ACADEMIC ACHIEVEMENT REPORT AND ANALYSIS SOFTWARE

TAN CHEE SEONG

This report is submitted in partial fulfilment of the requirements for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honours

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2010
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : ACADEMIC ACHIEVEMENT REPORT AND ANALYSIS SOFTWARE
Sesi Pengajian : 2009/2010

Saya Tan Chee Seong
mengaku membentuk Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-
syarat kegunaan seperti berikut:
1. Laporan adalah hak milik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi
pengajian tinggi.
4. Sila tandakan ( √ ) :

☐ SULIT*

(Mengandungi maklumat yang berdjarah keselamatan atau
kepentingan Malaysia seperti yang termaktub dalam AKTA
RAHISA RASMI 1972)

☐ TERHAD*

(Mengandungi maklumat terhad yang telah ditentukan oleh
organisasi/badan di mana penyelidikan dijalankan)

☑ TIDAK TERHAD

Disahkan oleh:

(TANDATANGAN PENULIS)

(COP DAN TANDATANGAN PENYELIA)

Alamat Tetap:

27, LORONG MESA 3, TAMAN CHIJUNGHUAI,
42900, KLANG, SELANGOR.

Tarikh: 26/4/2010

(TANDATANGAN Penyelia)

(TARIH: 26/4/2010)

© Universiti Teknikal Malaysia Melaka
"I hereby declare that this report is the result of my own work except for quotes as cited in the references"

Signature: ........................
Author:  Tan Chee Seong
Date: ........................
"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of scope and quality for the award of Bachelor of Electronic Engineering (Computer Engineering) with Honours"

Signature: [Signature]
Supervisor’s Name: Mr. Sani Irwan B Md. Salim
Date: 01/01/2010
Special dedicated to my beloved parents, family, lecturers and fellow friends, who had strongly encouraged, help and supported me in my entire journey of learning.
ACKNOWLEDGEMENT

Firstly, thanks to my family who are always supportive upon assisting me in completing my final year project and also my thesis.

Secondly, I am heartily thankful to my supervisor, Mr. Sani Irwan B Md. Salim, who willing to spare his time for encouragement, guidance and support from the initial to the final level enabled me to completing my final year project and also my thesis.

Next, thanks and appreciations to other lecturers who are always helpful when needed.

Lastly, I offer my regards and blessings to all of those who supported me in any respect during the completion of the project.
ABSTRACT

Universities in Malaysia are practicing an education model which is known as Outcomes Based Education. This model involves developing learning outcomes for a certain course and those works are usually done manually where all procedures are done on paper. Therefore, there is a need for academic performance analysis software that will cater current sophisticated analytical process in education system. The academic performance analysis software performs all analysis in programming level and provides standard documentation for reporting. Therefore, this is a software-based project that provides numerical analysis on academic achievement. The thesis concentrates on how to develop the academic performance analysis software that can be used by every lecturer in faculty. This project includes interface development, database development and documentation template. Interface development is focused on user graphic interface development where a proper interface with user-friendly and simple elements is designed. Meanwhile, the database development is focused on the construction of database for data storing and data analysis. In addition, the documentation template concentrated on creating a standardize template for documentation for reporting. Visual Basic 6, Microsoft Access and Microsoft Excel are utilized as software development platform throughout the project.
ABSTRAK

# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PROJECT TITLE</td>
<td>i</td>
</tr>
<tr>
<td></td>
<td>STATUS REPORT FORM</td>
<td>ii</td>
</tr>
<tr>
<td></td>
<td>STUDENT DECLARATION</td>
<td>iii</td>
</tr>
<tr>
<td></td>
<td>SUPERVISOR DECLARATION</td>
<td>iv</td>
</tr>
<tr>
<td></td>
<td>DEDICATION</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>ACKNOWLEDGEMENT</td>
<td>vi</td>
</tr>
<tr>
<td></td>
<td>ABSTRACT</td>
<td>vii</td>
</tr>
<tr>
<td></td>
<td>ABSTRAK</td>
<td>viii</td>
</tr>
<tr>
<td></td>
<td>TABLE OF CONTENTS</td>
<td>ix</td>
</tr>
<tr>
<td></td>
<td>LIST OF TABLE</td>
<td>xiii</td>
</tr>
<tr>
<td></td>
<td>LIST OF FIGURE</td>
<td>xiv</td>
</tr>
<tr>
<td></td>
<td>LIST OF ABBREVIATION</td>
<td>xvi</td>
</tr>
</tbody>
</table>

