series of tasks.
Data services	Shown as Tier 3 in the following graphic, data services are provided

by a structured or unstructured data store, which manages and provides access to the application data. A single application may enlist the services of one or more data stores.

Based on Smarkzy, M.L. (1998), the three-tier architecture isolates each major piece of functionality, so that the presentation is independent of the processing rules and business logic, which in turn is separate from the data. This model requires much more analysis and design up front, but greatly reduces maintenance costs and increases functional flexibility in the long run. The system processing can be centralized in at the middle tier. In larger enterprise level environments, many database servers may be storing information for a variety of application and business requirements. In these environments, the middle tier will easily support each different database server by using shared and reusable rules and models. These rules can be changed from a central location, providing standardization and organization for the corporation. Figure 2.3 illustrates the multi-tier client/server architecture.

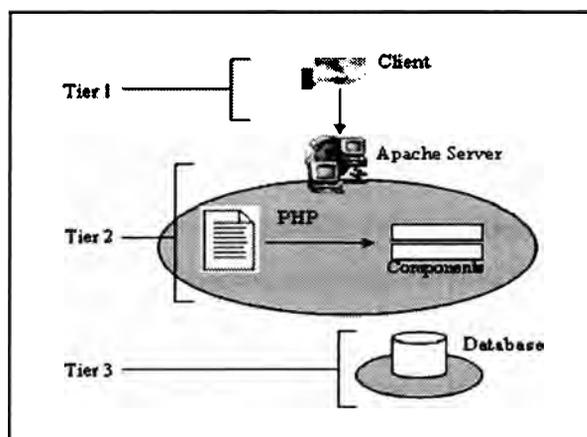


Figure 2.3: Multi-tier Client/Server Architecture

According to Bainbridge, W.S. (2002), human computer interaction (HCI) is an interdisciplinary area of applied research and design practice, which attempts to understand and facilitate the creation of user interfaces. In order to understand the cognitive aspects of this interaction, the HCI field uses the knowledge accumulated

within AI, cognitive science and cognitive psychology. From AI research HCI may use a variety of cognitive models for representing the user, as well as the means to test these modules. Cognitive science offers HCI as knowledge of what users understand and how they understand it. From cognitive psychology HCI uses the knowledge about cognitive processes and structures as well as the method of investigation: an empirical approach to the study of human behavior. These traditional cognitive approaches embedded within HCI methods and techniques however, have a limited impact on design practice.

2.2.1 BIOMETRIC SECURITY PUNCH CARD SYSTEM

BioMetric Security Punch Card System that was developed by Alias, I.A. *et al.* (2005), provides biometric security features in recording the employee's attendance. The system was developed for the usage in the factories and firms that are managing hundreds of employees. The combination between the barcode and thumbprint is the key point in this system and it is referred as the main security concern for the system. The modules that are provided are the attendance management, salary calculation and performance graph. The attendance details are recorded using the thumbprint device and the barcode scanner. The user will scan their employee card which has the barcode printed on it to verify their ID before confirming the identity of the employee through the thumbprint scanning. On completing both processes, the employee's name will be placed on the available list of the system. To check out from the system, the employee will go through the same processes.

The "attendance management" module allows the employer to view the employees' attendance records and search details of the employee salary. The "salary calculation" module enables the admin to compute the salary of a staff. The overtime payment will be carried out in the same module. The "performance graph" module allows the employer to analyze the attendance records through the graphs that were generated by the system.

Figure 2.4 shows the verification interface of the BioMetric Security Punch Card System which is the main interface of the system. According to Alias, I.A. *et al.* (2005), employee will scan their employee card using the barcode scanner and their details will appear on this page together with a prompt that will ask the employee to scan their thumb print to verify the details. On completing that, the time that employee checked in will be recorded.

