AUTOMATED LAB ATTENDANCE SYSTEM (ALAS) BY USING STUDENT CARD (BARCODE)

RAJA KUMARAN S/O M MURUGAKANDAR

A thesis submitted in fulfillment of the
requirements for the award of the degree of
Bachelor of Computer Science (Computer Systems& Network)

Faculty of Computer Systems & Software Engineering
University College of Engineering and Technology Malaysia

NOVEMBER, 2005

ABSTRACT

Students Attendance system is important to the lecturers to assist them in reading students attendance in the class or lab. Other than that, it will help the lecturers to know the percentages of attendance of the entire student. The main purpose of this system is to help the lecturers to take the students attendance systematically instead of using manual system. The Automated Lab Attendance System (ALAS) is developed based on KUKTEM environment. This system will not only will help the lecturer to take attendance of students but also help the Lab Administrator to control the usage of the lab. This system is developed using Microsoft Visual Basic.NET and Microsoft SQL Server 2000. Generally, this system is expected to be one of the systems that help the Lab Administrator to manage the time of lab usage and systematic computerized attendance system.

ABSTRAK

Catatan kehadiran pelajar ke kelas adalah amat penting bagi membantu pensyarah untuk mengenalpasti jumlah pelajar di dalam sesuatu kelas / makmal pada satu-satu masa. Selain itu, ia juga dapat menentukan samada seseorang pelajar itu lulus atau gagal sesuatu subjek berdasarkan jumlah kredit kedatangannya. Oleh itu, tujuan sistem ini dibangunkan adalah untuk membantu pensyarah mengambil kehadiran pelajar ke kuliah disamping dapat mengatasi kelemahan sistem penggunaan kertas untuk mengambil kedatangan pelajar. Oleh yang demikian, Automated Lab Attendance System (ALAS) ini dibangunkan berdasarkan persekitaran KUKTEM yang amat diperlukan. Ia bukan sahaja dapat membantu pensyarah malah dapat digunakan oleh pengurus makmal untuk mengawasi penggunaan sesebuah makmal bagi sesuatu masa. Sistem ini juga mudah digunakan berdasarkan pembangunannya yang mesra pengguna. Sistem ini terbukti lebih berkesan dan efisyen berbanding dengan cara tradisional yang kurang praktikal. Aplikasi ini telah dibangunkan dengan menggunakan perisian Microsoft Visual Basic.NET dan Microsoft SQL Server 2000. Secara amnya, aplikasi ini akan dijangka menjadi sebuah sistem yang akan memudahkan pengurus makmal untuk mengurus penggunaan masa bagi pengguna makmal selain daripada menjadikan sistem kehadiran yang sedia ada lebih bersistematik dengan penggunaan komputer sistem berbanding kaedah manual.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

LIST OF TERMINOLOGIES

ALAS	-	Automated Lab Attendance System
KUKTEM	-	Kolej Universiti Kejuruteraan & Teknologi Malaysia
UTP	-	Unshielded Twisted Pair
ID	-	Identification
AIDC	-	Auto ID Data Capture
ASCII	-	American Standard Code Information Interchange
USB	-	Universal Serial Bus
HID	-	Human Interface Devices
BC	-	Barcode
IBM	-	International Business Machines
PC	-	Personal Computer
RAM	-	Random Access Memory

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Automated Lab Attendance System *(ALAS)* is a system that designed for labs. This system is an integrated system between information system, student card (Barcode) and auto-locking door system at every lab.

This system is a web-based system which helps the administrator of lab to keep an eye on the lab from unauthorized person to entering the lab. Other than that, this system will help the lecturers to take the students attendance by scanning their student card in the barcode reader before entering the lab.

This *ALAS* will store the database in the server. When students want to enter the lab, they must scan their student card each time they enter and exit from the lab. If their name is listed as a current lab user, the attendance will be marked automatically.

This system will also capture the date and time of the attendance and saved into the database. In the end of the lab, if the lecturer wants to know the attendance, he or she cans easily view and printout from the system.