## I INTRODUCTION

1.1 Project Introduction  
1.2 Project Objectives  
1.3 Problem Statements  
1.4 Project Scope  
1.5 Report Layout  

## II LITERATURE REVIEW

2.1 Introduction
2.2 The Malaysian Engineering Education Model
2.3 Outcome Based Education
2.4 Program Educational Objectives (PEO)
2.5 Program Outcomes (PO)
2.6 Learning Outcomes (LO)

III METHODOLOGY

3.1 Overview
3.2 Project Flow Chart
3.3 System Block Diagram
3.4 Modules Flow Chart
  3.4.1 Login Module process flow chart
  3.4.2 LO Foundation Module process flow chart
  3.4.3 Assessment Module process flow chart
  3.4.4 Analysis Module process flow chart
3.5 Development Tools
  3.5.1 Microsoft Visual Basic 6.0
  3.5.2 Microsoft Access
  3.5.3 Visual Basic for Applications
  3.5.4 Microsoft Excel

IV RESULT AND DISCUSSIONS

4.1 Overview
4.2 System Interfaces and Its Function
  4.2.1 Login Interface
  4.2.2 Main Form
  4.2.3 Learning Outcomes Foundation form
  4.2.4 Matrix LO versus PO
  4.2.5 Method of Assessment form
4.2.6 Assessment Process form
4.2.7 Learning Outcomes Analysis Graph by Course and Subject
4.2.8 Learning Outcomes Continual Quality Improvement
4.2.9 Program Outcomes Analysis Interface
4.2.10 Program Outcomes Continual Quality Improvement
4.2.11 History View on Learning LO and Its Continual Quality Improvement
4.2.12 History View on PO Continual Quality Improvement
4.2.13 Course Subject Modification process

4.3 System Database Structure
4.3.1 Database Design
4.3.2 Database’s Tables Structure
   4.3.2.1 Login table (tb_Login)
   4.3.2.2 Program Outcome table (tb_PO)
   4.3.2.3 Subject table (tb_Subject)
   4.3.2.4 Learning Outcome table (tb_LO)
   4.3.2.5 Assessment table (tb_Assessment)
   4.3.2.6 PO Analysis table (tb_POAnalysis)
   4.3.2.7 Learning Outcomes Continual Quality Improvement table (tb_LOCQI)
   4.3.2.8 Program Outcomes Continual Quality Improvement table (tb_POCQI)

4.4 Documentation Templates for Academic Achievement Report and Analysis Software (ARA2009)

4.5 Package and Development for Academic Achievement Report and Analysis Software (ARA2009)
4.6 Discussion

V

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction 57
5.2 Conclusion 57
5.3 Future Development 58

