Contents

Abstract

This paper presents an examination automation system that uses barcode system to automate the examination attendance taking procedure. It aims to eliminate the use of examination slips and examination attendance slip in order to improve the efficiency of the attendance taking process while at the same time ensuring the genuineness of the verification process. The system captures the barcode on the students' matric card and registers it into the database to capture the attendance of that particular student for that particular examination. The software system is based on inserting, updating and querying of a database management system. Emphasis is mainly on a real time application, namely tracking and counting of students in the examination halls within a short time. This system aims to reduce the amount of workload borne by the university examination unit and saves time used up to collect and count the examination attendance slip. A barcode system will also significantly reduces human error in the whole process as it is all capture into the computer directly via a barcode scanner.

The methodology used in the development of this system is prototyping due to the fact that this method allows developer to continuously improve and modify the system based on user preference.

The development software used in the development of the prototype is Microsoft Visual Studio 2010.

Chapter 1: Introduction

1.1. Background of study

Universiti Teknologi PETRONAS is an Engineering and Technology higher learning institution. Despite the availability of many advanced technology in campus, the examination attendance system in the university is still conducted the manual way. Every semester, students need to queue up in a hall to collect their examination slip that states the number of course registered and more importantly, their examination identification number.

The purpose of the examination identification number is to protect the confidentiality of the students when the examination scripts are being marked. While the purpose of the examination slip is necessary but the entire process is too much of a hassle. Staff from the examination unit needs to put off two days of work to distribute the examination slip to the students while students need to queue up in to obtain their examination slip.

Besides that, every student needs to fill up an attendance sheet upon sitting for an examination as an evidence of his or her attendance to that particular examination. During the examination, students also need to present the matric card as a proof of the students' identity while the examination slip confirms the examination that the student is sitting for. The attendance sheet is then collected and checked with the master record to confirm students' attendance. When the examination is over the examination attendance slip needs to be stored for later references. The whole procedure is performed by the examination invigilators.

The procedure is practical but it may be very time consuming and difficult to handle when there is a large number of students. Therefore a more efficient way of managing the whole examination procedure needs to be implemented. To automate the examination attendance management system with a barcode system would saves time and eliminate human errors as well.

This system uses the barcode system to eliminate the use of examination slip and examination attendance slip. The system captures the students' identity via

the barcode on the students' matric card to register the students' attendance for that particular examination. The system then checks the student's registration for the particular course in the major database to confirm that the particular student had registered for the examination. An online portal will be prepared for students to check the attendance to the registered examination courses.

This Software Project has been created using the Visual Basic 2010. Using this software we can record attendance of students during the examination with the help of Barcode Device.

The attendance of student can be easily recorded with the help of this software and a separate barcode device, for this purpose we need to trace each barcode and this software will help to record the attendance of that particular student for a particular examination.

The use of barcode system enables the whole process to be performed in a shorter time as the information can be captured within seconds. It is useful when the number of students is huge and it also reduces the manpower needed to invigilate every examination. The usage of barcode system also reduces the possibility of human error as it is fully automated. Handheld barcode scanners are operated in Wireless Local Area Network (WLAN) therefore the system can be used even in huge examination hall.

1.2. Problem Statement

The current final examination management method had been practiced for many years by many institutions across the country. The use of the examination slip is highly overrated not to mention troublesome as students need to collect it a month before the final examination on a particular date regardless of the students' busy schedule. The staffs at the examination unit need to prepare the examination slip days and separate the examination slip according to the Matric

Identification Documents (ID). The whole process is troublesome for both the examination unit and students.

As the examination slip is distributed one month before the final examination, there is a possibility of the examination slip getting lost.

Next, the process of examination attendance taking is time consuming as the examination invigilator needs to walk around the whole examination hall to collect the students' examination slip and verify the students attendance with the list of students registered for that particular course. The whole process takes up a long time especially when there is a large number of students. Besides, this conventional method is also very prone to human error such as miscalculations or the slips getting lost in between examination scripts that causes delay to the whole process.

Storing the examination attendance slip also takes up a lot of spaces in the archives as the slips needs to be kept until the whole examination period is over. If in case any reference is needed, staff from the examination unit needs to go through the whole archive to retrieve the particular examination slip. This process is time consuming and labour intensive.

1.3. Objectives

1.3.1 To intergrade a barcode time attendance system into UTP examination attendance system

1.3.2 To develop an automated examination system that eliminate the hassle of final examination manual attendance verification process

1.3.3 To reduce the workload of the examination unit for distributing examination slip

1.3.4 To simplify the process of attendance verification while ensuring the genuineness of the process

1.3.5 To reduce the possibilities of human error of the attendance taking process during the examination period.

1.3.6 Reduce the amount of paper used for printing examination slips and examination attendance slip.

1.3.7 To fully utilize the function of students matric card.

1.4. Scope of study

1.4.1 To fulfill the research project requirement, there are three main areas that need to be deliberated

1.4.1.1. The database of students and the courses registered

1.4.1.2. A system that uses the barcode scanner to capture the code and match it with the information with the database

1.4.1.3. The web based portal for students to check if their attendance to the particular examination is captured.

1.5. Relevancy of Study

This project is will be used in UTP to eliminate the process of collecting examination slip and filing up the examination attendance slip during the examination time. Upon completion, this project will also increase the efficiency of the examination attendance taking process. The project will also shorten the time needed for any verification and information retrieval regarding students' attendance to the particular examination. It will also reduce the manpower needed to take down the examination attendance in the university which means that lecturers need to put off the task at hand to assist in the final examination invigilation due to lack of manpower.

1.6. Feasibility Study

1.6.1 Technical Feasibility

The system development of a system using Micrsoft Visual Basic 2008 and database management using MySQL is well within the capability of a final year student.

1.6.2 Organisational Feasibility

Users are familiar with web based system and data input- minimal guidance required since the system will minimize the requirement for manual data input process

1.6.3 Economic Feasibility

The examination unit will need to invest in the barcode scanner and laptop as a client computer in the examination hall but it would be worthy in a long run as it is a one-off cost as compared to long term cost needed for printing examination slip and examination attendance slip on top of the space needed to store them.

1.6.4 Timing Feasibility

The scope is not too big and is completed by April 2013

Chapter 2: Literature Review

2.1 The Barcode System

Barcodes are information carrying graphical patterns designed for easy and reliable automatic retrieval. Barcode scanner is a machine that can capture the barcode and store it in a database for future uses. Barcodes and barcode scanners offer a quick and accurate way for examination invigilators to complete the examination tracking system. Most modern barcode scanner operates on WLAN or Bluetooth technology for wireless convenience.

There are many different type of barcodes. Different types of barcodes are used to serve different organisational purposes. (Iksan& Norizan, 2009). Barcodes that comes in lines with different width arranged vertically in a single row are 1- Dimensional barcode while the barcodes that comes in the forms of patterns and squares or hexagon arranged in several roles are called 2- Dimensional matrix code. Two-dimensional symbols have error detection and may include error correction features. (Baharav et.al) Please refer to figure 1.1 and figure 1.2 below for image of sample barcodes.

Barcode scanners are optically or laser devices that read and decode barcodes. They interpret the varying widths of bars and stripes or the matrix

patterns then transmit the data within the barcode. Most scanners can read most barcode symbols.

The process involved in reading the barcode is as follows:

- Illumination system – The sensor of the barcode scanner detects the reflected light from the illumination system and generates an analog signal with varying voltage that represent the intensity (or lack of intensity) of the reflection.
- Converter – The converter transforms the analogue signal to a digital signal, which is fed to the decoder.
- Decoder – The decoder interprets the digital signal, does that mathematic required to confirm and to validate that the barcode is decipherable, converts it into ASCII text, formats the text and sends it to the computer the scanner is attached to.
- Sensor and Converter – A photo detector senses the reflected light and generates an analogue signal with varying voltage. The voltage fluctuates based on whether the sensor sees the reflected light from the white spaces because the black bars absorb the red light. The technology used in the sensor can vary depending on the illumination method. The output is always the same - a voltage waveform with peaks for the white spaces, and troughs for the black spaces in the barcode. (Iksan& Norizan, 2009)

2 2.The Advantages of Using the Barcode System.