1.1 Problem Statements

1.1.1 Current System

Currently, anyone who wants to use the lab should scan their student card on the card reader to enter. The student card is a tool for security measure in the lab.

Besides that, the current attendance system is not really systematic for the lecturers and students in KUKTEM. This is because sometimes through the manual attendance system, it is hard to prove about the presence of the students.

1.1.2 The process flow for current system

Currently, in KUKTEM we are not applying the student card to enter the lab or class. So the equipments in the lab are not secure. We are using manual student's attendance system although we have a student card scanning system.

1.1.3 Solution

By using this ALAS system, we can secure the equipments in the lab and from unauthorized person to enter the lab. For the attendance, we implement the computerized attendance system.

The flow of the system is, when the users scan their student card on the barcode reader, the barcode reader will capture the information (Student ID) from the student card. Then, a signal will be sent to the database to verify the information. If the information is valid, the attendance will be stored automatically and an "Authorized

User" message will appear. If the information is invalid, "Unauthorized User" message will appear.

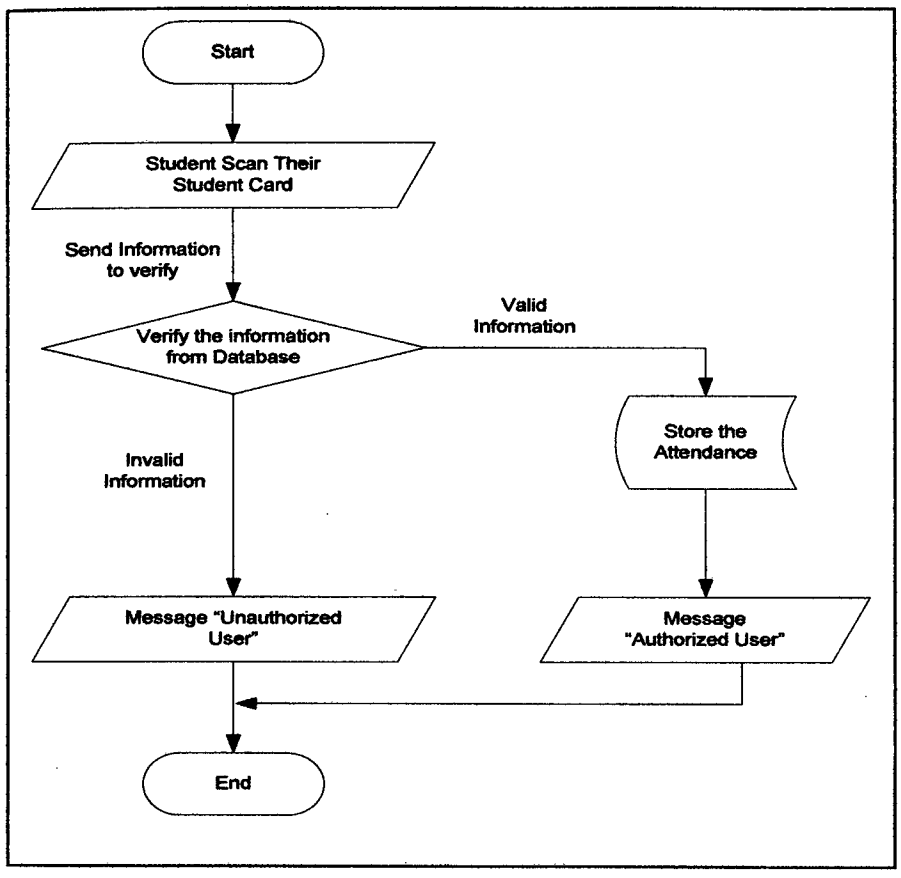

Figure 1: Flow of the Process

1.2 Objectives

There are several objectives that have been recognized in making this project. Below are the objectives of this project:

i. To develop a prototype of an Automated Lab Attendance System.

ii. The system allows admin to setup specific day and time for lab according to the specific time schedule.

iii. The system can produce user account, student list, time table and attendance reports base on the user's requirements.