REFERENCES 60
# LIST OF TABLE

<table>
<thead>
<tr>
<th>NO</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Recommended Skills and Competencies in MEEM</td>
<td>7</td>
</tr>
<tr>
<td>4.1</td>
<td>Description of tb_Login</td>
<td>42</td>
</tr>
<tr>
<td>4.2</td>
<td>Content of Program Outcome table (tb_PO)</td>
<td>42</td>
</tr>
<tr>
<td>4.3</td>
<td>Structure of tb_Subject</td>
<td>43</td>
</tr>
<tr>
<td>4.4</td>
<td>Table Structure for tb_LO</td>
<td>44</td>
</tr>
<tr>
<td>4.5</td>
<td>Table Structure for tb_LO</td>
<td>45</td>
</tr>
<tr>
<td>4.6</td>
<td>Structure design of tb_POAnalysis</td>
<td>46</td>
</tr>
<tr>
<td>4.7</td>
<td>Table tb_LOCQI design structure</td>
<td>47</td>
</tr>
<tr>
<td>4.8</td>
<td>Table tb_POCQI design structure</td>
<td>48</td>
</tr>
<tr>
<td>NO</td>
<td>TITLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>2.1</td>
<td>Development Concept of Outcome-based Education</td>
<td>9</td>
</tr>
<tr>
<td>3.1</td>
<td>Evolutionary development</td>
<td>14</td>
</tr>
<tr>
<td>3.2</td>
<td>System Block Diagram (System Modules)</td>
<td>14</td>
</tr>
<tr>
<td>4.1</td>
<td>User Login Interface</td>
<td>22</td>
</tr>
<tr>
<td>4.2</td>
<td>Alert messages on incorrect username or password</td>
<td>23</td>
</tr>
<tr>
<td>4.3</td>
<td>Main interface</td>
<td>23</td>
</tr>
<tr>
<td>4.4</td>
<td>Learning Outcomes Foundation form</td>
<td>24</td>
</tr>
<tr>
<td>4.5</td>
<td>Incomplete indication of learning outcome</td>
<td>25</td>
</tr>
<tr>
<td>4.6</td>
<td>Matrix Learning Outcomes versus Program Outcomes</td>
<td>25</td>
</tr>
<tr>
<td>4.7</td>
<td>Notification of save of data completed</td>
<td>26</td>
</tr>
<tr>
<td>4.8</td>
<td>Interface of Method of Assessment</td>
<td>26</td>
</tr>
<tr>
<td>4.9</td>
<td>Assessment Process Interface</td>
<td>27</td>
</tr>
<tr>
<td>4.10</td>
<td>Courses available for assessment analysis</td>
<td>27</td>
</tr>
<tr>
<td>4.11</td>
<td>Acceptance range for assessment method</td>
<td>28</td>
</tr>
<tr>
<td>4.12</td>
<td>LO Assessment Analysis Graph</td>
<td>29</td>
</tr>
<tr>
<td>4.13</td>
<td>Learning Outcome Continual Quality Improvement form</td>
<td>30</td>
</tr>
<tr>
<td>4.14</td>
<td>Notification of save of data completed</td>
<td>31</td>
</tr>
<tr>
<td>4.15</td>
<td>PO Analysis Process interface (No Course Selected)</td>
<td>32</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>4.16</td>
<td>PO Analysis Process interface (For Selected Course)</td>
<td>32</td>
</tr>
<tr>
<td>4.17</td>
<td>PO Analysis Graph for Selected Course</td>
<td>34</td>
</tr>
<tr>
<td>4.18</td>
<td>Program Outcome Continual Quality Improvement form</td>
<td>35</td>
</tr>
<tr>
<td>4.19</td>
<td>Notification of save of data completed</td>
<td>35</td>
</tr>
<tr>
<td>4.20</td>
<td>History View of LO and its CQI statements</td>
<td>36</td>
</tr>
<tr>
<td>4.21</td>
<td>LO’s History Search Option</td>
<td>36</td>
</tr>
<tr>
<td>4.22</td>
<td>PO CQI History View</td>
<td>37</td>
</tr>
<tr>
<td>4.23</td>
<td>Subject list of BENC</td>
<td>38</td>
</tr>
<tr>
<td>4.24</td>
<td>Add new courses</td>
<td>38</td>
</tr>
<tr>
<td>4.25</td>
<td>Subject lists of all courses</td>
<td>39</td>
</tr>
<tr>
<td>4.26</td>
<td>Detail of a Subject (Engineering Mathematics)</td>
<td>40</td>
</tr>
<tr>
<td>4.27</td>
<td>Database structure and its relationship between tables</td>
<td>41</td>
</tr>
<tr>
<td>4.28</td>
<td>Landscape Documentation Template Example</td>
<td>49</td>
</tr>
<tr>
<td>4.29</td>
<td>Portrait Documentation Template Example</td>
<td>50</td>
</tr>
<tr>
<td>4.30</td>
<td>Header of Report</td>
<td>51</td>
</tr>
<tr>
<td>4.31</td>
<td>Reporting for Analysis Graph</td>
<td>52</td>
</tr>
<tr>
<td>4.32</td>
<td>Naming for reporting</td>
<td>52</td>
</tr>
<tr>
<td>4.33</td>
<td>Package and Development Wizard tool</td>
<td>53</td>
</tr>
<tr>
<td>4.34</td>
<td>Package Type</td>
<td>54</td>
</tr>
<tr>
<td>4.35</td>
<td>Add system database as part of installer</td>
<td>54</td>
</tr>
<tr>
<td>4.36</td>
<td>SETUP.LST content</td>
<td>56</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATION

ARA2009 - Academic Achievement Report And Analysis Software
OBE   - Outcome-Based Education
PEO   - Program Educational Objectives
PO    - Program Outcomes
EAC   - Engineering Accreditation Council
LO    - Learning Outcomes
ID    - Identification
DAO   - Data Access Objects
VBA   - Visual Basic For Applications
IDE   - Integrated Development Environment
DLL   - Dynamic-Link Library
OLE   - Object Linking And Embedding
API   - Application Programming Interface
OS    - Operating System
LO CQI - Learning Outcomes Continual Quality Improvement
PO CQI - Program Outcomes Continual Quality Improvement
BENC  - Bachelor of Electronics Engineering (Computer Engineering) with honours
BENE  - Bachelor of Electronics Engineering (Industrial Electronics) with honours
BENT  - Bachelor of Electronics Engineering (Telecommunication Electronics) with honours
BENW  - Bachelor of Electronics Engineering (Wireless Communication) with honours
SQL   - Structured Query Language
CHAPTER I

INTRODUCTION

1.1 Project Introduction

Nowadays, current trend of education model adopted by Malaysia in all universities is Outcomes Based Education model. There are certain rules that needed to be obeyed in this education model such as developing learning outcomes for a certain course and those works are usually done by manually that is all procedures is done in paper-work. Thus there is a need for academic performance analysis software for benchmarking and enhancing performance of education system. Current sophisticated analytical process in education system is not flexible and do not cater the implementation method adopted by universities.