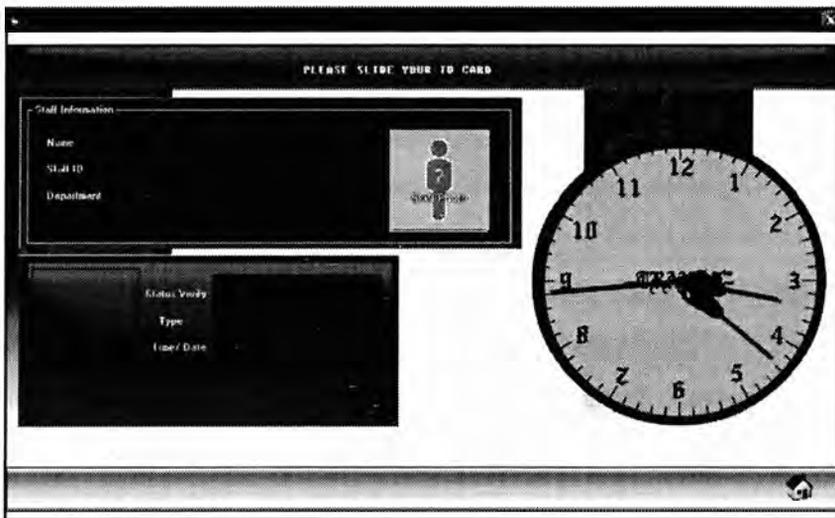


Figure 2.4: Verification interface of BioMetric Security Punch Card System

According to Alias, I.A. *et al.* (2005), a new employee must be registered as the company employee before enabling the employee to use the system. Important details of the new employee will be recorded during this registration process. Figure 2.5 shows the new employee registration interface of the BioMetric Security Punch Card System.

Figure 2.5: New employee registration interface

According to Alias, I.A. *et al.* (2005), BioMetric Security Punch Card System also adapts the usage of the barcode in recording the attendance. The system uses the barcode from the employee's employee card to register before the employee will be able to use the system. The BioMetric Security Punch Card System was developed using the VB.Net platform and the SQL Server 2005 as the database platform.

2.2.2 ATTENDANCE MANAGEMENT SYSTEM

Attendance Management System, which may be accessed through <http://www.windowsattendance.com/> is a system that is used to keep track of any organization's attendance records. It also works very well as a member database. The program was developed with three main goals in mind: versatility, ease of use, and security. Attendance Management System is developed for the clubs and small sized societies. The system does not apply any kind of special devices during the attendance recording process. The attendance will be taken by ticking the checkboxes that are placed next to the member's name. Among the functions that are provided by this system are:

- Module to maintain a running list of members who are absent and present.
- Customizable attendance reports that shows the exact information that is needed.
- Automatically create a list of members who have not met the group's minimum attendance requirements.
- Print professional-looking membership rosters, attendance forms, and attendance reports.

The Attendance Management System features are as follows:

► **Attendance Reports**

- Attendance reports for individuals or the entire organization
- Create lists of members who do not meet your organization's attendance requirements
- Sort by name or number of events attended
- Reports can cover any date range
- Printer-friendly attendance report available
- Filter reports by event types. For example, reports can show weekly meetings, staff meetings, or any combination of event types.
- Detailed view or summary view available

► **Membership Database**

- Store member's name, address, phone number, and email address
- Members may be marked active or inactive
- Optional passwords for each member
- Ability to store up to 1000 members

► **Real Time Attendance Information**

- Print attendance forms in advance and enter the information later
- Attendance data is recorded in real-time

Ability to mark a member excused so that the absence does not count against the member on attendance reports

- Ability to mark members inactive for a leave of absence

▶ **Attendance Forms and Membership Rosters**

- Print attendance forms with all members or only active members
- Print membership rosters with names, addresses, phone numbers, and/or email addresses

▶ **Event Calendar**

- On-screen calendar shows dates of all past events
- Ability to add and edit events and meetings from the calendar
- Past events can also be displayed in a list format

▶ **Support for Multiple Groups**

- Keep track of as many groups as preferred
- For example, schools and churches may keep track of each grade level or class separately

▶ **Security Features**

- All features can be protected by passwords to keep sensitive information private
- Password protection is optional and can be disabled at any time
- If security features are turned on, members will only see their own information

▶ **Export to Spreadsheet or Database Software**

Ability to export all membership data to most spreadsheet and database applications

This allows you to sort, filter, group, and format the information any way you'd like

- Some spreadsheet applications allow printing of envelopes and mailing labels
- Mail merge with Microsoft Word

Figure 2.6 shows the main interface of the Attendance Management System which contains the main functions of the system.