Using barcode system instead of conventional method for attendance taking provides greater administrative efficiency. Universities administration handles a huge amount of paperwork and data. The procedures of keeping these papers in order are very troublesome and labour intensive. Using barcode system can significantly reduce their

workload as it automates the whole system and eliminates the paperwork.

As the amount of number of manual labour reduces, the amount of labour cost can also be reduced. (Panos& Freed, 2007). The reduction of labour cost will help the company save cost in a long run and will break even the cost of purchasing the equipment used in implementing this system

Next, Panos and Freed also states that the usage of barcode can significantly reduce the number of human error in and inventory system. The same concept can be applied in an examination system as well, as both system includes capturing data into the database and compare the system.

Similar research had been performed by students from Universiti Malaya but the system had yet been implemented in any higher learning institution in Malaysia to date.

Figure 1.1 One dimensional Barcode

Figure 1.2 Two dimensional Matric code

Figure 1: Types of Barcodes

2.3 Comparison of different automatic identification technology

The technology today has made available several automatic identification technologies namely barcode identification; radio frequency identification (RFID) and biometric identification. Below are the comparison between the benefits and drawbacks of the several automatic identification technologies.

a) **Barcode identification**

Data density: Low
Machine readability: Good
Human readability: Simple
Influence by impurities i.e. dirt or damp: High
Degradation due to wear and tear: Limited
Purchasing cost: Low
Operating cost: Low
Unauthorized modification possibility: Slight
Reading speed: Less than 4 seconds

Maximum distance between data and reader: 0-50 cm

b) Radio Frequency Identification (RFID)

Data density: Very High

Machine readability: Good

Human readability: Impossible

Influence by impurities i.e. dirt or damp: No influence on readability

Degradation due to wear and tear: No influence on readability

Purchasing cost: Medium but higher than barcode system

Operating cost: Low

Unauthorized modification possibility: Impossible

Reading speed: Less than 0.5 seconds

Maximum distance between data and reader: 0-5 m (using microwave)

c) Biometric Identification

Data density: High

Machine readability: Good

Human readability: Difficult

Influence by impurities i.e. dirt or damp: No influence on readability

Degradation due to wear and tear: No influence on readability

Purchasing cost: Very High

Operating cost: Low

Unauthorized modification possibility: Impossible

Reading speed: Less than 5 seconds

Maximum distance between data and reader: Direct contact

Based on the comparison of several technologies, it is possible to look use different form of automatic identification technology instead of barcode system to enhance security and speed. As the development of this system is using a prototyping system, the initial prototype will use the barcode system and if the

target users require, a different form of automatic identification technology will be implemented.

2.4 Using biometrics as a time attendance system

Fingerprints are the oldest form of biometric identification. Modern fingerprint based identification is used in forensic Science, and in biometric systems such as civilian identification devices. Human beings have been using fingerprints for recognition purposes for a very long time, because of the simplicity and accuracy of fingerprints. Fingerprint identification is based on two factors:

a) Persistence: the basic characteristics and features do not change with the time
b) Individuality: fingerprint of every person in this world is unique

Biometric systems are basically used for one of the two objectives which are identification or verification. Identification means to find a match between the query biometric sample and the one that is already been stored in database. The fingerprints scanning system works by generating a new template when the prints are scanned and compare it with the ones stored in the database. If the match is found then the identification is confirmed.

Some of the most commonly used biometric systems are

a) Iris recognition
b) Facial recognition
c) Fingerprint identification
d) Voice identification

In comparison, fingerprint scanning system will generally be the recommended option if the traditional attendance system were to be replaced. However due to time constraint, this project will first develop the prototype using a barcode system and prepare a framework for the future development using biometric scanning system. The development of a time attendance system using fingerprint identification will require the

administrator to first obtain fingerprints sample of all students to be stored in the database as opposed to the barcode on the matric ID which are already available when the matric ID is issued.

2.5 Comparison of several time attendance system

a) Onyx Collector

Onyx Collector is a medium for producing single and cumulative missed attendance reports, for analysing data with third party tools or for exporting to third party systems. The system is designed to aid student retention through the early identification of course disengagement, and to assist with the institution's obligations under the UK Borders Agency Regulations. Student attendance is recorded automatically, rapidly and accurately by presentation of their existing ID card at lectures and other student engagements using fixed and/or portable scanners. This builds a picture of engagement that can identify any students with difficulties while there is still time to act. The system can also be utilised to record other key events like examination attendance or coursework submission to ensure that courses are completed. The system can also provide the proof of attendance required by Student Finance systems and by compulsory attendance courses. Student identification card scanning is a rapid and reliable approach that eliminates the human error that is inevitable with manual recording techniques. Onyx Collector operates with fixed and/or portable scanners and is compatible with nearly all existing card formats

b) PET Group of companies e-attendance tracking system

The PET Group e-attendance system is designed to allow companies and supervisors to track employees electronically online via the web browser. The

advantage of an online e-Attendance system is that as a web-based paperless easy-to-use system, automating employee's attendance and punctuality tracking just by checking the system from the authorised superiors' office. The advantages of the system are the ability to support unlimited roster, real time monitoring of employees and personnel. Superiors can also gain immediate visibility of employees update irrespective time or location. This system also allows employers ensure the genuineness of the overtime claims.

c) Wasptime Time attendance system

Wasptime is a commercialised time attendance system that uses many different type of automatic identification technology to suit the industry needs include barcode system, fingerprint log in (biometric), radio frequency identification (RFID) and also the conventional punch cards. It is designed to suit the business industry needs and are available in Standard, Pro and Enterprise edition depending on the scale of the business.

Chapter 3: Methodology

3.1 RAD methodology

RAD methodology, or Rapid Application Development methodology, is a new system development methodology that emerged in the 1990s. This methodology helps adjust the SDLC phase so that it could get some parts of the system quickly to be delivered to customers. By this, customers can understand the application and suggest revisions to help improve system's functionality.

3.2 Prototyping-based methodology

The type of methodologies following the RAD concept used in this project is prototyping. A prototyping-based methodology will perform the analysis, design and implementation phase concurrently. All these three phases are performed concurrently until the system is completed. Users will be provided with the system very quickly to interact with and will involve in the development of the system development process. The usage of prototyping methodology also allows the user to sample the framework of the final product and allows the developer to alter the product accordingly shall there be any dissatisfaction.

The core elements in the prototyping-based methodology are displayed in the following diagram:

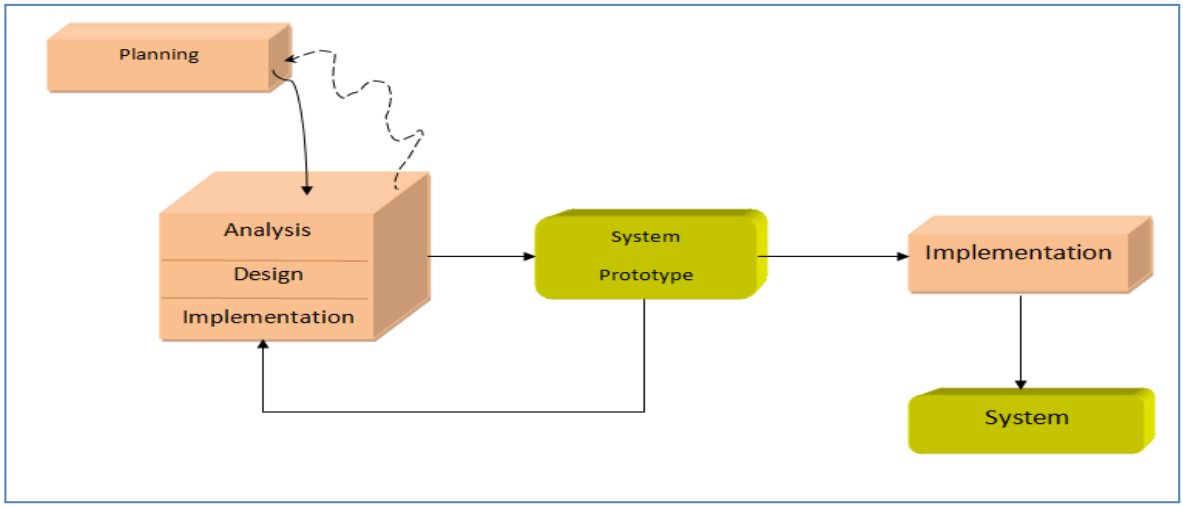

Figure 2 The prototyping-based methodology

Planning: This phase serves the purpose of understanding the reason for this application should be built. In this phase, problem statement for the project should be clearly understood. The purpose for building this system needs mentioning, too. Also, the feasibility analysis needs conducting to examine the key aspects of the project.