The project is a software-based that provides numerical analysis on academic achievement of a certain faculty. The software is based on Microsoft Visual Basic while can be integrated as network-based system. All the required data are input by user and stored inside the database in Microsoft Access format while other prefixed data or description also are store in Microsoft Access. The sample data comes from reports of subject’s achievement obtained from faculty’s lecturer and the result analysis is done accordingly.

The software is also provide compatibility as it can present reports and outcomes through various other software such as excel, word for general
consumption. The software also can prints out the report and analysis result in plain
dpaper for user to carry around. The software also considers several access categories
such as lecturer privilege’s and administrator’s privilege.

1.2 Project Objectives

There are four objectives had been come out for the success of this project
and there are listed as below:

i. Design the interface of the software, simple interface that user friendly.
ii. Integrate output of the software to be compatible with other application such
     as Microsoft Excel.
iii. Integrate the software as a network-based system.
iv. Integrate Microsoft Access with Visual Basic 6 as the backbone of this
    software.

1.3 Problem Statements

Current trend of academic achievement reporting and analysis is done
manually where lecturers need to write out everything and do analysis by themselves.
Therefore, this project is to design software that can help lecturers to do those tasks
and provides numerical analysis automatically. Thus, the reason for the development
of this project is to overcome several problems such as:

i. Current operation is using manual calculation to provide data analysis. This
   will lead to incorrect results thus provide inaccurate decision.
ii. Current system is inefficient in terms of updating data and organization.
iii. Reporting method of results and data analysis is not standardized and varies
    from format to another.
1.4 Project Scope

The scope of the project has been set in order to make sure the project stand on the right course and using the appropriate resources to accomplish this project. There are several scopes have been set and there are shown as below:

i. This project uses Visual Basic 6 to design the interface of the software and also control the process flow of the software.

ii. Microsoft Access is used as database foundation to store any data get from user and use it in next level for analysis purpose.

iii. Microsoft Office 2007 also is used to export the analysis report to other formats such as Excel or Word.

iv. The target user for this project will be concentrated on Administrator and Lecturer. Administrator will has full privileges over the software while Lecturer will have limited privileges.

1.5 Report Layout

The project thesis is done basically to document all the conceptual theories, activities and outcomes of the project that is relevant to the project progress. The thesis consists of five main chapters where all the chapters are essential to describe all the architecture and functionality of the project itself.

Chapter 1 describes briefly about the project's introduction. It is also discuss about the objectives, scopes of project and project application. Chapter 2 describes about the literature review that consists of the background of the project. It also describes about the same projects that have been done of previous person and it is more to make research on different, advantages and disadvantages of previous project. Chapter 3 describes about the methodology of this project. It defines the physical block diagram, system overview and flow chart operation of the Academic Achievement Report and Analysis software. Chapter 4 describes matters regarding results and analysis on the subjected items. This chapter will discuss about the interface of the software, debugging of that software and also system testing on other
computer. Chapter 5 describes about conclusion and recommendation. This section will conclude about knowledge that comes out from the project and some recommendation to the further study regarding to the upgrading option for Academic Achievement Report and Analysis software.
CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Outcome-based Education (OBE) is a method of teaching that emphasizes what students can actually do after they are trained. Decisions on teaching and learning are made based on how best to facilitate the desired outcome which in turn leads to a planning process that is different from traditional educational planning. In OBE, the desired outcome is first identified before the curriculum is created to support the intended outcome (Fitzpatrick, 1995; Furman, 1994).

In industrial training program such as the teaching program for graduating Education students, the students are required to keep journals or learning logs. Journals, particularly the type that emphasizes the students’ reflections on their performance, are believed to enlighten the students and their lecturers on issues such as the students’ level of motivation, the challenges faced and how those challenges were overcome (Faizah, 2004). Indirectly, this could lead to better observations of the students’ demonstration of what they have been trained for.
2.2 The Malaysian Engineering Education Model

In order to overcome the capabilities of engineers in the fast changing world, there is a need to have great emphasis on the knowledge of engineering science so that they are flexible and capable to move across several engineering disciplines. As a result, a suitable training is required to prepare engineers who are capable to perform useful function in the industry, able to communicate effectively, manages or leads organization and having innovative thinking skills.