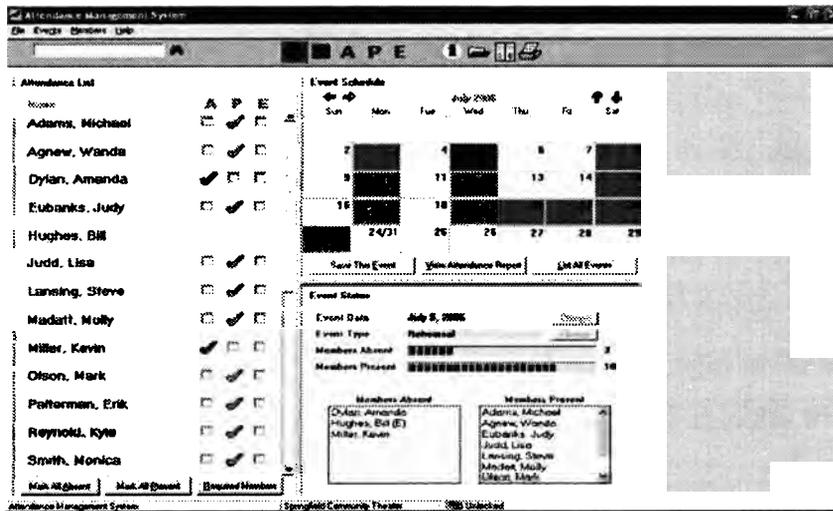


Figure 2.6: Attendance Management System's main interface

The Attendance Management System was developed using the PHP as the server side language and MySQL as the database platform.

2.2.3 STOCK CONTROL AND POINT-OF-SALES SYSTEM

The Stock Control and Point-of-Sales system that was developed by Sahabudin, M.S. (2006), provides barcode scanning features in recording the point of sales for the departmental stores. The users of the system are the store administrator and the cashiers. The barcode scanner is used by the cashiers in scanning the barcode that is printed on the products that are selected by the customers. The store's admin will enter the product details into the system before the products are sold to the customers. The barcode printed on the product will be scanned by the cashier before the price and category of the product

are identified by the system. The details will be printed on a bill which will be issued by the system. The main modules of the system are as the following:

- **Add New Items**

This module is used to add a new product into the system database. To add a new product, user needs to enter the product code which will appear in the barcode format. Later, the other details of the product will be entered. The details will be the product name, quantity, cash price, cash margin, term price, term margin and cost price. The details will be saved into the database if all the details are valid.

- **Update Items**

This module is used to enable the store's admin to update an item's detail. This feature allows the admin to correct or update any false input or data that were saved into the database earlier. On updating the details, admin needs to save those data into the database.

- **View Items**

This module is used by the users to view the items that are available in the store. The items available are listed according to the categories. The categories are books, stationeries and miscellaneous. Through this module, the store's admin will be able to delete any items that are no longer available in the store.

- **POS**

This module is used to identify the point of sales for the departmental store. Through this module, the users will be able to see sales performance for each day. The users will also be able to calculate the sales income and etc.

- **Report**

This module is used to generate the report that will show the details about the daily or monthly sales performance. The report will be generated by the store's admin. The admin will select the details that will be included in the report. At the

same time, the store's admin may also go through the previous report that was stored in the database.

According to Sahabudin, M.S. (2006), the Stock Control and Point-of-Sales system was developed using the PHP as the server side language and MySQL as the database platform.

2.2.4 INTERVIEW

The interview with the IT Department Head of Department, Mr Zaidi b. Yusof was scheduled to get the details about the to-be system. The details gathered during the interview were as follows:

- The system to-be must use the barcode reader to scan the students matrix cards
- Only authorized individuals will be able to view the attendance details
- Students should be able to check in simultaneously

2.2.5 APPSERV INSTALLATION

According to www.appservnetwork.com/, the AppServ program needs to be configured as the following:

- **Preparing package before installation**

Download AppServ program from <http://www.appservnetwork.com/>. User can choose version 2.4.x or 2.5.x. 2.4.x is a Superb stable version work for all user; by the way this version use PHP 4.x because work fine with the old PHP code. 2.5.x is the Rock function. This version provide newest and experimental of Apache, PHP, MySQL.