1.3 Scopes

Below are the project's scopes:

i. This system will use Windows XP Professional (Service Pack II) as a platform.
ii. Database used to store student's information.
iii. Barcode scanner is used to read data from the student card and verify data for current user from the database.
iv. Microsoft Visual Basic.net and Microsoft SQL Server 2000 are used to develop this system.
v. Anybody who hold student card can use the card although he is not the owner of the card.

This system will be separated into four parts. They are admin/server, client, student card (Barcode) and barcode reader. This project is focus on Admin/Server, Student Card (Barcode) and Barcode Scanner. The tasks that we did in every part are shown as below.

i. Admin/Server
ii. Clients
iii. Student Card (Barcode)
iv. Barcode Scanner

1.3.1 Admin/Server

i. Key-in the lab user's information and auto update the time table of the lab.
ii. Store all the data in database.
iii. Print report.
iv. Update data in database.

1.3.2 Clients

i. Edit their profile.
ii. View and print the attendance.
iii. View and print the Lab Time Table.

1.3.3 Student Card (Barcode)

Scan student card (barcode) on the barcode scanner. Then information from student card will be sent to the database for verification.

1.3.4 Barcode Scanner

The Barcode Reader will send signal to verify the user's information whether it is in the database for current time. If the user's information is valid, a message will appear.

CHAPTER 2

LITERATURE REVIEWS

A barcode (also bar code) is a machine-readable representation of information in a visual format on a surface. Originally barcodes store data in the widths and spacings of printed parallel lines, but today they also come in patterns of dots, concentric circles, and hidden in images. Barcodes can be read by optical scanners called barcode readers or scanned from an image by special software. Pearce and Bushnell (1999) stated that, barcodes are widely used to implement Auto ID Data Capture (AIDC) systems that improve the speed and accuracy of computer data entry.

There are two types of the barcode. There are code-39 and code-128. The barcode reader/scanner used to read the data from the barcode. There is several type of the barcode reader/scanner available in the market.

2.1 Barcode

Figure 2.1: Example of Barcode

Palmer (1995) stated that, a Barcode (Figure 2.1) is just a different way of encoding numbers and letters by using a combination of bars and spaces of varying widths. This is just another way of entering data into a computer. A barcode does not contain descriptive data. It is a reference number that a computer uses to look up an associated record that contains descriptive data and other important information.

2.2 Why barcodes used for

Barcodes are used to efficiently and reliably enter data into a system with little or no human interaction, effectively eliminating the human-error element from data entry.

2.3 How Barcode are Read

Barcodes are read by sweeping a small spot of light across the printed bar code symbol. Palmer (1995) stated that, the sweep starts at the white space before the first bar and continues passed the last bar and ends in the white space which follows the last bar. Because a bar code cannot be read if the sweep wanders outside the symbol area, bar heights are chosen to make it easy to keep the sweep within the bar code area. The longer the information to be coded, the longer the bar code.

The words "reader" and "scanner" are often used interchangeable to describe the device which is used to read a bar code. A bar code scanner only designates the optoelectronic part of the device which transforms the optical image of the bar code into electrical signals. Palmer (1995) stated that, a bar code reader, on the other hand, includes the bar code scanner and the decoder which transforms the electrical signal from the scanner into ASCII (American Standard Code for Information Interchange) representations of the data.

2.4 Code-39

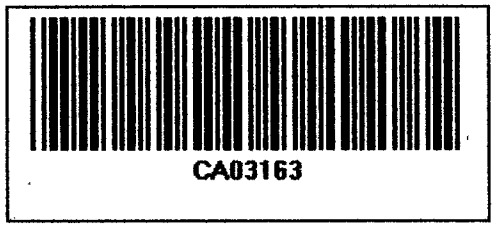

Figure 2.2: Example of Barcode Code-39

Longe (1994) stated that, code 39 (Figure 2.2) was the first alpha-numeric symbol to be developed; today it is the most widely used barcode. Code 39 is a bi-directional, self-checking, discrete, variable-length code. Code 39 can encode numerals 0 through 9, alphabets A through Z and "-.*$%/+{SPACE}".