To prepare engineers ready for future challenges, five criteria were identified as important in the Malaysia Engineering Education Model and they are:

i. **Scientific strength**, which provides engineers who are innovative, able to work in research and development activities, and adaptable in different engineering fields.

ii. **Professional competencies**, which provide engineers who are able to identify, formulate, and solve engineering problems, responsible professionally, and able to use techniques, skills, and modern engineering tools for engineering practice.

iii. **Multi-skilled**, which provides engineers who are able to work in different engineering fields and function in multidisciplinary teams.

iv. **Well-respected and potential industry leader**, which provide engineers who are able to understand the impact of engineering solutions in a global/social context, knowledgeable of contemporary issues, able to communicate effectively and be involved in community or social projects.

v. **Morally and ethically sound** which provide engineers who understand ethical and moral responsibility.

Besides, six skills and competencies, as shown in Table 2.1 are identified as highly necessary in preparing engineering students to satisfy the five criteria mentioned. There is a freedom to emphasize on scientific or professional skills and competencies or balancing both components. Appropriate emphasis on global and strategic skills, adequate exposure to industrial and practical skills and incorporating humanistic skills also allow completeness in the training.
<table>
<thead>
<tr>
<th>Skills &amp; Competencies</th>
<th>Characteristics</th>
<th>Typical Subjects (Civil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global &amp; Strategic</td>
<td>These skills enable students to adapt easily within the borderless world that is experiencing rapid expanding knowledge.</td>
<td>Languages, Strategic Planning, Information Technology, Multimedia, International Business</td>
</tr>
<tr>
<td>Industrial</td>
<td>Skills that go beyond the scientific and professional and which are necessary in the advanced phase of the graduate's career.</td>
<td>Environment, Management Finance, Economics, Engineers in Society, Communication Skills, Law, Occupational Safety, Human Resource Management, Innovation</td>
</tr>
<tr>
<td>Humanistic</td>
<td>These skills help create a balanced engineer with high ethical and moral standards.</td>
<td>Islamic Civilization, Asian Civilization, Nationhood, Islamic Studies, Moral Education,</td>
</tr>
<tr>
<td>Practical</td>
<td>These enable students to be directly involved with hands-on activities or real-life situations, thus providing the basis for integrating the intra and inter engineering and non-engineering knowledge.</td>
<td>Final Year Project, Industrial Project, Practical Training, Engineering Design</td>
</tr>
<tr>
<td>Professional</td>
<td>Such skills cover technical competency aspects required to perform specific engineering tasks.</td>
<td>Professional Subjects in Civil Engineering e.g. Foundation Engineering, Water &amp; Waste Engineering, Highway Engineering, Concrete Structures, Public Health Engineering, Surveying</td>
</tr>
<tr>
<td>Scientific</td>
<td>They enable students to have a firm foundation in engineering science, thus enabling them to realign themselves with the changes in emphasis in the scientific field and to develop an interest in R&amp;D and design.</td>
<td>Engineering Sciences e.g. Engineering Mathematics, Engineering Materials, Fluid Mechanics, Engineering Statistics, Thermodynamics, Engineering Mechanics, Programming</td>
</tr>
</tbody>
</table>
2.3 Outcome Based Education

There is no one single model to describe OBE. According to Faouzi et al (2003, pp. 204), the frameworks for OBE is to share an emphasis on systems-level change, observable, measurable outcomes, and the belief that given time, all students can learn. Glatthorn (1993) and Guskey (1994) also postulate that the shift towards OBE is resulted from worries about the traditional education system. According to them, there is a classic belief that the input the traditional education system provides cannot prepare students for life and work in the twenty-first century. Hence, there exists a need for a more effective approach which focuses on the potential and actual abilities of the students after they are trained.

The following are the three important aspects of OBE:

i. The focus on outcomes

ii. The curriculum design process which starts from the exit level outcome downwards.

iii. The responsibility of the institution and teacher/trainer to supply appropriate learning experiences for the success of all students.

On the part of the curriculum design and implementation of the curriculum, there are several conditions which are controllable and they include:

i. Where the instructional focus is placed.

ii. How long, how often, and when the time for learning is provided.

iii. What learning is expected from whom, and how it is rewarded.

iv. How the curriculum is designed and organized (Gerber, 1997)