- **AppServ installation step-by-step**

1. Double Click appserv-win32-x.x.x.exe to install AppServ on the computer.

Figure 2.7 illustrates the AppServ Welcome Screen.



Figure 2.7: AppServ Welcome Screen

2. License Agreement: AppServ distribution under GNU/GPL License. User must read license agreement before installing the program.

Figure 2.8 illustrates the GNU/GPL License Agreement screen.

3. Choose Install Location: AppServ default location is C:AppServ. If user needs to change the destination, user must click Browse button to change the destination for AppServ program and then click Next to go to next step.

Figure 2.9 illustrates the Choose Install location screen.

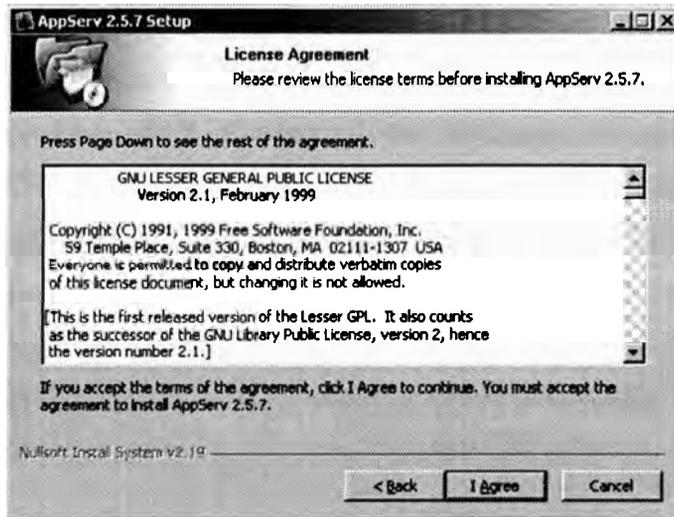


Figure 2.8: GNU/GPL License Agreement screen.

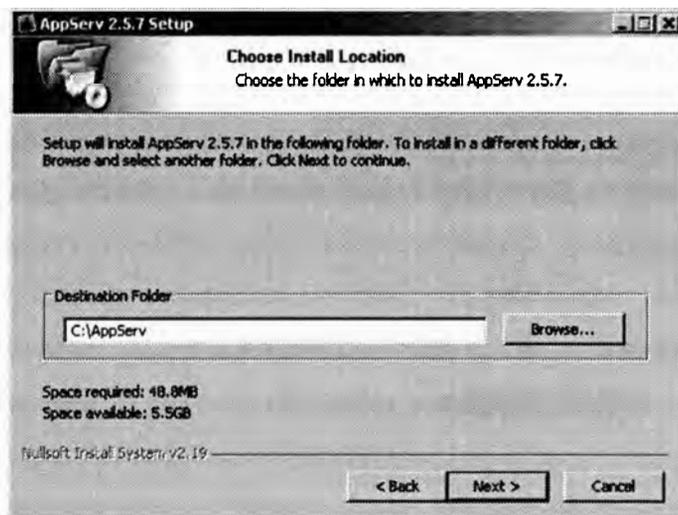


Figure 2.9: Choose Install location screen.

4. Select Components: AppServ default package components are checked all packages. If user needs to choose some package to install, user can click the checkbox.
 - Apache HTTP Server is a Web Server.
 - MySQL Database is a Database Server.

- PHP Hypertext Preprocessor is a PHP Programming processor.
- phpMyAdmin is a MySQL Database control via WWW.
If user completes choosing it click Next to go next step.

Figure 2.10 illustrates the Choose Package Components screen.

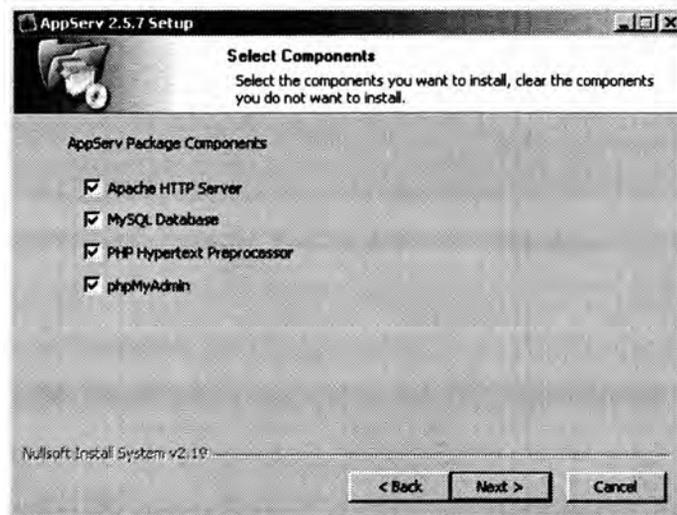


Figure 2.10: Choose Package Components screen.