Analysis: In this stage, the developer will carry on research about current systems (literature review) and gather requirement through interviews or questionnaires.

Design: Design phase will decide how the system will operate in the future. Thus, it requires the availability the application framework and application interface as the deliverables for this phase.

Implementation: This is the final stage in SDLC, in which the system is actually built.

Since prototyping-based methodology is used in this project, the prototype will be given to users to ask for their feedbacks. System will gradually be completed based on users' recommendation.

Once the system is successfully built, User Acceptance Testing will be performed. Thus, a UAT result and a summary assessment are required at the end of the process.

3.3 Tools and Software involved

3.3.1 Software

3.3.1.1 Microsoft Visual Basic 2010

Microsoft Visual Basic (VB) 2010 will be used as the main Integrated Development Environment (IDE) in this project. It will be used to develop the system and connect the database to the whole system that works with the barcode scanner.

3.3.1.2 Microsoft Access 2010

Microsoft Access 2010 will be used to store databases of students information and examination courses used in the system. This system prototype is developed using Microsoft Access to create a mock database for the system. When the system is implemented, MySQL will be used to store the database as it can host a larger amount of data. MySQL is one of the world's most popular open source databases because of its high performance, high reliability and ease of use. It is being used by many of the world's largest organization to develop and maintain their systems. Also, MySQL can run on multiple platforms like Linux, Windows, Mac OS, Solaris, thus we can flexibly use it in our system.

3.3.2 Hardware

3.3.2.1 A laptop computer

The computer needs to have a minimum of 3.5Ghz processor that supports both MySQL and Microsoft Visual Basic 2010.

Computer/ Processor	Minimum 1.0 GHz Processor

Memory	Minimum 512 MB RAM
Hard Disk	Minimum 1.3 GB Hard Disk Space
Drive	CD-ROM or DVD drive
Display	VGA or Higher resolution monitor
Keyboard	Required

3.3.2.2 A simple barcode scanner

This project needs a simple barcode scanner that is able to capture and store one dimensional barcode.

3.4 Project activities

3.4.1 Data Collection

There are two types of data, which are primary data and secondary data. Primary data refers to the data gathered based on our own objective and designed by the developer. The primary data will serve for developer's own purpose of research. Secondary data, on the other hand, is the data which already exists. This data is collected by others. These data is extracted for reference and research purposes such as literature review.

Primary data:

A semi- structured interview will be carried on to understand users' requirements. In the interview, both closed-ended questions and open-ended questions are used to gather information from users. Closed-ended will give a specific answer from users but could not explain the way the answer is. Thus, open-ended questions are needed to help gather richer information. Interview will be conducted with staff from examination unit to understand their need on the project. A survey will also be conducted on students to obtain their view on the matter of replacing the use of papers with a barcode system for examination attendance purpose.

Secondary data:

Information gathered from the research conducting about related projects. The research is performed in articles, scientific journals and other relevant papers both on internet and in the university library.

3.4.2 System development

The development of the system will begin after the sufficient data collection is conducted. The developer will begin to prepare the framework of the system to prepare a prototype to perform be presented to the user and once it is accepted the whole system will be developed.

Task No.	Task Name	Status
1.	Identify a topic area and define title	Completed
2.	Discuss with supervisor on the next step	Completed
3.	Prepare for literature view, background studies,	Completed

	objectives, and methodology	
4.	Create work plan and Gantt Chart	Completed
5.	Analyse as-is process and define to-be process	Completed
6.	Gather requirements and data necessary for the analysis	Completed
7.	Finalize the functions (system specification)	Completed
8.	Create functional, structural and behavioral models	Completed
9.	Develop Design Strategy	Completed
10.	Architecture and Interface Design	Completed
11.	Program Design	Completed
12.	Development of the system	Completed
13.	Testing	Completed
14.	Provide Feedback to and fro Users and Modify requirement if any	Completed
15.	System Implementation and Documentation	Completed

Table 1 Project Activities

3.5 Key Milestone

In the scope of Final Year Project 2, the key milestones for this Project are presented in the following diagram:

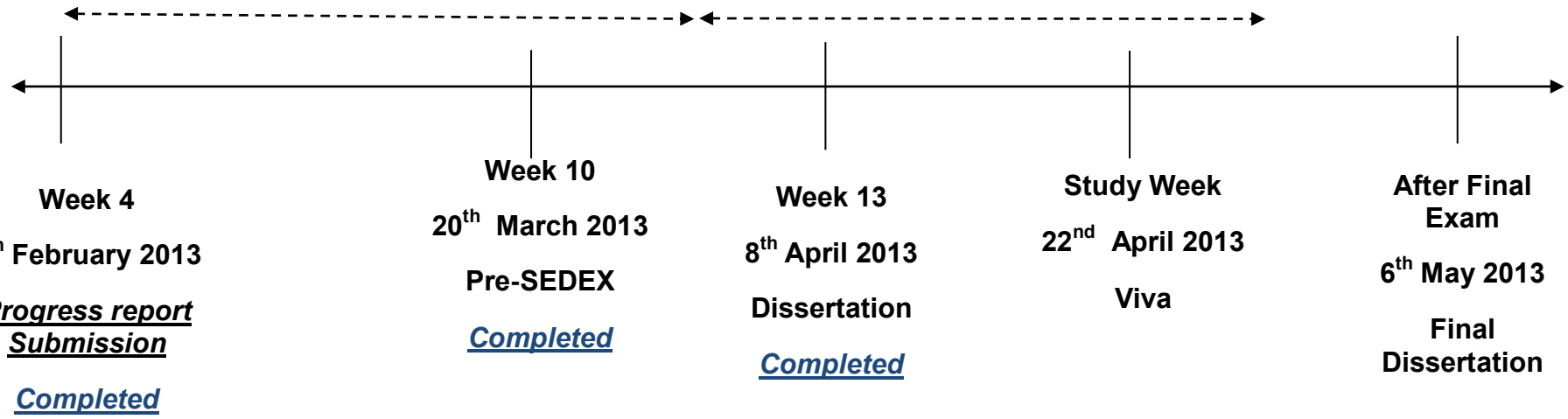

Figure 3 Key milestones of the project

The main activities performed in the Final Year Project 1 understand users' needs, conducting research, gathering users' data and preparing the tools and devices involved. These activities will ensure the project can properly developed and meet the users' requirement in Final Year Project 2 afterwards.

3.6 Gantt Chart

		Week																											
No	Project Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Planning Phase																													
1	Identify a topic area and define title																												
2	Project Title Approval																												
3	Submission of Project Proposal																												
Analysis Phase																													
4	Methodology Analysis																												
5	Literature Review and Information/ Data Gathering																												
6	Results and Analysis																												
7	Requirement Gathering																												
Design Phase																													
8	System Design																												
9	Architecture and Interface Design																												
10	Program Design																												
Implementation Phase																													
11	System Construction																												
12	Instalation																												
13	Testing and Collection of User Feedback																												
Report and Presentation																													
14	Support Plan and Documentation																												

Figure 4 Gantt Chart

CHAPTER 4: RESULTS AND DISCUSSION

1. DATA GATHERING & ANALYSIS

In this project, we have been using a simple method of data gathering which is questionnaire distribution and collection

Questionnaire distribution was carried out online by using Google Spreadsheet. So far there are 100 responses of undergraduate students from various departments in Universiti Teknologi Petronas (UTP) have responded. The result of the survey would be modelled in the following pie charts:

As predicted, figure 5 shows that 100% of the respondents responded that they need to collect their examination slip prior examination period and fill in examination attendance slip during every examination session.

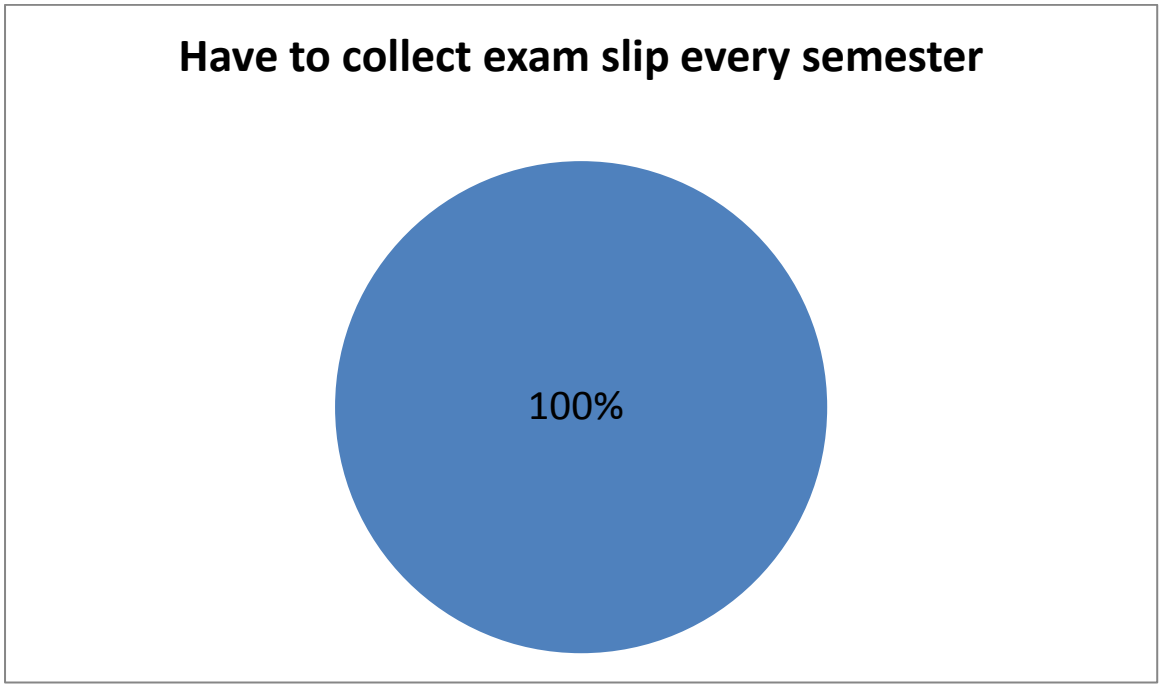

Figure 5 Students need to collect Examination Slip prior Final Examination Period

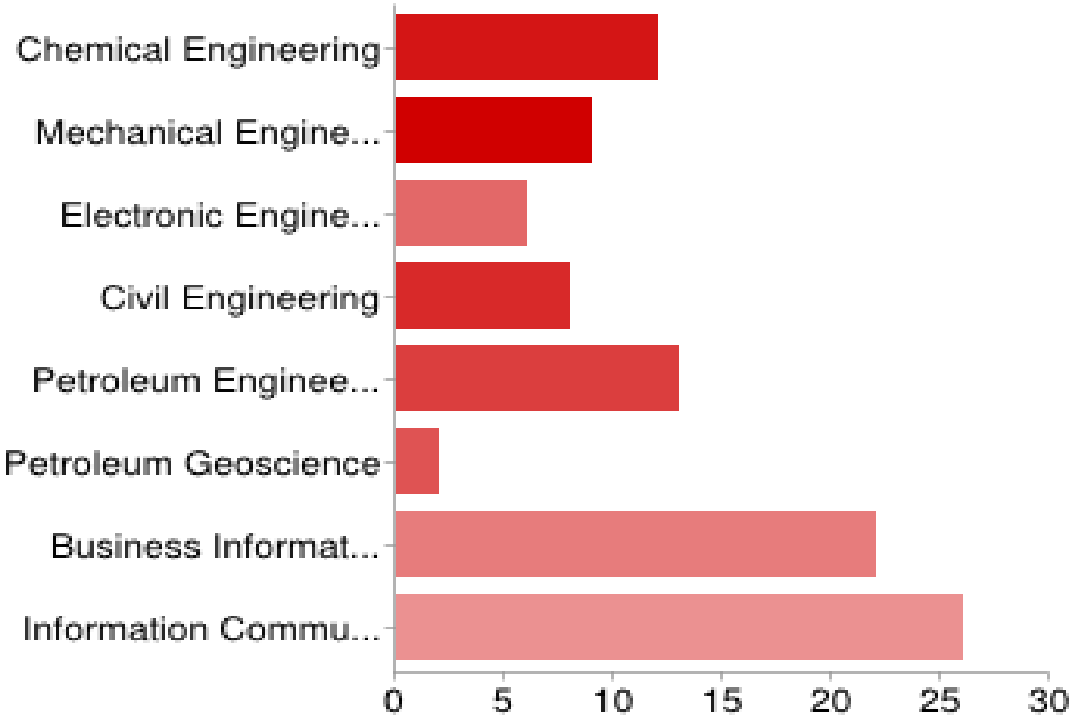

Figure 6 Distribution of respondents within all departments in UTP

Figure 6 above shows the distribution of respondents within all departments of UTP to show that the survey done is fair among all students. Information collected take into consideration of students from all departments and not limited to the Computer Information System department only.

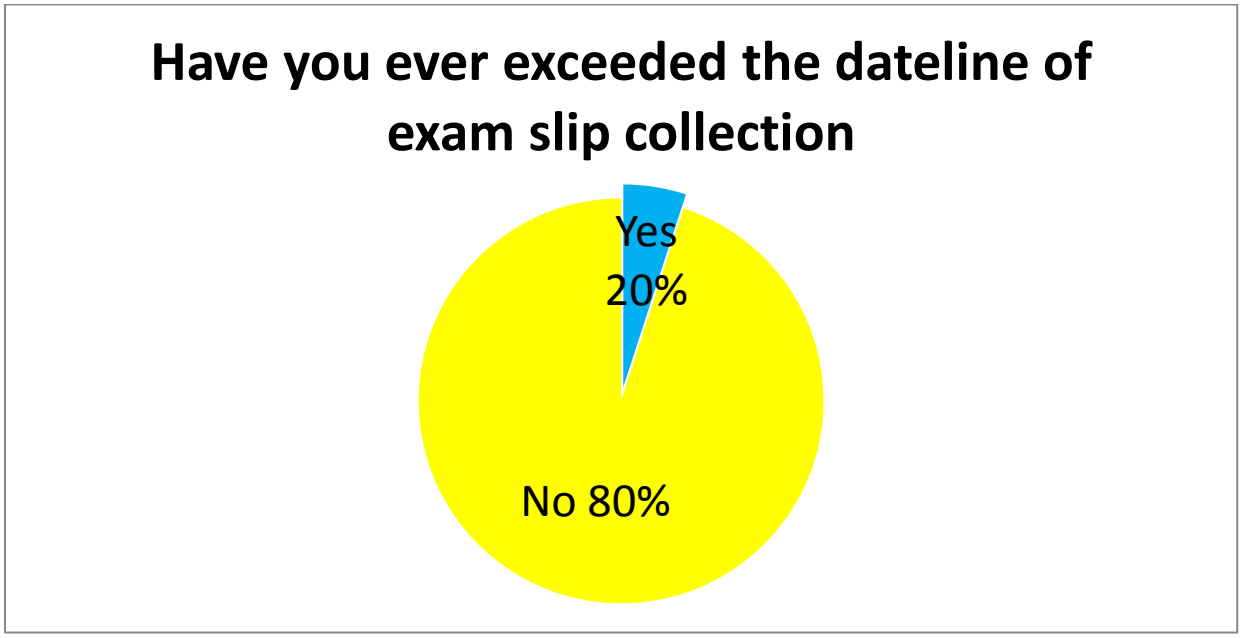

Figure 7 Students that have exceeded dateline of examination slip collection

Figure 7 shows that 20% of students have exceeded the dateline of collecting the examination slip due to hectic campus schedule and resulted in a RM 5.00 fine from the examination unit. 20% spread among students shows a significant percentage as the distribution are spread among all departments. As the campus are striving towards a reseach based university, students are often involved in research and competition conducted outside of the campus, therefore there might be chances for students missing the schedule of the examination slip collection date.

Scale of hassle in students' opinion

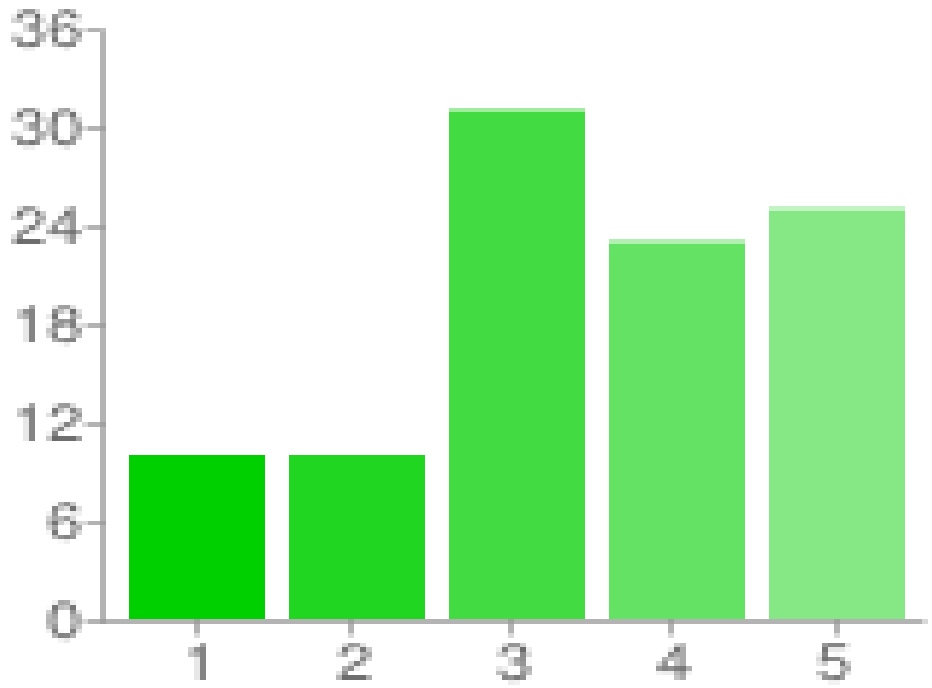

Figure 8 On a scale of 1-5, how troublesome does student find the process of collecting examination slip. (1- least troublesome to 5- Very Troublesome)

It is no surprise that many students find the hassle of collecting examination slip ranging from tolerable to very troublesome as the location of distribution of examination slip is located in the multipurpose hall which is located quite far from the students' hostel and the academic building.

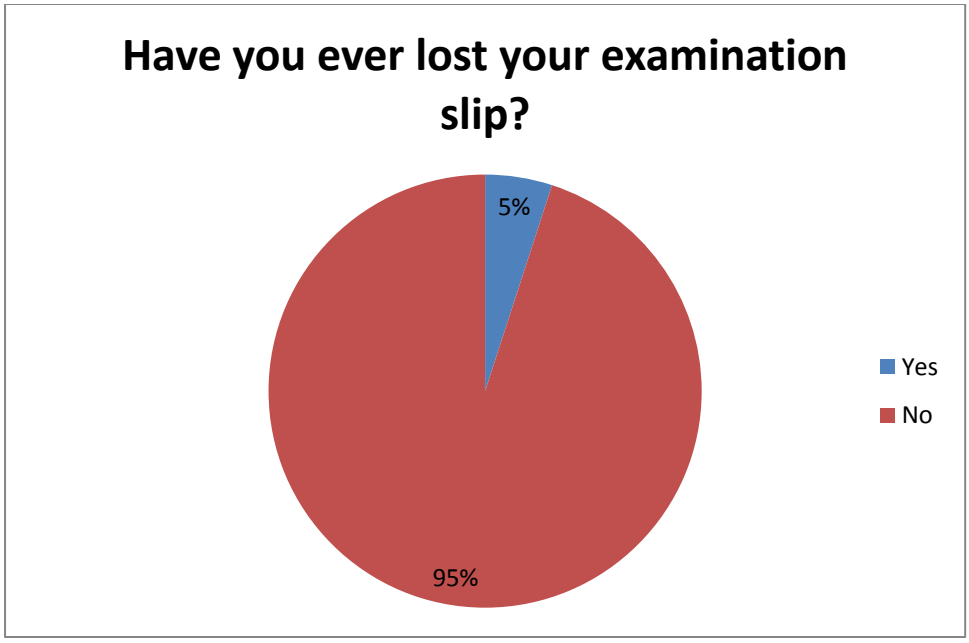

Figure 9 Students who have lost their examination slip

Figure above shows that 27% of students have actually lost their examination slip before. This is because the slip is lightweight and it is collected 1 month prior to the examination period. There is a high possibilities of the examination slip being lost in the midst of the loads of students paper works of the semester as the campus is yet to implement any paperless system be it academic or administration.

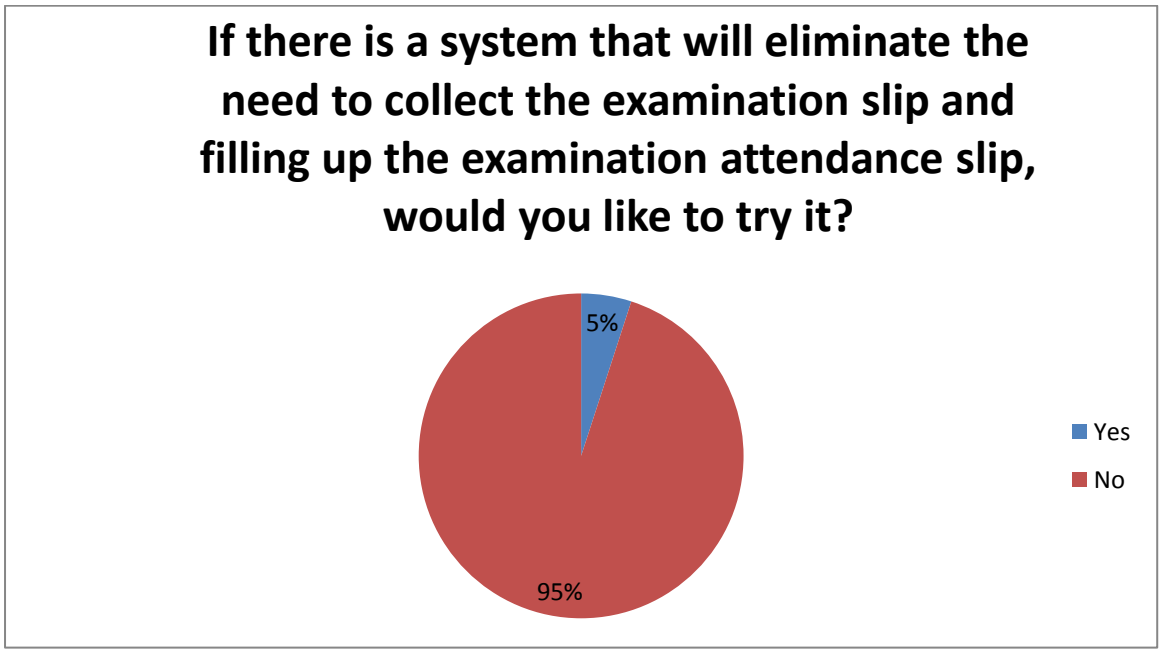

Figure 10 Students acceptance towards the idea of a new system

Figure10 shows that 95% of the students are receptive towards the idea of a new system that is able to substitute the conventional examination slip system. This is a positive response towards the system implementation as students are willing to try provided that the examination unit is also receptive towards the idea as the consultation is still pending.

Apart from that, students also provided comments on the project as follows(Directly quoted from students' responses):

- It's better for UTP to put exam slip ID into student ID rather than manually to keep physical paper.
- If this system reduces the need to carry alot of documents and keep them in hand, then this is a good system. Carrying Paper examination slip is not reliable, such as it being a paper, it can be torn or misplaced etc. So this is a good approach!
- Exam unit should use student ID as examination ID so then students do not get confuse. And they should maximise the use of student ID as the examination slip.
- Try to focus more on its architecture to ease students and management.Think of thousands of students are having examination at one venue.
- Make matric card of higher quality please now that the card should be of high importance.

2. Use Case Diagram

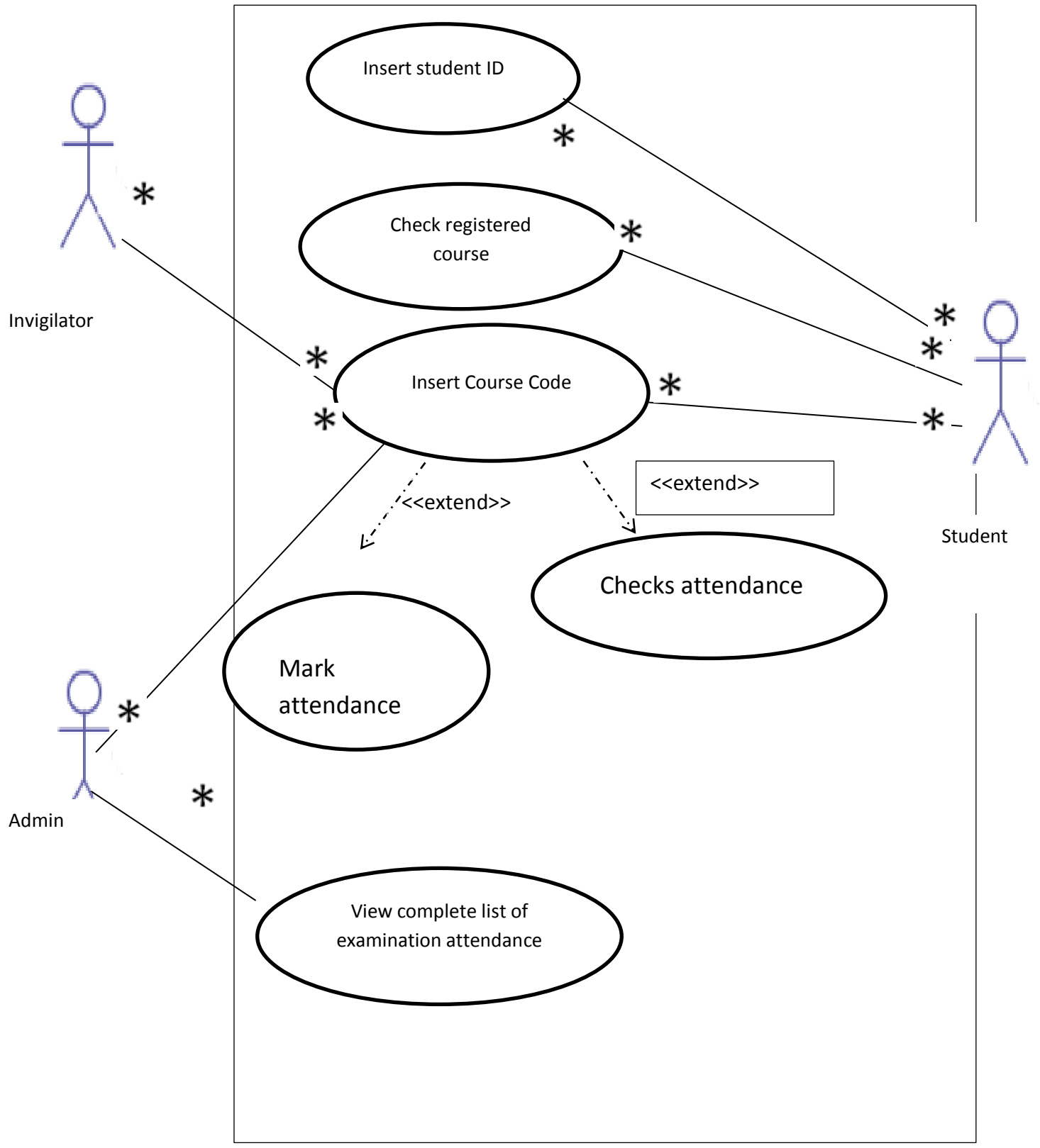

Figure 11 Use Case Diagram

3. System Architecture

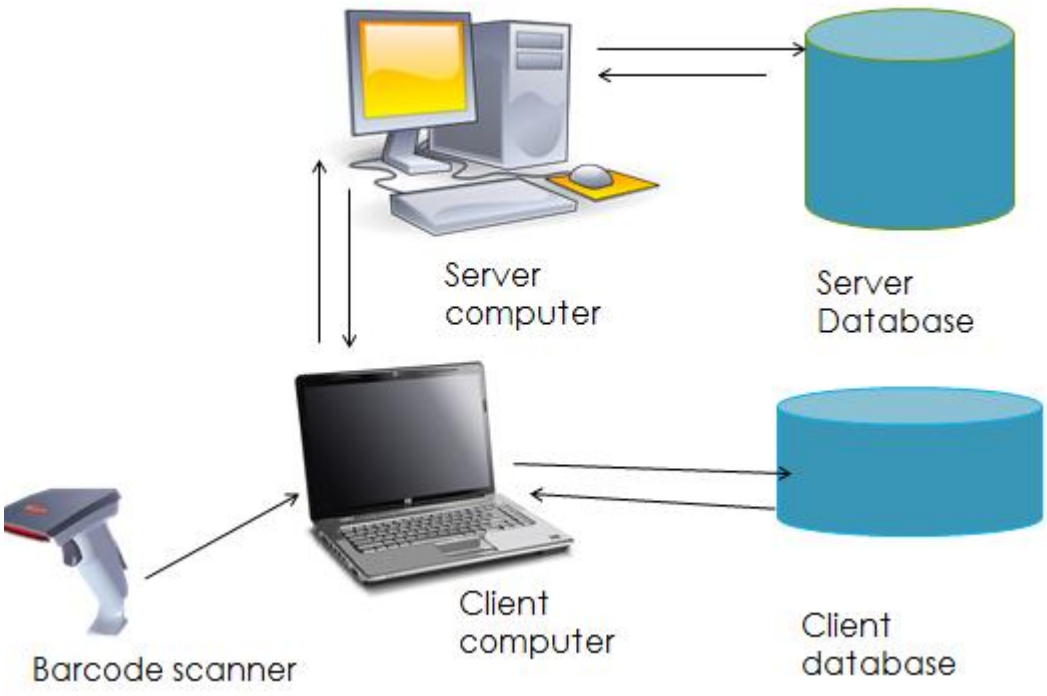

Figure 12: System Architecture.

In the system architecture above, it is shown that the barcode scanner is connected to the client computer. These two items will be placed in the examination hall to collect students attendance during the examination session. The scanner used here is a handheld portable scanner, therefore the invigilator will need to walk around the examination hall to scan the students matric id. The client computer will download students information for the particular examination commencing during that session and store the data in the client database. Once the students attendance is captured, it will be matched with the information from the client database for the verification process. After all the verification is done, the information in the client database will be sent to the server computer and stored in the server database for long term storage purposes and all the data in the client database will be wiped out for security purposes. A web based portal will be created for students to check that their attendance had been collected and captured.

4. Interface Design

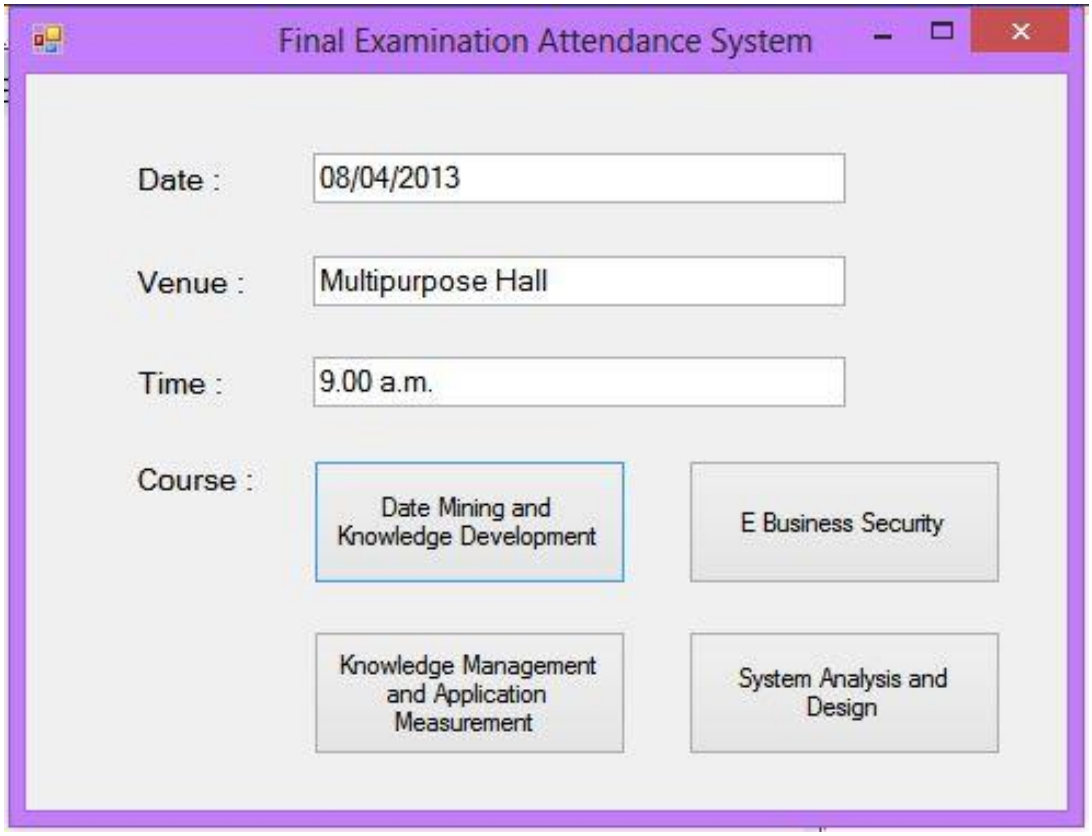

Figure 13 Main window

The above figure shows the main window of the system. From this window user can see that the date and venue of that particular day of examination is displayed along with the courses held on the examination on that particular day. Once that particular course is selected, the following window shows.

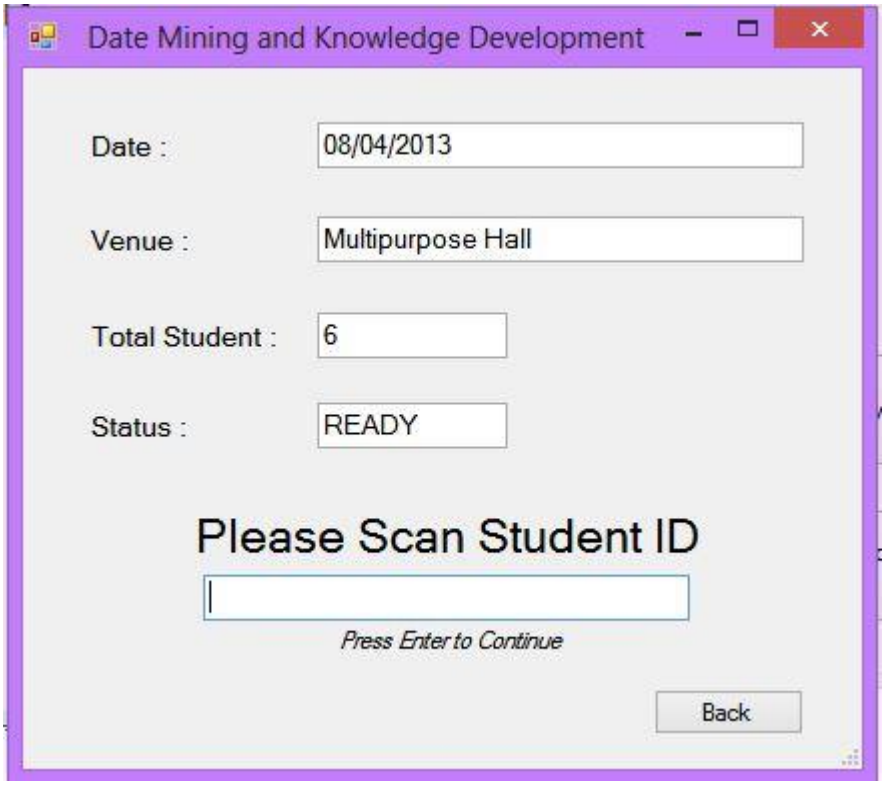

Figure 14 Secondary window

The above image shows that the system is ready for input, thus a barcode scanner is used to scan the barcode of the student matric ID for input.

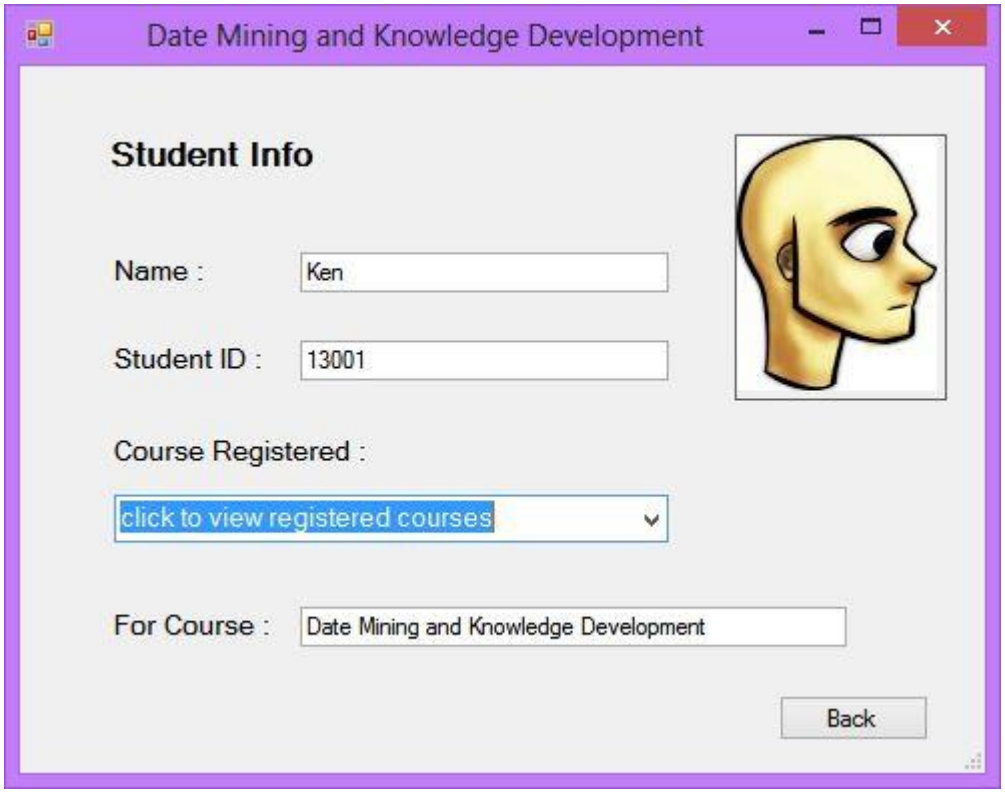

Figure 15Student Information

The above image shows information of the particular student for verfication by lecturer to prevent fraud.

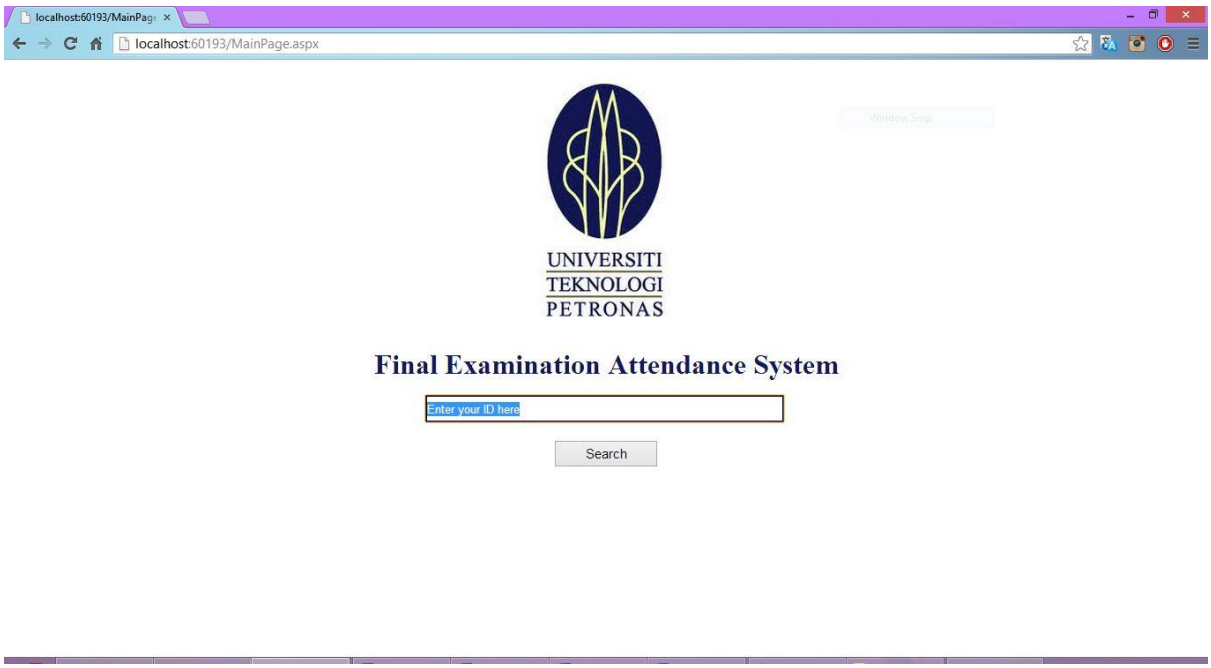

Figure 16: The web portal

The above web portal is designed for the student to keep track of the examination attendance instead of the previous examination attendance slip.

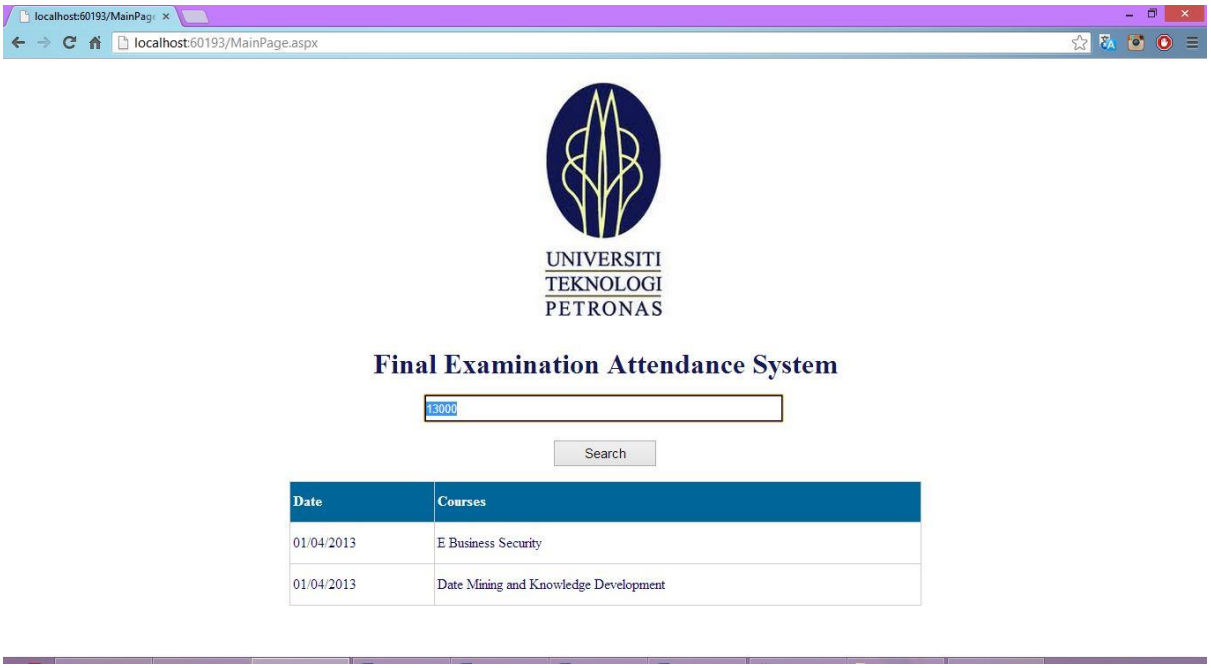

Figure 17: The above image shows the attendance recorded for the particular student.

CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

According to the results from data gathering, we can conclude that the project is strongly supported by target users – students. Hence, it should be implemented as soon as possible. Moreover, analysis and designing should be continuously revised as the project goes on in order to save more time for the development.

I sincerely hope that those concerned will find this project useful for the Attendance Recording (with Hardware Interaction) during the final examination, and will provide ease at the all end namely students, invigilator and also the staff at the Examination Unit.

Success of this project has motivated us to learn and apply more of the computer knowledge to develop new computer applications, even better and useful; Suggestions are always welcome to make this effort more useful.

5.2 Future Work Continuation

The development of the prototype should be started latest by January 2013. At the same time, data gathering will also be conducted and reviewed from time to time to ensure that all requirements are met.

Certainly, the examination automation system should be able to serve its main objective is to assist simplifying the examination attendance taking process and while ensuring the genuineness of the students information

Besides, there was a suggestion from Dr. Dominic and Dr. Baharum that alternative method of automatic identification should also be considered instead of focusing on barcode system. On top of that, Dr. Baharum also suggested that students picture should also be retrieved from the server database to ensure there is no falsifying of students identity during the examination session.

Besides that, there is also suggestion that an Android based system should be created to replace the need for barcode scanner and the client computer. The

Android system will use the barcode scanner on a smartphone to act as both the scanner and the client computer.
Last but not least, having student web based portal on mobile platform is obviously more attractive to user. Thus, porting to mobile is also included in our ‘wish list’ to be considered in the future after the development of the main system is completed.

This project can be improvised in many ways to ease up the process of the examination attendance taking system especially in this particular university where many information system and technology elites reside.

Reference

[1] Mohd Ikhsan Moksin, Norizan Mohd Yasin. (2009). Web-based Query Builder. *International Journal on Computer Science and Engineering* , 552-556.

[2]Michele Angelaccio, T. C. (1990). Query by diagram: A fully visual query system . *Journal of Visual Languages & Computing* , 255-273.

[3]L. Cinque, S. L. (1991). An expert visual query system. *Journal of Visual Languages & Computing* , 101-113.

[4]Ilker, S. (2001). Implementation of Data Flow Query Language.

[5](n.d.). Retrieved June 17, 2012, from Active Query Builder: http://www.activequerybuilder.com

[6]Alan Dennis, B. H. (2005). *System Analysis and Design with UML Version 2.0.* John Wiley&Son,Inc. .

[7] Gordon B. Davis, Margrethe H. Olson, "Management Information System", 2nd Ed., New Delhi, Tata McGraw-Hill Publishing Company Ltd.

[8] James A. O'Brien, "Management Information System", 5th Ed., New Delhi, Tata McGraw-Hill Publishing Company Ltd.

[9] Craig Utley, "A Programmer's introduction to Visual Basic.NET", Indianapolis, IN 46290 USA, Sams Publication.

[10]"SQL", Tata McGraw Hill Publication, 7 West Patel Nagar, New Delhi, India

Appendix

Questionnaires

Are you an undergraduate student?

- Yes
- No

Do you need to get an examination slip every semester prior to the final examination period?

- Yes
- No

Which course are you taking?

- Chemical Engineering
- Mechanical Engineering
- Electronic Engineering
- Civil Engineering
- Petroleum Engineering
- Petroleum Geoscience
- Business Information System
- Information Communication Technology

Have you ever exceeded the dateline of collecting the examination slip?

- Yes
- No

On a scale from 1 to 5, how troublesome do you find the process? (1- least troublesome, 5 - very troublesome)

1	2	3	4	5

Have you ever confused your examination ID with your matric ID?

- Yes
- No

Have you ever forgotten to bring/lost your examination slip?

- Yes
- No

If there is a system that will eliminate the need to collect the examination slip and filling up the examination attendance slip, would you like to try it?

- Yes
- No

The system will use a bar-code scanner to scan the bar-code on your matric card to take down your attendance during the final examination, do you think it will be more efficient than the manual method?

- Yes
- No

Feel free to leave your comments in the box below