2.4.1 Benefits

Code 39 is a self-checking symbologies, which means any single print defect cannot lead to misinterpretation of one character into another valid character.

2.4.2 Limitation

Longe (1994) stated that, since Code 39 is a width-encoding symbol, it relies on all narrow bars being of one width and all wide bars being of another and any ink-spread during the printing process can result in an unreadable barcode.

2.5 Code 128

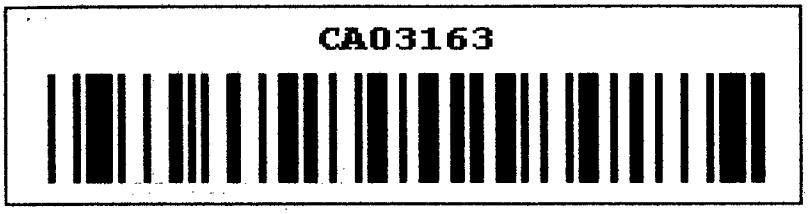

Figure 2.3: Example of Barcode Code-128

Code 128 (Figure 2.3) is a very high-density alpha-numeric symbology. Code 128 is a variable-length code and encodes the full 128 ASCII character set. It is more compact and flexible than Full ASCII Code 39 and Interleaved 2-of-5.

2.5.1 Benefits

Code 128 is one of the most efficient general-purpose barcode. Bushnell and Meyers (1999) states that, code 128 can handle any data and encodes the barcode in a relatively lot smaller space by using various compression techniques.

2.5.2 Limitation

Being a high density barcode, Code 128 cannot be read easily using low resolution scanners.

2.6 Barcode Reader

Barcode reader or barcode scanner is a computer peripheral for reading barcodes. Ralf Jesse and Oliver Rosenbaum (1994) stated that 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.

2.6.1 Active Non-Contact Scanner

Figure 2.4: Example of Active Non-Contact Scanner

Figure 2.4 shows example of Active Non-Contact Scanner. This type is generally uses a beam of focused light to read the bar code. The most common form of active non-contact scanner uses a laser beam that is automatically scanned back and forth across the symbol at a high rate. Active non-contact scanners may be stationary as are found in grocery stores or they may be hand held. Industrial versions of active non-

contact scanners, however, often keep the beam of light fixed on a single spot and are arranged so that the symbol is moved across the field of view of the scanner.

The hand-held laser scanner is an active non-contact type which is very popular for some applications. Ralf Jesse and Oliver Rosenbaum (1994) stated that, the major advantage is that the scanner can read bar code from several feet away. If the symbol is printed large enough, the laser scanner can read the symbol from as far away as 30 feet. In a warehouse this ability can be a definite advantage. But hand-held laser scanners are more expensive than other bar code readers. They also have moving parts which can be sensitive to rough use.

2.6.2 Passive Non-Contact Scanner

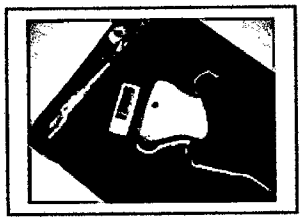

Figure 2.5: Example of Passive Non-Contact Scanner

Figure 2.5 shows example of Passive Non-Contact Scanner. This type of scanner uses a small video camera or photoelectric strip to convert an optical image of the symbol to a video signal which is then decoded. Ralf Jesse and Oliver Rosenbaum (1994) stated that these scanners have a limited depth of field and generally must be held within a few inches of the symbol.

2.7 Type of Barcode Reader Connector

Most barcode readers use a PS/2 wedge cable for output: This cable is connected to the host computer's 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 they came from its keyboard. USB is supported by many newer scanners, in many cases a choice of USB interface types (HID, CDC) are provided.

2.8 Advantages of using Barcode

Barcodes are printed and processed by machines; they are processed much faster than standard human data entry and with a much higher degree of accuracy. Stephen Pearce (1992) stated that, barcodes have the potential of dramatically improving productivity and reliability of nearly all applications.

The error rate for typing is one substitution error in every 300 characters types. In contrast barcodes have error rates less than one in every one million barcodes scanned.