5. Apache Configuration: This screen is used to specify Apache configurations.
 - Server Name: User must specify Server Name e.g. `http://www.appservnetwork.com/`.
 - Admin Email: User must specify Admin Email e.g. `root@appservnetwork.com`
 - HTTP Port: User must specify HTTP port for Apache Web Server.

Figure 2.11 illustrates the Apache Web Server configuration screen.

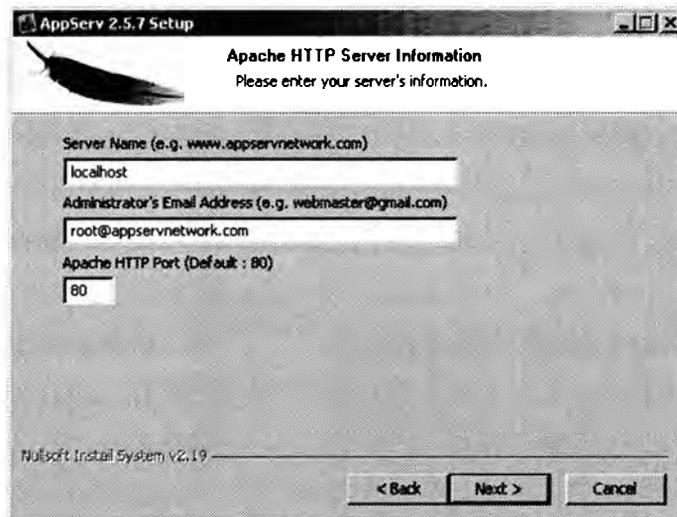


Figure 2.11: Apache Web Server configuration screen

6. MySQL Configuration:

- Root Password: User must enter root password for MySQL Database.
- Character Sets: Specify for data storage language and collations.
- Old Password: User must check this option to avoid error.
- Enable InnoDB: If user is using InnoDB, this option must be checked.

Figure 2.12 illustrates the MySQL Database configuration screen.

7. Complete AppServ setup: Setup asks for start Apache and MySQL immediately. Click Finish to end this setup and AppServ prompt to use.

Figure 2.13 will illustrates the Complete AppServ Setup screen.

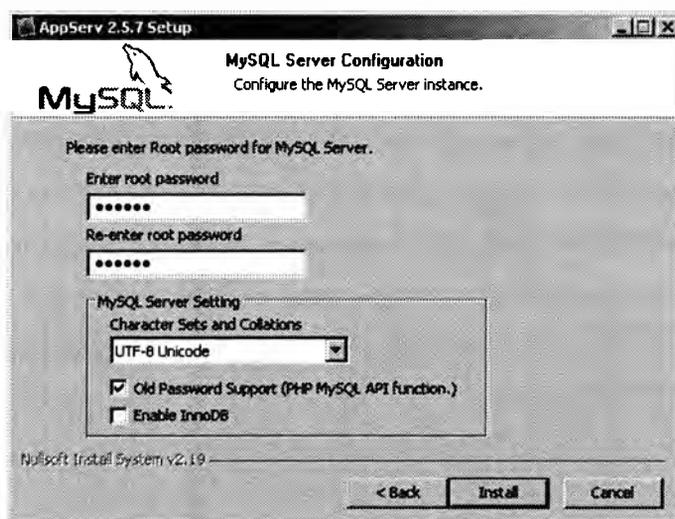


Figure 2.12: MySQL Database configuration screen.



Figure 2.13: Complete AppServ Setup screen.

2.2.6 BARCODE TECHNOLOGY ADVANTAGES

According to Simpsons, B.G. (2000), the use of bar code technology brings a number of valuable advantages. The advantages are listed as the following: